**WHAT IS MODEL ROCKETRY?**

Imagine the thrill of pressing the launch switch and watching a rocket you have built roar skyward in a cloud of smoke, leaving a vapor trail behind as it shrinks into just a speck. Then at the apex of its flight, a parachute blossoms out, returning the rocket gently to earth, ready for another flight.

But there is more to model rocketry than this. Not only is it thrilling, but it provides an unexcelled opportunity to study and learn space science, to begin studying for a career dedicated to pushing man's frontiers farther and farther towards the stars. Scores of young rocketeers today are finding the value of model rocketry in science fair projects, school projects, and in their own private research programs.

Today's youth are finding model rocketry an ideal means for aiding their studies of aerodynamics, math, physics, optics, biology, space medicine, aeronautics, electronics, photography, and psychology. They also find it of great value as a stimulant to the study of the non-science fields such as language arts, history, and literature. These young people who today are pursuing, on their own, a study of the sciences with model rocketry are a vital part of the new generation of scientists. These are the people who will explore the planets and beyond.

How does model rocketry accomplish this? A model rocket itself is a highly specialized mechanism, light in weight, utilizing nonmetallic materials such as paper, plastic, and balsa. Standard modeling tools are used to assemble the rockets. By using these materials, the model rocketeer gains the highest performance from a prepackaged commercial engine, and is able to launch accelerometers, biological specimens, electronic instruments, and many other objects inexpensively, reliably and above all, without the dangers often associated with nonprofessional rocketry.

The model rocketeer does not make his own engines or mix his own propellants, for he realizes that he does not have the facilities and background to do so either efficiently or safely. Instead, he makes use of propellant devices which are pre-made, providing him with a reliable power package which is consistent from one unit to the next. This introduces an element of control into his experiments and enables him to reduce and correlate his data more readily and accurately. He can now draw conclusions from his experiments which would otherwise have been only conjecture.

The type of youth science study provided by model rocketry has no equal for developing active minds which can explore new concepts and principles. Practical experience, gained from working with the same principles, theories and ideas which will be used in his profession, is necessary if today's young person is to be motivated to study for a vital career in the space sciences. When motivated he becomes a pioneer, a pioneer of the greatest frontier man has ever faced.
GET STARTED THE EASY WAY
Beginners Specials Give You The Best Start In Model Rocketry

The complete outfit for getting started in model rocketry — the Beginners special contains the basic equipment for learning to build and fly model rockets. Whether you're looking for a science project or an enjoyable hobby, the Beginners Special will give you the best start.

Included in the special is the WAC Corporal rocket kit — a scale model that helps you learn about rocket stability and parachute recovery. You also get two engines for flying your model, a comprehensive manual of information on model rocketry, a launcher that will serve your needs for years and batteries to power the launcher. All this comes to you at a single, reduced price of only $6.00. Cat. No. 651-SK-6 only $6.00 each

ASSEMBLY SPECIAL
A Complete Construction And Finishing Set

All the tools and supplies recommended for assembling and painting most model rockets — in one convenient package. Ideal for the beginner who doesn't already have modeling equipment, this set helps you build the best models right from the start.

$3.00 ASSEMBLY SPECIAL INCLUDES:

<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Bottle White Glue</td>
<td>#WG-1</td>
</tr>
<tr>
<td>3 Emery Boards</td>
<td>#EB-1</td>
</tr>
<tr>
<td>3 Sheets Sanding Material</td>
<td>#SP-320</td>
</tr>
<tr>
<td>1 Bottle Sanding Sealant</td>
<td>#SS-1</td>
</tr>
<tr>
<td>1 Bottle Silver Dope</td>
<td>#BRD-1</td>
</tr>
<tr>
<td>1 Bottle Dope Thinner</td>
<td>#BDT-1</td>
</tr>
<tr>
<td>1 Gold Mine Special Decal Sheet</td>
<td>#D-5</td>
</tr>
<tr>
<td>18 Sheets Sandpaper</td>
<td>#SPA-3</td>
</tr>
<tr>
<td>3 Paint Brushes</td>
<td>#PB-3</td>
</tr>
<tr>
<td>1 Bottle Orange Dope</td>
<td>#BRD-1</td>
</tr>
<tr>
<td>1 Bottle White Dope</td>
<td>#BRD-1</td>
</tr>
<tr>
<td>1 Roll Masking Tape</td>
<td>#MT-1</td>
</tr>
<tr>
<td>Shipping weight 1 lb., 8 oz.</td>
<td></td>
</tr>
</tbody>
</table>

Cat. No. 651-CK-3A $3.00 each postpaid

ALSO AVAILABLE — THE $2.00 BEGINNERS SPECIAL

Recommended for beginners who have access to a launcher or wish to design and build their own. The $2.00 Beginners Special includes:

<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 WAC Corporal Kit</td>
<td>#K-11</td>
</tr>
<tr>
<td>1 Design Booklet</td>
<td>#P-1</td>
</tr>
<tr>
<td>1 Electro-Launch</td>
<td>#FS-1</td>
</tr>
<tr>
<td>4 Batteries</td>
<td>#PF1-1</td>
</tr>
<tr>
<td>1 Engine</td>
<td>#1/2A.8-2</td>
</tr>
<tr>
<td>1 Engine</td>
<td>#1A.8-3</td>
</tr>
</tbody>
</table>

Shipping weight 12 oz.

Cat. No. 651-SK-2 $2.00 each postpaid
DESIGN AND CONSTRUCTION

Most model rockets, though varying greatly in appearance and purpose, use certain basic components. These include the nose cone or payload section, body tube, engine retainer, fins, launch lug, and recovery system. The arrangement of these parts in a working model rocket is shown in the plan. The functions of the various parts are explained on the next page.

While the range of possible sizes for model rockets is quite great, three body diameters have become the most popular. These are the .710" i.d. (BT 20), .950" i.d. (BT-50) and 1.595" i.d. (BT-60). Parts which fit these tubes are identified by their numbers. For example, a BNC-20N fits a BT-20, a BNC-60L fits a BT-60 and a TA-2050 adapter mates a BT-20 to a BT-50. The other tube sizes available follow the same system. Thus the EB-30 engine block, the BNC-30E nose cone, the PS-30B payload section and the NB-30 nose block all fit the BT-30 body tube.

All parts are manufactured to close tolerances, assuring the builder a precision fit and good appearance. When, after building several kits, the rocketeer is ready to begin designing his own models, he will find that the complete range of precision mating parts makes construction both easier and more satisfying for him.

PAYLOAD SECTION
Accommodates small biological specimens, instruments, etc. On models designed purely for sport or high performance, the payload section is often omitted and the recovery system is attached directly to the nose cone.

BODY TUBE
Serves as the basic airframe of the model. Generally all other parts of the rocket are attached in some manner to the body.

LAUNCH LUG
A tube which fits over the launch rod to guide the model along the rod for the first few feet of its flight, keeping it going straight until it is moving fast enough for the fins to guide it.

FINS
Act like the feathers on an arrow, guiding the rocket in the air by providing lift in a direction opposite any turning force.

ENGINE RETAINER
In this model, an engine block which positions the engine in the body tube.

ENGINE
A completely pre-assembled solid propellant device which provides the motive power for the model. In addition, single and upper stage engines contain a delay charge, activated when the propellant is exhausted, which allows the model to coast up to its peak altitude before it in turn activates the ejection charge to deploy the recovery system.
SAFETY

Since 1960 model rocketeers across the country have flown more than 3 million model rockets. During this time they have established one of the best safety records of any sport or hobby. While no exact data is available, it is known that model rocketry is considerably safer than most "normal" sports such as hunting, swimming, bicycling, football and baseball.

Several factors contribute to this safety record. Such hazardous operations as mixing and loading propellants are eliminated by the use of a pre-manufactured engine. The model rocket itself has a great margin of safety built into it. Model rockets are built of lightweight balsa and paper so that they absorb any impact rather than the object struck. The model rocket spends very little of its flight near the ground—most of its flight is several hundred feet away from anything. Finally, model rocketeers themselves have contributed greatly by following a recognized safety code such as the one reprinted below. The newcomer to model rocketry will do well to follow this safety code too. Not only will it add to the safety of his activities, but will make model rocketry more enjoyable and more valuable also.

SAFETY CODE: As a model rocketeer I will act in a mature manner with safety foremost in mind in all my model rocket activities and will obey this safety code at all times.

1. I will not attempt to compound propellants or other combustible materials or tamper with pre-manufactured rocket engines. I will not use model rocket engines for purposes other than those for which they are recommended by the manufacturer. I will inspect each rocket engine before use and never use an engine which shows signs of physical damage, remembering that any rocket propellant can be explosive under certain conditions.

2. I will not smoke near rocket engines, launch my rockets in the presence of highly combustible materials, use flammable recovery wadding or engage in any activity which would present a fire hazard.

3. I will never use any metallic rocket engines, will not construct my rockets with substantial metal parts in the area of the engine, and will not launch any rocket over 15 inches in weight or containing more than 4 ounces of propellant in compliance with Federal regulations.

4. My model rockets will be electrically ignited, using a launch system with either a switch protector or a safety interlock to prevent accidental ignition of the rocket engine, and I will remain at least 10 feet away from any rocket which is being launched. I will use only igniters of the type recommended by the engine manufacturer.

5. I will launch my model rockets using a launching rail or other suitable guide means aimed within 25 degrees of the vertical to assure a safe and predictable flight path, and will launch any rockets whose stability characteristics have been predetermined.

6. I will not fly model rockets in high winds, conditions of low visibility, in the vicinity of low flying aircraft, near tall buildings, nor in areas where people are not aware of the launching, or under any conditions which might endanger property or persons.

7. I will not launch rockets so that their ballistic trajectory will carry them against targets on the ground and will never use an explosive warhead or other pyrotechnic payload in a rocket.

8. My model rockets will contain recovery devices which will deploy at an altitude of at least 30 feet to return the rocket safely and undamaged. To insure proper operation of my rocket's recovery system, I will make a careful pre-launch inspection of all the recovery components with special attention to tightness of the engine and nose cone.

9. To prevent accidental eye injury I will always either place the launcher so the end of the rod is above eye level or grasp the end of the rod with my hand when approaching it. I will not place my head or body over the launching rod.

10. When conducting research activities with unproven designs or methods I will, when technically possible, determine their reliability through pre-launch static tests, and I will conduct launchings of unproven designs in complete isolation from persons not participating in the actual launching.

Get The Most From Model Rocketry

...by following a carefully planned course of study and experiments. By starting out with simple models and working up to the more complex ones, you'll have more successful flights, enjoy your studies more and learn more. By studying technical reports and other available literature you'll gain a solid knowledge of model rocketry that will serve you well in other areas of science.

To help you plan your own studies in model rocketry, here's a suggested program. With this program you tackle more advanced subjects after mastering the basic ones.

1. Build and fly the WAC Corporal. Study the rocket's design and read the included report, TR-1, to gain a thorough understanding of the principles of rocket stability which are so very important to proper rocket performance.

2. Extend your knowledge of stability by building and flying the Astron Scout.


4. Build and fly the Astron Apogee. Study TR-2 (included with the kit) to master the principles of multi-staging.

5. Build and fly the Astron Farside to gain further experience in multi-staging and gain a broader knowledge in the field.

6. Design, build and fly your own multi-stage model, practicing the techniques you learned with the Apogee and the Farside.

7. Learn the principles of rear engine boost-gliders by building and flying the Astron Space Plane and studying the included report, TR-4.

8. Build the Astron Falcon to learn the principles of front engine boost-gliders and gain further experience in the art of balancing for maximum performance.

9. Design, build and fly your own boost-glider, applying the principles you have studied while working with the Space Plane and the Falcon.

10. Get started in clustering by building and flying the Astron Cobra and studying TR-6 (included with the kit).

11. Practice what you've learned by designing, building and flying your own cluster rocket.

12. Start your own special research program. Aerial photography, space medicine, electronics, meteorology, physics and aerodynamics are but a few of the fields open to the ambitious model rocketeer.

Once you've started, don't stop. The whole universe is yours to explore. As you train yourself to be a competent scientist, you'll find more and more new fields opening up for you. Don't be afraid to be curious. Curiosity gave us the electric light, the radio, the automobile and the airplane. Your curiosity may well give man things he has never dreamed of.
WHERE TO LOOK FOR TECHNICAL INFORMATION

Note: Publications in which an article is reprinted are listed in parentheses after the primary source of the article or information.

Acceleration — MRN V4-N2
Altitude Tracking — TR3, (Design Booklet, Best from Vols. 1 & 2, MRN V3-N1)
Basic Construction — MRN V4-N3, Design Booklet
Bibliography — TR-8
Body Tube Making — Design Booklet
Boost-Gliders — TR-4, (MRN V3-N3, Design Booklet), TR-7, (MRN V4-N3)
Cluster Rockets — TR-6, (MRN V3-N4, Design Booklet)
Displaying Models — MRN V5-N1
Drag — MRN-V4-N2
Estes Industries — MRN V3-N2
Fin Design — TR-1, (Design Booklet), TR-9, (MRN V5-N2), MRN V3-N3
Glossary — Best from Vols. 1 & 2
Ignition (engine) — Engine Instructions
Mathematics — MRN V4-N2, MRN V4-N3
Multi-Staging — TR-2, (MRN V4-N1, Design Booklet)
Nose Cone Making — Design Booklet
Parachute Recovery — MRN V4-N1, (Design Booklet)
Payload Rockets — Design Booklet, Best from Vols. 1 & 2
Recovery Systems — Design Booklet, MRN V4-N1, MRN V5-N2
Safety — MRN V3-N3, MRN V5-N1, Best from Vols. 1 & 2, Why Model Rocketry
Science Fairs — MRN V3-N1, MRN V3-N4
Sectional Construction — MRN V4-N2
Specific Impulse — MRN V4-N3
Stability — TR-1, (Design Booklet), TR-9, (MRN V5-N2), MRN V3-N3
Study Guide — TR-8
Test Stands — MRN V3-N1, MRN V4-N3
Wind Tunnels — TR-5, (Design Booklet)
Writer's Program — MRN V4-N2

. . . FOR MODEL ROCKET PLANS

Aerobee-Hi (Semi-scale Model)
MRN V5-N2
Arrow C (Sport Model) — Design Booklet
Big Bertha (Demonstration Rocket) — Design Booklet, MRN V3-N2
Buchanan Buster (Odd Ball Rocket) — MRN V3-N1
Bug-A-Bye (Payload Rocket) — Design Booklet, Best from Vols. 1 & 2
Cloud Buster (Sport Model) — Best from Vols. 1 & 2
Cobra (Cluster Rocket) — MRN V3-N4
Commuter (Sport Model) — MRN V5-N1
Deacon (Two Stage Rocket) — MRN V4-N3
Dirty Bird (Sport Model) — Design Booklet, Best from Vols. 1 & 2
Flying Jenny (Boost-Glider) — MRN V4-N2
Loadlifter 1A (Payload Rocket) — Design Booklet, MRN V4-N1
Mini-X (Two Stage Rocket) — Design Booklet
MMSV-II (Two Stage Rocket) — MRN V4-N1
Moonnik I (Odd Ball Rocket) — MRN V3-N3
Orange Bullet (Altitude Rocket) — Design Booklet
Sky Bird (Sport Model) — Design Booklet
Sky Hook (Sport Model) — MRN V3-N4
Sky Slash II (Boost-Glider) — Design Booklet
Sly Bolt (Sport Model) — MRN V4-N3
Sputnik-Two (Odd Ball Rocket) — Design Booklet, MRN V3-N3
Tiger Shark (Two Stage Rocket) — MRN V4-N2
MODEL ROCKET PERFORMANCE

HOW HIGH WILL YOUR MODEL GO?

The altitude capabilities of different model rockets vary greatly. There are several things that affect the performance of a model. The first of these is engine size. The greater the total impulse of an engine, the higher it will boost a model. The chart below shows the approximate altitudes that can be achieved with single stage rockets.

<table>
<thead>
<tr>
<th>Engine Size</th>
<th>Altitude Range</th>
<th>Approximate Altitude in a typical 1 oz. model</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼A.8-2</td>
<td>50' to 250'</td>
<td>100'</td>
</tr>
<tr>
<td>½A.8-2</td>
<td>100' to 450'</td>
<td>300'</td>
</tr>
<tr>
<td>A.8-3</td>
<td>200' to 900'</td>
<td>650'</td>
</tr>
<tr>
<td>B.8-4</td>
<td>300' to 1200'</td>
<td>1000'</td>
</tr>
</tbody>
</table>

(Some high performance models will reach higher altitudes than shown above.)

The second thing that affects rocket performance is weight. The heavier a rocket is, the less altitude it will reach. A baseball can be tossed higher than an 8 pound cannon ball — and the same holds true for model rockets. In addition, heavier rockets are more apt to tilt at an angle as they leave the launcher, reducing altitude even more.

Drag, or wind resistance, is the third item which affects performance. The more drag on a rocket, the less altitude it will reach. A number of factors determine the amount of drag on a rocket. The more frontal area the rocket has, the greater its drag will be. As a result, large diameter model rockets will generally not reach as great an altitude as smaller diameter rockets with the same engine power. Rough surfaces create turbulence in the air as it flows past the rocket, increasing drag. Smooth finishes will increase the altitude capability of the model. The stability of the rocket also affects drag — if it wobbles in flight, it will have greater drag. Careful attention to reducing drag can sometimes double a rocket’s altitude capability.

The kits, components and engines in this catalog have been designed to cover the entire performance range from low altitude sport and demonstration models to high altitude, high performance payload and competition rockets. By choosing his kits, materials and engines carefully, the rocketeer can fill his performance needs exactly. Complete specifications are given on all items to make this selection easy.
EXCITING NEW BREAKTHROUGH... THE

CAMROC ROCKET CAMERA

ADVANCE TO ROCKET AERIAL PHOTOGRAPHY
ADD A NEW DIMENSION TO YOUR MODEL ROCKET ACTIVITIES

The Camroc opens an entire new field for the model rocketeer. Now you can study space-age reconnaissance techniques the practical way — over familiar terrain with known objects. At the same time you learn the principles of camera construction and operation.

With a ready-to-fly weight of under one ounce the Camroc can be carried to high altitudes by lightweight model rockets. When mounted on a suitable launch vehicle such as the Astron Delta and propelled by the correct engines, camera and rocket will follow the flight path illustrated at left, taking a picture at ejection when the lens is pointed toward the ground.

A single exposure film disc is mounted in a detachable, light-tight film holder for quick and easy replacement in the field. The camera comes complete with one film holder loaded with an unexposed film disc and one empty film holder for practicing and experimenting.

The kit includes complete instructions for camera assembly and operation as well as materials for practicing and checking the camera's operation. NOTE: While the camera system is quite simple in its operation, we recommend that you first learn to build and fly model rockets correctly and only then advance to camera work if good results are to be obtained.

Cat. No. 651-C-1 $4.00
(All items shipped postpaid.)

SPECIAL COMBINATION OFFER
Complete Camroc kit plus Astron Delta kit. You save $.50
Cat. No. 651-RC-1 $5.00
CAMROC PICTURES
NOW YOUR OWN AERIAL PHOTOS

The Camroc produces a round negative of 1½" diameter. Prints produced in the E. I. photo lab are enlarged 2 times (to 3" diameter). Rocketeers who do their own processing can make contact prints the same size as the negative or can enlarge to any size they desire.

The 3" print below is a vertical shot showing part of the office area at Estes Industries. The negative is an oblique photo showing farm land east of Estes Industries. By using various launch rod angles and engine delay times it is possible to cover the entire range of aerial photograph types from high obliques to verticals.

PROCESSING AND SUPPLIES

Rocketeers who have access to a photographic darkroom can develop and print negatives from the Camroc with no difficulty. For those who would rather not do their own processing, Estes Industries offers developing and printing services. All prints produced in the E. I. photo lab are enlarged 2 times from the negative size as shown.

FILM HOLDERS AND FILM

Four sealed film holder sections for the Camroc, each preloaded with a fresh Astropan 400 film disc. A discount of $.25 on the price of the loaded film holders is allowed for each used film holder returned at the time the order is placed. (Film holders containing exposed film returned for processing at the same time may be counted towards this discount. However, a discount will be allowed only on orders for loaded film holders.)

Cat. No. 651-FFH-4 ........................................... 4 for $2.00

DEVELOPING AND PRINTING

Film returned in film holders is developed under controlled conditions and one glossy print of each negative made at 2 times enlargement (3 inch diameter image). A refund of $.20 will be made on any negative which does not meet the requirements for making a satisfactory print due to incorrect exposure, and the negative will be returned unprinted.

Cat. No. 651-FDP-1 ........................................... .75 each 4 for $2.00

EXTRA PRINTS

Additional prints at 2x enlargement of negatives which have been previously developed. The negative(s) must be enclosed in a suitable protective package with the order. (Please do not order additional prints until you have checked the negative and the first print to determine whether it is good enough to justify making additional prints.)

Cat. No. 651-NP-1 ........................................... .40 each 4 for $1.10

FILM ONLY

Six precut Astropan 400 film discs to fit the Camroc film holder. Packaged in light-proof double envelope. The envelope should be opened only in total darkness to prevent fogging of the film. (Loading instructions included in camera instruction.)

Cat. No. 651-NF-6 ........................................... 6 for $.75

CHANGING BAG

Light-tight "portable darkroom" for handling film in the field. Fits over operator's arms, provides total darkness for changing film in film holders. Especially recommended for large quantity work. Shipping weight 8 oz.

Cat. No. 651-FCB-1 ........................................... 1.00 each
GEMINI-TITAN

GT-3

Semi Scale Model
Spectacular Flights
Parachute Recovery
Two Engine Power

Spectacular on the ground and in the air, the Gemini-Titan is a model for the expert rocketeer, a model that is a challenge to build and fly. In not-so-easy-to-assemble kit form, GT-3 is a rocket that the modeler can point to with real pride when he's finished it. Features clear plastic fins to stabilize it in flight without detracting from its appearance, full 24” parachute for soft landings. Requires 24 volt Electro-Launch or 12 volt car battery power supply for launching. Kit is complete with all parts and detailed instructions (but no engines). Shipping weight 16 oz.

Cat. No. 651-K-21 $4.00 each

MARS SNOOPER

Fascinating Design
Parachute Recovery
Ideal for Demonstration Flights

A truly different model rocket, the Mars Snooper combines interesting appearance with reliable performance — makes an excellent model for demonstration flying and display. Features payload section and 18” parachute, precut fins for easier assembly. Recommended for the careful modeler, the Mars Snooper kit comes complete with all parts and detailed instructions (but no engines). Shipping wt. 12 oz.

Cat. No. 651-K-20 $3.00 each

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Recommended Engines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>21.7 in.</td>
</tr>
<tr>
<td>Body Dia.</td>
<td>.95 in.</td>
</tr>
<tr>
<td>Weight</td>
<td>2.2 oz.</td>
</tr>
</tbody>
</table>

Recommended Engines

1\% A.8-2
A.8-3
B.8-4
AEROBEE 300
Flying Scale Model

PARACHUTE RECOVERY
HIGH PERFORMANCE
EASY TO BUILD

Easy to build scale model of a great sounding rocket. Gives top performance in flight after flight. Features parachute recovery for gentle landings, payload section for small specimens. Kit is complete with all parts and easy-to-follow instructions (but no engines). Shipping weight 14 oz.

Cat. No. 651-K-17 $2.00 each

Recommended Engines

<table>
<thead>
<tr>
<th>Engine</th>
<th>Specifications</th>
</tr>
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<tbody>
<tr>
<td>½A.B-2</td>
<td>Length 20 in.</td>
</tr>
<tr>
<td>A.B-3</td>
<td>Body Dia. 1 in.</td>
</tr>
<tr>
<td>B.B-4</td>
<td>Weight 0.65 oz.</td>
</tr>
</tbody>
</table>

EASY-TO-BUILD
WAC CORPORAL

Great for Flying and Display

FLYING SCALE MODEL

High-flying scale model of the famous sounding rocket! Easy enough for the novice to build, yet interesting enough for the experienced rocketeer, the WAC CORPORAL gives top performance for a scale model. Parachute recovery gives gentle landings flight after flight. Comes in easy to assemble kit form. (Engines not included.) Shipping wt. 5 oz.

Cat. No. 651-K-11 $1.50 each

Body Dia. .736 in
Length 11.8 in
Weight .65 oz

Recommended Engines

<table>
<thead>
<tr>
<th>Engine</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼A.B-2</td>
<td>Body Dia. 1 in.</td>
</tr>
<tr>
<td>A.B-3</td>
<td>Weight 0.65 oz.</td>
</tr>
</tbody>
</table>

(Use ½A.B-2 engines for first flights.)
V-2

Flying Scale Model
PARACHUTE RECOVERY
EASY-TO-BUILD KIT

High performance scale model of the rocket that started the space age. Easy but interesting to build, the V-2 features reliable parachute recovery for gentle landings. Detailed instructions provide full information on assembly and finishing. Kit comes complete with all parts (but no engines). Shipping weight 7 oz.

Cat. No. 651-K-22 $1.75 each

Specifications
- Length: 11.2 in.
- Body Dia.: 1.225 in.
- Weight: 1.4 oz.

Recommended Engines
- $\frac{1}{2}$A-8-2
- A-8-3
- B-8-4
- B-3-5

X-RAY

Visible Payload

- SINGLE STAGE
- PARACHUTE RECOVERY

An easy-to-build high performance single stage payload rocket, the Astron X-Ray features parachute recovery and a large see-through payload compartment. Perfect for research work and sport flying too. Kit comes complete (less engines).

Cat. No. 651-K-18 $1.75 P.P.

RECOMMENDED ENGINES
- Length: 16.54 in.
- Body Dia.: 0.736 in.
- Payload: 0.95 in.
- Sec. Dia.: 0.75 in.
- Weight: 0.7 oz.
**ASTRON DRIFTER**

**2 BIG CHUTES**

**ASTRON SCOUT**

**Patent No. 3,114,317**

- LEARN FROM BUILDING
- TUMBLE RECOVERY
- EDUCATIONAL

Get valuable experience building and flying the Astron Scout. Kit teaches rocket balance principles. A must for the rocketeer who wishes to learn to design his own models. Kit comes complete with all parts, instructions, and a copy of technical report TR-1 (but no engines). Shipping weight 2 oz.

Cat. No. 651-K-1 $ .70 each

**ASTRON MARK**

**THE NEXT STEP FOR THE BEGINNER**

IDEAL FOR SPORT AND DEMONSTRATION FLYING

An excellent bird for novice or experienced rocketeer. Easy to build, ideal for sport and demonstration flying, the Astron Mark gives top notch performance. Kit comes complete with all parts and instructions (but no engines). Shipping weight 5 oz.

Cat. No. 651-K-2 $ 1.25

**Recommended Engines**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>½A.6-2</td>
<td>½A.8-2</td>
<td>B.3-5</td>
</tr>
<tr>
<td>A.8-3</td>
<td>A.8-3</td>
<td>B.8-4</td>
</tr>
</tbody>
</table>

(Use ½A.6-2 for first flights.)

**ASTRON DRIFTER**

**GREAT FOR COMPETITION AND SPORT FLYING**

Spectacular in upward flight and recovery, the Astron Drifter combines low weight with large chute capacity. Perfect in any competition with its 24” chute, the Astron Drifter is a great performer with its 12” chute for test and sport flying tool. Parachutes are easily interchanged.

Cat. No. 651-K-14 $ 1.75 each

Shipping weight 8 oz.

**Recommended Engines**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>½A.6-2</td>
<td>½A.8-2</td>
<td>B.3-5</td>
</tr>
<tr>
<td>A.8-3</td>
<td>A.8-3</td>
<td>B.8-4</td>
</tr>
</tbody>
</table>

(Use ½A.6-2 for first flights.)

**only $1.75**
ASTRON FAR SIDE

3 - STAGES

A sophisticated ultra-high altitude probe or a workhorse vehicle for high altitude studies with large payloads — take your choice with the Astron Far Side. Advanced stage coupling gives dependable ignition and stage separation. Perfect for your advanced research programs. Top stage flies to well over 2500’, returns gently by parachute. Available with standard 1” payload section (No. 651-K-12) or with extra large 1½” dia. capsule for large payloads (No. 651-K-12X). Be sure to specify model type when ordering. Kit comes complete with all parts and assembly instructions (but no engines). Shipping weight 8 ounces.

STANDARD MODEL:
Cat. No. 651-K-12 $2.75 each

LARGE PAYLOAD MODEL:
Cat. No. 651-K-12X $3.00 each

Length K-12 K-12X
21.5 in 25 in

Weight 2.0 oz. 2.5 oz

Diameter 1 in 1.5 in

RECOMMENDED ENGINES

<table>
<thead>
<tr>
<th>First Stage</th>
<th>Second Stage</th>
<th>Top Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 A, 0-0</td>
<td>14 A, 0-0</td>
<td>14 A, 8-4</td>
</tr>
<tr>
<td>14 A, 0-0</td>
<td>14 A, 0-0</td>
<td>14 A, 8-4</td>
</tr>
<tr>
<td>A, 8-0</td>
<td>A, 8-0</td>
<td>A, 8-4</td>
</tr>
<tr>
<td>B, 8-0</td>
<td>B, 8-0</td>
<td>B, 8-6</td>
</tr>
<tr>
<td>C, 8-0</td>
<td>C, 8-0</td>
<td>B, 3-5</td>
</tr>
<tr>
<td>B, 3-0</td>
<td>B, 3-0</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Other booster engines may be used if there is no wind.

ASTRON APOGEE II

IN ORBIT...

THE HIGHEST OR FARthest POINT FROM EARTH IS CALLED "APOGEE."

The ability of this rocket to reach extreme altitudes consistently makes "APOGEE" a natural name choice.

The ultimate in two stage performance and dependability. The new, improved Astron Apogee II incorporates revolutionary discoveries in multi-stage methods, features a transparent, see-through payload capsule — lets you observe specimens without removing them from the rocket. Parachute recovered for soft landings. Complete with all parts and instructions (but no engines). Shipping weight 6 ounces.

Cat. No. 651-K-5 $2.00 each

Recommended Engines

<table>
<thead>
<tr>
<th>Booster</th>
<th>Upper Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 4 A, 0-0</td>
<td>1 4 A, 0-0</td>
</tr>
<tr>
<td>1 4 A, 0-0</td>
<td>1 4 A, 0-0</td>
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<tr>
<td>A, 8-0</td>
<td>A, 8-0</td>
</tr>
<tr>
<td>B, 8-0</td>
<td>B, 8-0</td>
</tr>
<tr>
<td>C, 8-0</td>
<td>C, 8-0</td>
</tr>
<tr>
<td>B, 3-0</td>
<td>B, 3-0</td>
</tr>
</tbody>
</table>

Weight .60 oz
Length 14.75 in
Body Dia. .736 in

Patent Pending
Spectacular Single Engine Performance

ASTRON STREAK

2,000 ft. flights

Low weight and wind cheating design give the Astron Streak fantastic performance. Uses mylar body tube for high strength and low weight — only ½ ounce without engine. Ideal for contests and records. Recommended engine for normal flying is the ¼ A.8-4. Kit comes complete with all parts and instructions (but no engines). Shipping weight 4 oz.

Cat. No. 651-K-4 $ .50

ASTRON PHANTOM

Complete Cutaway Rocket

DEMONSTRATES BASIC BUILDING RULES.

Great for classroom or science fair!

This bird will never fly, but it will certainly help get your science fair project or special demonstration off the ground! The Astron Phantom has a transparent body to show all the insides of a model rocket — plus a special dummy engine cut in half to show its insides. A great help in answering questions on model rocketry, the Astron Phantom kit comes complete with all parts and instructions (but no fins). Shipping weight 5 oz.

Cat. No. 651-K-7 $ 1.75

ASTRON SKY HOOK

ONLY

$ 1.35

Body Dia. .765 in
Length .12 in
Weight .65 oz

Recommended Engines
¼ A.8-2
½ A.8-2
A.8-3
B.8-4
B.3-5
(For first flights use ¼ A.8-2 engines.)

You'll really enjoy building and flying your Astron Sky Hook. Easy to build and durable, parachute recovery brings it back gently for flight after flight. Kit comes complete with all parts and instructions (but no engines). Shipping weight 5 oz.

Cat. No. 651-K-8 $ 1.35 P.P.

ASTRON SPACEMAN

The most controversial model rocket yet. Some feel he's a disgrace to the sport, others say he does an important job in showing that a rocket doesn't have to look like a rocket to fly well. Requires patience and a bit of artistic ability to build. Uses the featherweight recovery system. Kit comes complete with all parts and instructions (but no engines). Shipping weight 7 oz.

Cat. No. 651-K-9 $ .75 P.P.

4" wide, 7.25" long, weights .45 oz.

Recommended Engines
¼ A.8-2
½ A.8-2
A.8-3
B.8-4
(Use ¼ A.8-2 engines for first flights.)
ALWAYS A WINNER!

AMERICA'S NO. 1 CONTEST WINNER AND RECORD HOLDER!

Rocket powered glider — ascends vertically, then glides to a gentle landing. The most successful boost-glider ever developed, the Space Plane wins duration contests with amazing regularity. The Space Plane features easy and accurate adjustment of glide characteristics, plus a payload compartment large enough to handle small biological specimens, and other scientific objects. The Astron Space Plane is easy to launch and with proper care will give you unlimited flying enjoyment. This kit is recommended for the experienced modeler, and must be assembled with precision and care. (Engines not included.) Shipping weight 5 oz.

Cat. No. 651-K-3 $1.80 each

Recommended Engines

<table>
<thead>
<tr>
<th>Engine</th>
<th>Length</th>
<th>Wing Span</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4A.B-2</td>
<td>10 in</td>
<td>9 in</td>
<td>.5 oz</td>
</tr>
<tr>
<td>1/2A.B-2</td>
<td>12 in</td>
<td>10 in</td>
<td>.40 oz</td>
</tr>
</tbody>
</table>

For normal flying only 1/4A and 1/2A engines are recommended — the Astron Falcon can easily glide out of sight with larger engines if it is built and balanced carefully.
ASTRON INVADER

HIGH PERFORMANCE
GLIDE RECOVERY
FUTURISTIC DESIGN

Flying saucer? UFO? The Astron Invader is a truly unique boost-glider. Recommended for the experienced modeler, the Invader gives top duration in flight after flight — fascinates spectators with its performance and appearance. Comes in kit form with complete instructions (less engines). Shipping weight 5 oz.

Cat. No. 651-K-19 $1.20

ASTRON SPRITE
Ideal for small field sport and demonstration flying

HIGH PERFORMANCE • TUMBLE RECOVERY

The perfect model for small fields and sport or demonstration flying. The Astron Sprite is easy to build, with tumble recovery to teach principles of rocket balance and bring the model back safely — close to the launcher. Uses lightweight Series III engines only, gives top performance for its size. Kit comes complete with instructions and a copy of TR-1 (but no engines). Shipping weight 5 oz.

Cat. No. 651-K-15 $ .75 each

DELTA
TWO STAGES • FLIES OVER 2000 FEET
ADVANCED DESIGN • MULTI PURPOSE

Reliable workhorse booster for payload research. The Astron Delta accommodates all BT-50 size payload sections. May be flown either as a single or two stage vehicle, features advanced stage coupling for top dependability. Kit is complete with all parts and easy-to-follow instructions (nose section and engines not included). Shipping weight 8 oz.

Cat. No. 651-K-16 $1.50 each

Specifications
Length 13.6 in.
Body Dia. 1 in.
Weight 1.45 oz.

Recommended Engines
A-8-3
B-8-2

PARACHUTE RECOVERY
BIG BERTHA

SIMPLE - RELIABLE PARACHUTE RECOVERY
PERFECT FOR DEMONSTRATIONS
SINGLE ENGINE OPERATION

Easy-to-build, reliable and impressive in flight, Big Bertha is an ideal model for demonstration flights. Features a slow, realistic takeoff that fascinates spectators. This is the model shown in action on the inside front and back covers. Big 18" chute gives slow descent and gentle landings. Kit comes complete with all parts and easy to follow instructions (but no engines). Shipping weight 16 oz.

Cat. No. 651-K-23 $2.00

Specifications
Length 24 in.
Body Dia. 1.6 in.
Weight 2.25 oz.

Recommended Engine 88-2

CONSTRUCTION TIPS

This Fin Spacing Guide will space equally three or four fins on all body tubes sold by Estes Industries. To space the fins, center the end of the tube in the circles, then mark at the "X" lines for four fins or on the "0" lines for three fins. Draw lines from these marks as shown in the bottom drawing.

BT-10 is an ultra-light mylar tube for use with the featherweight recovery system. It will withstand the heat of an ejection charge only when the engine is ejected from the rocket body by the charge. Paper reinforcing material must be used to glue parts to the tube, as ordinary glue will not stick to the mylar tube.

After fins are dry flow in a good filler of white glue or plastic putty.

Apply PRM-I smoothly eliminate bubbles

Strips of PRM-I
Where balsa must be glued to plastic surface

Mark the body tube for fin alignment using the "V" notch of a drawer sill as shown. Match the edge of the sill with a spacing mark and run a pencil along the top of the drawer against the tube. Glue the fin on the line and it will be parallel to the body.
CUTTING the BODY TUBE

Support the tube from the inside with a stage coupler.

Cut strip of paper with straight edge.

Cut mark.

Match edges.

Wrap paper around tube and align edge with cut location mark. Draw a line completely around the tube.

USE A SHARP BLADE...but don't try to cut through the tube on the first turn. Follow the line cutting very little more than the surface layer. One or two more turns keeping the same knife pressure should give a clean square cut.

Layout...

Pin pattern

FINISHING

Apply two or more coats of sanding sealer. Sand lightly between each coat.

Cutting...

Sanding...

For general purposes sand all but the root edges round.

THICK FINS MUST BE GIVEN MORE ATTENTION.

Sand to rough airtight shape with medium sandpaper and block. The final shape is reached with extra-fine sandpaper and a gentle touch.

ENGINE BLOCK INSTALLATION

Start the engine block into the rear of the body tube. Press it into position with the engine casing in one smooth movement to prevent the block from "freezing" in the wrong position.

Engine Casing  Engine Block  Rear of Body Tube

Mark casing for proper depth. Glue spread inside tube where engine block will seat.

ENGINE HOLDERS

ENGINE HOLDERS PROVIDE FOR QUICK EASY AND RELIABLE POSITIONING AND RETAINING OF THE ENGINE.

FOR IST-50 INSTALLATION

2050 Spacing Rings glued together before installing on tube.

FOR IST-20 INSTALLATION

Measure and slot the body tube as shown above. Insert holder and coat area with glue. While glue is wet, press reinforcing gauze into place as shown. Let dry.

FINISHING

Sealer is exaggerated here but emphasizes that the wood grain should be filled and the surface smoothed for the application of the color coat.

REMEMBER - FINAL FINISH IS ONLY AS GOOD AS THE BASE PREPARED FOR IT.

Brush

Spraying

DO

Maintain even distance.

DON'T

Revolve the can.

Spray too close! Hold can 8 to 12 inches from work.

A better than average finish for the beginner...an excellent finish when you've got the "hang" of it.

color fresh dope. Dope can be thinned 50% for a smoother finish. Avoid "brushing over" as the surface sets rapidly. Unnecessary brushing can produce an uneven finish. Lighter colors are more difficult to apply.
**Nose Cones**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Dimensions</th>
<th>Material</th>
<th>III</th>
<th>Average Weight</th>
<th>Ship. Weight</th>
<th>Price Each</th>
<th>Price 3 for</th>
</tr>
</thead>
<tbody>
<tr>
<td>651-BNC-51</td>
<td>0.515&quot;  0.541&quot; 1/4&quot; 1-3/8&quot;</td>
<td>Balco S</td>
<td>.020 oz.</td>
<td>1 oz.</td>
<td>$ .25</td>
<td>$ .50</td>
<td></td>
</tr>
<tr>
<td>651-BNC-81</td>
<td>0.515&quot;  0.541&quot; 1/4&quot; 3-1/8&quot;</td>
<td>Balco W</td>
<td>.029 oz.</td>
<td>2 oz.</td>
<td>$ .40</td>
<td>$ .80</td>
<td></td>
</tr>
<tr>
<td>651-BNC-55</td>
<td>0.515&quot;  0.541&quot; 1/4&quot; 1-3/4&quot;</td>
<td>Balco S</td>
<td>.016 oz.</td>
<td>1 oz.</td>
<td>$ .25</td>
<td>$ .50</td>
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<tr>
<td>651-BNC-31</td>
<td>0.515&quot;  0.541&quot; 1/4&quot; 1&quot;</td>
<td>Balco Y</td>
<td>.013 oz.</td>
<td>1 oz.</td>
<td>$ .25</td>
<td>$ .50</td>
<td></td>
</tr>
<tr>
<td>651-BNC-10A</td>
<td>0.702&quot;  0.728&quot; 1/4&quot; 1-1/16&quot;</td>
<td>Balco A</td>
<td>.03 oz.</td>
<td>1 oz.</td>
<td>$ .25</td>
<td>$ .50</td>
<td></td>
</tr>
<tr>
<td>651-BNC-10B</td>
<td>0.702&quot;  0.728&quot; 5/16&quot; 3/8&quot;</td>
<td>Balco B</td>
<td>.05 oz.</td>
<td>1 oz.</td>
<td>$ .25</td>
<td>$ .50</td>
<td></td>
</tr>
<tr>
<td>651-BNC-20A</td>
<td>0.710&quot;  0.736&quot; 1/4&quot; 1-1/16&quot;</td>
<td>Balco A</td>
<td>.03 oz.</td>
<td>1 oz.</td>
<td>$ .25</td>
<td>$ .50</td>
<td></td>
</tr>
<tr>
<td>651-BNC-20B</td>
<td>0.710&quot;  0.736&quot; 5/16&quot; 3/8&quot;</td>
<td>Balco B</td>
<td>.05 oz.</td>
<td>1 oz.</td>
<td>$ .25</td>
<td>$ .50</td>
<td></td>
</tr>
<tr>
<td>651-BNC-30A</td>
<td>0.725&quot;  0.767&quot; 3/8&quot; 3-1/8&quot;</td>
<td>Balco C</td>
<td>.04 oz.</td>
<td>1 oz.</td>
<td>$ .30</td>
<td>$ .60</td>
<td></td>
</tr>
<tr>
<td>651-BNC-30B</td>
<td>0.725&quot;  0.767&quot; 1/2&quot; 3-1/4&quot;</td>
<td>Balco D</td>
<td>.06 oz.</td>
<td>1 oz.</td>
<td>$ .30</td>
<td>$ .60</td>
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<tr>
<td>651-BNC-40A</td>
<td>0.725&quot;  0.767&quot; 5/8&quot; 3-3/4&quot;</td>
<td>Balco E</td>
<td>.07 oz.</td>
<td>1 oz.</td>
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<td>$ .80</td>
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<tr>
<td>651-BNC-50A</td>
<td>0.725&quot;  0.767&quot; 3-1/4&quot; 3-1/4&quot;</td>
<td>Balco F</td>
<td>.06 oz.</td>
<td>1 oz.</td>
<td>$ .30</td>
<td>$ .60</td>
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<tr>
<td>651-BNC-50B</td>
<td>0.725&quot;  0.767&quot; 2&quot; 3-3/4&quot;</td>
<td>Balco G</td>
<td>.08 oz.</td>
<td>2 oz.</td>
<td>$ .45</td>
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<tr>
<td>651-BNC-50C</td>
<td>0.725&quot;  0.767&quot; 3-1/4&quot; 3-1/4&quot;</td>
<td>Balco H</td>
<td>.08 oz.</td>
<td>2 oz.</td>
<td>$ .45</td>
<td>$ .90</td>
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<tr>
<td>651-BNC-50D</td>
<td>0.725&quot;  0.767&quot; 3-1/4&quot; 3-1/4&quot;</td>
<td>Balco I</td>
<td>.10 oz.</td>
<td>2 oz.</td>
<td>$ .50</td>
<td>$ 1.00</td>
<td></td>
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</tbody>
</table>

**PLASTIC AND BALSA BLOCKS**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Dimensions</th>
<th>Material</th>
<th>Price Each</th>
<th>Price 3 for</th>
</tr>
</thead>
<tbody>
<tr>
<td>651-BNC-51</td>
<td>1.283&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco F</td>
<td>$ .75</td>
<td>$ 1.50</td>
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<tr>
<td>651-BNC-81</td>
<td>1.350&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco AA</td>
<td>$ .75</td>
<td>$ 1.50</td>
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<tr>
<td>651-BNC-55F</td>
<td>1.995&quot; 1.627&quot; 3/8&quot; 3-3/4&quot;</td>
<td>Balco L</td>
<td>$ .75</td>
<td>$ 1.50</td>
</tr>
<tr>
<td>651-BNC-55S</td>
<td>1.995&quot; 1.627&quot; 5/8&quot; 3-3/4&quot;</td>
<td>Balco L</td>
<td>$ .75</td>
<td>$ 1.50</td>
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<tr>
<td>651-BNC-55G</td>
<td>1.995&quot; 1.627&quot; 3-3/4&quot; 3-3/4&quot;</td>
<td>Balco X</td>
<td>$ .50</td>
<td>$ 1.00</td>
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**Exclusively for the BT-60**

<table>
<thead>
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<th>Catalog No.</th>
<th>Dimensions</th>
<th>Material</th>
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<th>Price 3 for</th>
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</thead>
<tbody>
<tr>
<td>651-BNC-51</td>
<td>1.283&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco F</td>
<td>$ .75</td>
<td>$ 1.50</td>
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<tr>
<td>651-BNC-81</td>
<td>1.350&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco AA</td>
<td>$ .75</td>
<td>$ 1.50</td>
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</tbody>
</table>

**Ideal for the P-55**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Dimensions</th>
<th>Material</th>
<th>Price Each</th>
<th>Price 3 for</th>
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</thead>
<tbody>
<tr>
<td>651-BNC-51</td>
<td>1.283&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco F</td>
<td>$ .75</td>
<td>$ 1.50</td>
</tr>
<tr>
<td>651-BNC-81</td>
<td>1.350&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco AA</td>
<td>$ .75</td>
<td>$ 1.50</td>
</tr>
</tbody>
</table>

**Especially for our Engine Mailing Tube**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Dimensions</th>
<th>Material</th>
<th>Price Each</th>
<th>Price 3 for</th>
</tr>
</thead>
<tbody>
<tr>
<td>651-BNC-51</td>
<td>1.283&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco F</td>
<td>$ .75</td>
<td>$ 1.50</td>
</tr>
<tr>
<td>651-BNC-81</td>
<td>1.350&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco AA</td>
<td>$ .75</td>
<td>$ 1.50</td>
</tr>
</tbody>
</table>

**And a Tail Cone for BT-55**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Dimensions</th>
<th>Material</th>
<th>Price Each</th>
<th>Price 3 for</th>
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<tbody>
<tr>
<td>651-BNC-51</td>
<td>1.283&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco F</td>
<td>$ .75</td>
<td>$ 1.50</td>
</tr>
<tr>
<td>651-BNC-81</td>
<td>1.350&quot; 1.283&quot; 3/4&quot; 3-1/2&quot;</td>
<td>Balco AA</td>
<td>$ .75</td>
<td>$ 1.50</td>
</tr>
</tbody>
</table>

**Letters listed under "III." identify nose cone shape as shown in the picture on page 53. Dimensions are shown in the drawing on that page.**

Nose cone dimensions listed on opposite page.

**Notes:** Dimensions may vary .003".

**Caution:** Before using lightweight nose cones, be sure to study TR-1 on rocket balance and stability. Don't forget to order screw eyes and nose cone weights.

**Nose Cone Stock:** Balloon block lengths of balsa block for making nose cones of your own design. Cut-off pieces have damaged corners which will not interfere with their usability.

1" x 1" Blocks: Shipping Weight 1 oz. Cat. No. 651-NCS-1 $ .15 each
2" x 2" Blocks: Shipping Weight 3 oz. Cat. No. 651-NCS-2 $ .20 each

**Nose Cone Dowels:** Use as shown in the drawing. Hardwood, 1/4" diam., 2" long. Shipping weight 2 oz. Cat. No. 651-NCD-2 3 for $ .10
PAYLOAD SECTIONS

Ideal for payload launchings! Carry instruments, biological specimens, etc. in these lightweight, high capacity payload sections. These capsules come complete with all needed parts, including nose cone, body tube, nose block or adapter and screw eye.

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Body Mat'l</th>
<th>Weight oz.</th>
<th>Fits</th>
<th>Inside Dia.</th>
<th>Inside Length</th>
<th>Overall Length</th>
<th>Price Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>651-PS-20A</td>
<td>Clear Plastic</td>
<td>.16</td>
<td>1 BT-20</td>
<td>.710&quot;</td>
<td>2&quot;</td>
<td>4&quot;</td>
<td>$ .80</td>
</tr>
<tr>
<td>651-PS-20C</td>
<td>Clear Plastic</td>
<td>.40</td>
<td>4 BT-20</td>
<td>.950&quot;</td>
<td>3&quot;</td>
<td>7&quot;</td>
<td>$ .85</td>
</tr>
<tr>
<td>651-PS-30B</td>
<td>Regular Tube</td>
<td>.24</td>
<td>1 BT-30</td>
<td>.725&quot;</td>
<td>2&quot;</td>
<td>3.75&quot;</td>
<td>$ .65</td>
</tr>
<tr>
<td>651-PS-40A</td>
<td>Regular Tube</td>
<td>.32</td>
<td>1 BT-40</td>
<td>.765&quot;</td>
<td>2&quot;</td>
<td>3.75&quot;</td>
<td>$ .85</td>
</tr>
<tr>
<td>651-PS-50A</td>
<td>Clear Plastic</td>
<td>.39</td>
<td>4 BT-50</td>
<td>.950&quot;</td>
<td>3&quot;</td>
<td>6.50&quot;</td>
<td>$ .90</td>
</tr>
<tr>
<td>651-PS-50C</td>
<td>Clear Plastic</td>
<td>1.0</td>
<td>11 BT-50</td>
<td>1.59&quot;</td>
<td>4&quot;</td>
<td>10.5&quot;</td>
<td>$1.30</td>
</tr>
<tr>
<td>651-PS-50D</td>
<td>Regular Tube</td>
<td>.95</td>
<td>11 BT-50</td>
<td>1.59&quot;</td>
<td>4&quot;</td>
<td>10.5&quot;</td>
<td>$1.25</td>
</tr>
<tr>
<td>651-PS-50E</td>
<td>Clear Plastic</td>
<td>1.1</td>
<td>11 BT-50</td>
<td>1.75&quot;</td>
<td>4&quot;</td>
<td>10.5&quot;</td>
<td>$1.35</td>
</tr>
<tr>
<td>651-PS-60A</td>
<td>Clear Plastic</td>
<td>.98</td>
<td>11 BT-60</td>
<td>1.59&quot;</td>
<td>4&quot;</td>
<td>9.50&quot;</td>
<td>$1.20</td>
</tr>
<tr>
<td>651-PS-60B</td>
<td>Regular Tube</td>
<td>.90</td>
<td>11 BT-60</td>
<td>1.59&quot;</td>
<td>6&quot;</td>
<td>10.5&quot;</td>
<td>$1.25</td>
</tr>
<tr>
<td>651-PS-60C</td>
<td>Clear Plastic</td>
<td>1.0</td>
<td>11 BT-60</td>
<td>1.75&quot;</td>
<td>4&quot;</td>
<td>9.50&quot;</td>
<td>$1.35</td>
</tr>
</tbody>
</table>

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. Read FINS in Vol. 3, No. 3 of the Model Rocket News for more information.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Dimensions (In Inches)</th>
<th>Weight oz.</th>
<th>Major Use</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>651-BFS-10</td>
<td>1/32 x 3 x 9</td>
<td>.065</td>
<td>4 High Performance</td>
<td>3 for $ .35</td>
</tr>
<tr>
<td>651-BFS-20</td>
<td>1/16 x 3 x 9</td>
<td>.130</td>
<td>4 High Performance</td>
<td>3 for $ .40</td>
</tr>
<tr>
<td>651-BFS-20L</td>
<td>1/16 x 3 x 12</td>
<td>.172</td>
<td>6 High Performance</td>
<td>3 for $ .55</td>
</tr>
<tr>
<td>651-BFS-20B</td>
<td>1/16 x 1/2 x 6</td>
<td>.015</td>
<td>2 Glider Elevon</td>
<td>2 for $.10</td>
</tr>
<tr>
<td>651-BFS-30</td>
<td>3/32 x 3 x 9</td>
<td>.150</td>
<td>4 Sport Models</td>
<td>3 for $.45</td>
</tr>
<tr>
<td>651-BFS-30L</td>
<td>2/32 x 3 x 9</td>
<td>.200</td>
<td>6 Sport Models</td>
<td>3 for $.60</td>
</tr>
<tr>
<td>651-BFS-40</td>
<td>1/8 x 3 x 9</td>
<td>.200</td>
<td>4 Cluster Rockets</td>
<td>3 for $.50</td>
</tr>
<tr>
<td>651-BFS-40L</td>
<td>1/8 x 3 x 12</td>
<td>.265</td>
<td>6 Glider Wings</td>
<td>3 for $.65</td>
</tr>
<tr>
<td>651-BFS-60S</td>
<td>3/16 x 1/2 x 3.7</td>
<td>.030</td>
<td>2 Scout Fin Replacement</td>
<td>3 for $.15</td>
</tr>
<tr>
<td>651-BFS-80</td>
<td>1/4 x 2 x 17</td>
<td>1.00</td>
<td>12 Sky Slash Body</td>
<td>$.30 each</td>
</tr>
</tbody>
</table>

MERCURY CAPSULE

Add a special touch to your rockets. Get this model Mercury Capsule. A big 1.8 inches in diameter and 3.2 inches high, this capsule is equipped with a removable base for easy payload access. Comes in easy to assemble kit form with a full set of adapters to fit the capsule to all Estes body tubes. Makes an ideal display model too. Shipping weight 3 ounces.

Cat. No. 651-PSM-1 $1.00 each

CLEAR PLASTIC FIN STOCK: Build flyable models of finless space boosters and retain scale appearance. Clear plastic fins can be practically invisible; yet can also be as large as needed for proper stability. Recommended practice is to form a tube of 0.020" thick plastic to slide onto the outside of your model and glue fins made from 0.040" thick plastic to this tube. Use clear butylate dope for gluing and filleting. In 3" x 9" sheets, shipping weight 4 oz.

0.020" THICK: Cat. No. 651-CFS-20 $ .20 each
0.040" THICK: Cat. No. 651-CFS-40 $.40 each

SPIN FIN: One-piece plastic unit has fins set at an angle to make the rocket spin. Made of molded polyethylene, fits body tube BT-40. Ideal for beginners and experimenters. For the best fit, slot the body on opposite sides. Net weight 0.35 oz. Shipping weight 4 oz.

Cat. No. 651-PP-40B $.50 each 3 for $1.20

FIN PATTERN SHEET: Fourteen different popular fin designs, all tried and proven, printed full size on heavy index stock. Simply cut out and trace around pattern to transfer design to balsa. A must for the model rocket designer. Shipping wt. 1 oz.

Cat. No. 651-PP-2 $.25 each 3 for $.50
NOSE BLOCKS

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

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Dimensions</th>
<th>Fits</th>
<th>Weight oz.</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O.D.</td>
<td>Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Net</td>
<td>Ship.</td>
<td>Each</td>
<td>3 for</td>
</tr>
<tr>
<td>651-NB-20</td>
<td>.710&quot;</td>
<td>.34&quot;</td>
<td>.014</td>
<td>.30</td>
</tr>
<tr>
<td>651-NB-30</td>
<td>.725&quot;</td>
<td>.34&quot;</td>
<td>.014</td>
<td>.30</td>
</tr>
<tr>
<td>651-NB-40</td>
<td>.745&quot;</td>
<td>.34&quot;</td>
<td>.015</td>
<td>.30</td>
</tr>
<tr>
<td>651-NB-50</td>
<td>.950&quot;</td>
<td>1&quot;</td>
<td>.040</td>
<td>.35</td>
</tr>
<tr>
<td>651-NB-60</td>
<td>1.595&quot;</td>
<td>1½&quot;</td>
<td>.190</td>
<td>.50</td>
</tr>
<tr>
<td>651-NB-1MT</td>
<td>.937&quot;</td>
<td>1&quot;</td>
<td>.040</td>
<td>.35</td>
</tr>
</tbody>
</table>

ENGINE BLOCKS

Get light weight, precision fitting engine blocks for the best internal construction on your models. These hollow bulkheads position the engine, allow gases to pass forward unobstructed for normal ejection or upper stage ignition.

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Dimensions</th>
<th>Fits</th>
<th>Weight oz.</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O.D.</td>
<td>I.D.</td>
<td>Length</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Net</td>
<td>Ship.</td>
<td>Each</td>
<td>3 for</td>
</tr>
<tr>
<td>651-EB-20</td>
<td>.710&quot;</td>
<td>.46&quot;</td>
<td>.34&quot;</td>
<td></td>
</tr>
<tr>
<td>651-EB-30</td>
<td>.725&quot;</td>
<td>.46&quot;</td>
<td>.34&quot;</td>
<td></td>
</tr>
<tr>
<td>651-EB-40</td>
<td>.765&quot;</td>
<td>.46&quot;</td>
<td>.34&quot;</td>
<td></td>
</tr>
<tr>
<td>651-EB-20A</td>
<td>.708&quot;</td>
<td>.65&quot;</td>
<td>.1/4&quot;</td>
<td></td>
</tr>
<tr>
<td>651-EB-20B</td>
<td>.708&quot;</td>
<td>.65&quot;</td>
<td>.1/4&quot;</td>
<td></td>
</tr>
<tr>
<td>651-EB-30A</td>
<td>.724&quot;</td>
<td>.65&quot;</td>
<td>.1/4&quot;</td>
<td></td>
</tr>
<tr>
<td>651-EB-40A</td>
<td>.763&quot;</td>
<td>.65&quot;</td>
<td>.1/4&quot;</td>
<td></td>
</tr>
</tbody>
</table>

BALSAD ADAPTERS

Super light, precision-made balsa adapters give unlimited flexibility for model rocket design. Switch from one size body tube to another for payload capsules, parachute compartments, propulsion sections, etc. Adapters fitting BT-20 can be built up with masking tape to fit BT-30 or BT-40. Any adapter can be hollowed with a knife or drill to make a passage for ejection gases. All adapters have a 1/2" mating surface on each end.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Mates</th>
<th>Length</th>
<th>Taper Length</th>
<th>Weight oz.</th>
<th>Price</th>
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<td></td>
<td></td>
<td></td>
<td>Net</td>
<td>Ship.</td>
<td>Each</td>
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<tr>
<td>651-TA-520</td>
<td>BT-5</td>
<td>1.75&quot;</td>
<td>.04</td>
<td>1</td>
<td>.30</td>
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<tr>
<td>651-TA-350</td>
<td>BT-5</td>
<td>2.2&quot;</td>
<td>.06</td>
<td>4</td>
<td>.35</td>
</tr>
<tr>
<td>651-TA-2050</td>
<td>BT-5</td>
<td>2.2&quot;</td>
<td>.06</td>
<td>4</td>
<td>.40</td>
</tr>
<tr>
<td>651-TA-2050A</td>
<td>BT-5</td>
<td>2.2&quot;</td>
<td>.11</td>
<td>4</td>
<td>.35</td>
</tr>
<tr>
<td>651-TA-2060</td>
<td>BT-5</td>
<td>2.2&quot;</td>
<td>.20</td>
<td>4</td>
<td>.60</td>
</tr>
<tr>
<td>651-TA-5060</td>
<td>BT-5</td>
<td>2.2&quot;</td>
<td>.23</td>
<td>4</td>
<td>.60</td>
</tr>
<tr>
<td>651-TA-5065</td>
<td>BT-5</td>
<td>2.2&quot;</td>
<td>.26</td>
<td>4</td>
<td>.60</td>
</tr>
<tr>
<td>651-TA-6065</td>
<td>BT-5</td>
<td>2.2&quot;</td>
<td>.23</td>
<td>4</td>
<td>.50</td>
</tr>
</tbody>
</table>

PAPER ADAPTERS

Add still another dimension to rocket design. Easy-to-use paper adapters are perfect for making transitions between tube sizes for countless designs. Set includes 20 rings for positioning BT-5 in BT-20, BT-20, BT-30 and BT-40 in BT-50; and BT-5, BT-20, BT-30, BT-40, and BT-50 in BT-60, three universal tapered shrouds and instructions. (Does not include body tubes or nose cones.) Shipping weight 2 oz.

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Dimensions</th>
<th>Fits</th>
<th>Weight oz.</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O.D.</td>
<td>I.D.</td>
<td>Length</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Net</td>
<td>Ship.</td>
<td>Each</td>
<td>3 for</td>
</tr>
<tr>
<td>651-1-1</td>
<td>.710&quot;</td>
<td>.46&quot;</td>
<td>.34&quot;</td>
<td></td>
</tr>
<tr>
<td>651-TA-2050</td>
<td>BT-5</td>
<td>1.75&quot;</td>
<td>.04</td>
<td>1</td>
</tr>
</tbody>
</table>

20-50 RINGS — Set of 20 rings for centering and mounting BT-20 in BT-50. Shipping weight 2 oz. Cat. No. 651-RA-2050 $ .30 per set

20-60 RINGS — Set of 10 rings for centering and mounting BT-20 in BT-60. Shipping weight 2 oz. Cat. No. 651-RA-2060 $ .30 per set
ENGINE MOUNTS

Get a precision engine fit in large body tubes without adding unnecessary weight. Engine mount sets come complete with instructions — just assemble and glue in place in your model.

**EH-2040**
- Fits BT-40, includes BT-20J and EB-20A.
- Mount slips easily into rocket body. Net wt. 0.1 oz. Shipping wt. 5 oz.
- Cat. No. 651-EH-2040 ............ $ .15 each

**EH-2050**
- Cat. No. 651-EH-2050 ............ $ .25 each

**EH-2055**
- Cat. No. 651-EH-2055 ............ $ .35 each

**EH-2060**
- Fits BT-60, includes BT-20J, EB-20A, 2 rings for centering holder tube, and JT-60C for positioning rings. Net weight 0.17 oz. Shipping weight 5 oz.
- Cat. No. 651-EH-2060 ............ $ .35 each

STAGE COUPLERS

Little tubes with many uses, stage couplers exactly fit the inside of the tube designated. Great for multi-staging, joining body tubes, positioning adapter rings, etc. Make perfect guides for cutting body tubes and sanding cut edges of body tubes, too. Extra durable, light weight. Shipping weights: JT-5C, JT-20C, 30C, and 40C, 1 oz., JT-50C and 60C, 5 oz.

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Dimensions</th>
<th>O.D.</th>
<th>I.D.</th>
<th>Length</th>
<th>Fits</th>
<th>Average Weight</th>
<th>Price Each</th>
<th>3 for</th>
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</thead>
<tbody>
<tr>
<td>651-JT-5C</td>
<td>0.513&quot;</td>
<td>0.455&quot;</td>
<td>3/4&quot;</td>
<td>BT-5</td>
<td>.020 oz</td>
<td>$ .10</td>
<td>$ .20</td>
<td></td>
</tr>
<tr>
<td>651-JT-20C</td>
<td>0.708&quot;</td>
<td>0.650&quot;</td>
<td>3/4&quot;</td>
<td>BT-50</td>
<td>.027 oz</td>
<td>$ .10</td>
<td>$ .20</td>
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</tr>
<tr>
<td>651-JT-30C</td>
<td>0.724&quot;</td>
<td>0.650&quot;</td>
<td>3/4&quot;</td>
<td>BT-30</td>
<td>.030 oz</td>
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<td>$ .20</td>
<td></td>
</tr>
<tr>
<td>651-JT-40C</td>
<td>0.736&quot;</td>
<td>0.650&quot;</td>
<td>3/4&quot;</td>
<td>BT-40</td>
<td>.023 oz</td>
<td>$ .10</td>
<td>$ .20</td>
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</tr>
<tr>
<td>651-JT-50C</td>
<td>0.949&quot;</td>
<td>0.920&quot;</td>
<td>1&quot;</td>
<td>BT-50</td>
<td>.051 oz</td>
<td>$ .15</td>
<td>$ .30</td>
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<tr>
<td>651-JT-55C</td>
<td>1.28&quot;</td>
<td>1.25&quot;</td>
<td>1 3/4&quot;</td>
<td>BT-55</td>
<td>.088 oz</td>
<td>$ .15</td>
<td>$ .30</td>
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<tr>
<td>651-JT-60C</td>
<td>1.59&quot;</td>
<td>1.55&quot;</td>
<td>1 7/8&quot;</td>
<td>BT-60</td>
<td>.124 oz</td>
<td>$ .15</td>
<td>$ .30</td>
<td></td>
</tr>
</tbody>
</table>

RECOVERY SUPPLIES

**RECOVERY WADDING:** Extra soft and flexible, light weight tissue paper (bathroom type), specially treated to make it flame resistant. Gives the very best protection from hot ejection gases for parachutes and streamers. Each package contains approximately 75 4 1/2" squares — enough wadding for up to 25 flights. Instructions included in package. Shipping weight 6 oz. Cat. No. 651-RE-1A ............. $ .25 each

**SHROUD LINES:** Build reliable, durable custom parachutes with this strong, hard surface shroud line cord. Comes in 72 yard spools. Available in red or white. Specify color when ordering. Shipping weight 5 oz. Cat. No. 651-SL-1 ............. $ .25 each

**SCREW EYES:** Attach recovery systems to nose cones or nose blocks with these light weight metal screw eyes. Available in three sizes, specify size when ordering. Shipping weight for 3 eyes 1 oz.

**LARGE EYE:** 1" long; .04 oz.
- Cat. No. 651-SE-1 3 for $.10 12 for $.35

**SMALL EYE:** 3/4" long; .03 oz.
- Cat. No. 651-SE-2 3 for $.10 12 for $.35

**EXTRA SMALL EYE:** 3/8" long; .01 oz.
- Cat. No. 651-SE-3 3 for $.10 12 for $.35

**TAPE DISCS:** Fasten shroud lines to plastic chutes with these 3/4" pressure sensitive tape discs. Shipping weight for 12 discs, 1 oz. Cat. No. 651-TD-1 ............. 4 for $.10 12 for $.15 Roll of 1,000, $4.00

**TAPE STRIPS:** For top strength, low bulk and low weight, fasten shroud lines with these 3/16" X 3/4" tape strips. In sheets of 35 strips, shipping weight 1 oz.
- Cat. No. 651-TD-2 ............. $ .30 per sheet

**SHOCK CORD:** Convenient 18" lengths of model airplane contest rubber to absorb shock of ejection and recovery system deployment. In 1/8" widths for normal models, 1/4" widths for heavy rockets. Specify width when ordering. Both are .03" thick. Shipping weight 1 oz.
- 1/8" WIDE: Net wt. .039 oz. Cat. No. 651-SC-1 $ .10 each 3 for $.20
- 1/4" WIDE: Net wt. .078 oz. Cat. No. 651-SC-2 $ .15 each 3 for $.20

**SNAP SWIVELS:** For quick changes and reduced tangling in your recovery systems, use these tiny 1" long snap swivels. Net weight .01 oz. Shipping weight 1 oz.
- Cat. No. 651-SV-12 ............. 6 for $ .20
RECOVERY EQUIPMENT

PARACHUTE KITS: Get the best in parachute recovery! Two color printed plastic ‘chutes give maximum visibility — feature easy to see pattern. Lightweight, durable and easily folded, these ‘chutes are only 0.00075” thick, allowing the most material to be packed into the least body space. Each kit comes complete with ‘chute material, tape strips and shroud lines.

Specify color combination and size when ordering. Shipping weight 2 oz.

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Parachute Diameter</th>
<th>Color Combinations Available</th>
<th>Net Weight</th>
<th>Price Each</th>
<th>3 for</th>
</tr>
</thead>
<tbody>
<tr>
<td>651-PK-12</td>
<td>12 inches</td>
<td>Orange and White, Red and White</td>
<td>.078 oz.</td>
<td>$.20</td>
<td>$.50</td>
</tr>
<tr>
<td>651-PK-18</td>
<td>18 inches</td>
<td>Red and White, Red and Yellow, Yellow and Black</td>
<td>.144 oz.</td>
<td>$.30</td>
<td>$.75</td>
</tr>
<tr>
<td>651-PK-24</td>
<td>24 inches</td>
<td>Red and White, Orange and Black</td>
<td>.298 oz.</td>
<td>$.45</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

PARACHUTE MATERIAL: You get a big square yard of extra strength, high visibility black plastic ‘chute material. Each sheet can be cut to make one or more round or square parachutes up to 36” across. Net weight .98 oz. Shipping weight 5 oz.

Cat. No. 651-PM-2 ........................................................................................................... $ .45 each

STREAMER MATERIAL: Bring light weight models back to earth with bright orange, flame resistant crape paper streamers. In 7½ foot lengths, enough for two to eight streamers. Available in 1” and 2” widths. Specify size when ordering. Shipping weight 1 oz.

1” wide Net wt. .092 oz. Cat. No. 651-SM-1 ............... $ .15 each 3 for $ .30

2” wide Net wt. .184 oz. Cat. No. 651-SM-2 ............... $ .20 each 3 for $ .40

MODEL ROCKET RECOVERY

Shock Cord Attachment

Perhaps the most important part of the recovery system (next to the ‘chute) is the shock cord and its anchor. Shown at left is the standard attachment method.

For BT-50 and larger body tubes the installation method shown at the right may be used. This system is particularly desirable for scale models.

'Chute Assembly

Install a snap swivel

Assembly and Use of Recovery System

Install screw eye (1) in nose cone (2). Tie shock cord (3) to screw eye. Tie shroud lines (4) to snap swivel (5) and clip to screw eye.

Pack your bird with flameproof wadding before each flight. The wadding should be packed into a 1-1/2 times its diameter.

To be sure the ejection gases activate the recovery system correctly, secure the engine in parachute and streamer models by wrapping the nozzle end with tape until it makes a snug press fit in the body.

Tape on Nozzle end

Wadding
FINISHING SUPPLIES

ASTROSEAL Balsa Filler: The first step to a perfect finish. Astroseal contains 40% balsa wood plus additional fillers to completely fill the grain in balsa parts. Gives smooth surface for dope or enamel application. Brush on two to four coats, letting each dry thoroughly. Sand with #SP-320 sanding material between coats. In four ounce jar. Shipping weight 7 oz.
Cat. No. 651-SS-2 ........................................... $ .60 each

HEAT RESISTANT PAINT: Protect exposed rocket parts from heat damage with easy to apply, brush-on, high heat aluminum paint. Protects to 1000°F, gives a bright metallic finish. Recommended for swept fins and other parts exposed to hot exhaust gases. In 1½ ounce bottles. Shipping weight 6 oz.
Cat. No. 651-AP-1 ........................................... $ .35 each

FLUORESCENT SPRAY PAINT: The brightest colors anywhere — make rockets easy to spot in the air and on the ground. Glowing, high visibility paint comes in handy 6 oz. spray cans, dried in minutes. For maximum brilliance use glossy white enamel as an undercoat. Available in Cerise Red, Yellow Orange, Red Orange and Green. Specify colors when ordering. Shipping weight 16 oz. each.
Cat. No. 651-FP-1 ........................................... $1.40 each

ENAMEL SPRAY PAINT: Get that "professional" appearance for your best models. Top quality enamel in handy 5 oz. spray cans dries in minutes. Use indoors and outdoors. Not fluorescent. Available in the popular colors of Regal Blue, Hunter Green, Chrome Yellow, Glossy Black, Glossy White and Cherry Red. Specify colors when ordering. Shipping weight 16 oz. each.
Cat. No. 651-EP-1 ........................................... $1.20 each

CLEAR SPRAY: Crystal clear spray coating goes on clear — stays clear. Gives extra gloss to enamel finishes, protects decals and decorations, makes fluorescent finishes smooth, durable and glossy. For best results, let paint dry thoroughly before applying clear spray. Use several light coats for maximum gloss. In handy 5 oz. spray can. Shipping weight 16 oz.
Cat. No. 651-EP-2 ........................................... $1.20 each

Cat. No. 651-BRD-1 ........................................... $ .20 each

SANDING SEALER: Fills small holes in balsa, paper and other porous materials, provides a smooth surface for paint or dope. To use, sand the surface, brush on sealer, let dry and sand again. Repeat as needed to obtain a glass-like surface. In 1 ounce bottles. Shipping weight 4 oz.
Cat. No. 651-SS-1 ........................................... $ .20 each

THINNER: For diluting butyrate dope, sanding sealer and Astroseal and for brush cleaning. Completely colorless — won't interfere with the drying action of the dope. Comes in 1 ounce bottles. Shipping weight 4 oz.
Cat. No. 651-BDT-1 ........................................... $ .20 each

WHITE GLUE: Preferred for rocket building! Sets fast, gives super strong joints with wood, paper, cloth and other porous materials. In 2 ounce plastic squeeze bottle. Shipping weight 6 oz.
Cat. No. 651-WG-1 ........................................... $ .40 each

Cat. No. 651-FM-1 ........................................... $ .30 each

FINISHING WAX: For the high gloss finish so important to appearance and low drag. Apply with soft cloth, let dry and polish with a soft, dry cloth. Recommended for use on enamel and butyrate finishes only. In 2 ounce jar. Shipping weight 5 oz.
Cat. No. 651-FW-2 ........................................... $ .80 each

SANDING MATERIAL: Fold, roll or crumple it for hard to reach places. Special mylar plastic backed abrasive sheet can be used over and over again. Helps you get a mirror finish. Extra fine 320 grit in easy to handle 2½" x 2½" sheets. Shipping weight 1 oz.
Cat. No. 651-SP-320 ........................................ 3 sheets $.10

SANDPAPER: Shape and smooth model rocket parts with these handy 3" x 3" sheets of top quality sandpaper. Available in three grades. Specify grade when ordering. Shipping weight 1 ounce for 6 sheets.
6 SHEETS MEDIUM — Cat. No. 651-SPM-2 .......... $ .10
6 SHEETS FINE — Cat. No. 651-SPF-2 ............ $ .10
6 SHEETS EXTRA FINE — Cat. No. 651-SPEF-2 .... $ .10
18 SHEETS ASSORTED (6 each) — Cat. No. 651-SPA-2 ... $ .25

PAINT BRUSHES: The set designed for model rocketry. You get one #1 brush for extra fine work, one #4 brush for normal work and one #6 brush for covering large areas rapidly. Brushes are 6" long with quality camel hair bristles set in nickel-plated ferrules. Available in sets of three only. Shipping weight 2 oz.
Cat. No. 651-PB-3 ........................................... $ .30 per set

MASKING TAPE: Secure engines in model, mask for painting, etc. Extra strong ½" wide tape comes in 30 foot rolls. Flexible, seals tightly and strips off clean. Shipping weight 5 oz.
Cat. No. 651-MT-1 ........................................... $ .30 each
DECALS

STARS AND BARS: Sheet of 12 red, white and blue Air Force emblems, each 1¼" wide. Fit on fins and body tubes, look great on gliders. Shipping weight 1 oz.
Cat. No. 651-D-1 $ .15 each

LARGE STARS AND BARS: Add a special touch to your large models. Sheet contains two large 2" insignia, two medium 1¼" insignia and appropriate designations. Shipping weight 1 oz.
Cat. No. 651-D-2 $ .15 each

¾" LETTERS AND NUMBERS: Identify and decorate models the easy way with these ¾" high letter and number decals. Sheet contains 62 characters. Available in black or white. Specify color when ordering. Shipping weight 1 oz.
Cat. No. 651-D-3 $ .15 each

¼" LETTERS AND NUMBERS: Ideal for code markings and identification on smaller rocketers. Sheet contains 65 characters ¼" high. Available in black or white. Specify color when ordering. Shipping weight 1 oz.
Cat. No. 651-D-4 $ .15 each

GOLD MINE SPECIAL: A real gold mine of decorative decals for your models. Lettering, vents, hatches, rivets and more, all on one big 3½" x 8½" sheet. Printed in brilliant red, white and black to add extra color. Shipping weight 1 oz.
Cat. No. 651-D-5 $ .25 each

#1 KIT NAMES DECAL: Dress up models with these special kit names decals. Identify and decorate — easy to apply. Comes in black or white. Specify color when ordering. Shipping weight 1 oz.
Cat. No. 651-D-6 $ .25 each

#2 KIT NAMES DECAL: New and extra-colorful, this decal sheet has names for the latest Estes models on a big 3½" x 8½" sheet. Printed in stand-out colors of red, yellow, white and black, you'll have the extra touch for good looking models when you use this sheet. Shipping weight 1 oz.
Cat. No. 651-D-11 $ .25 each

1/5" CHECKERBOARDS: Glossy, colorful 1/5" square checks on clear background. Add color contrast to model for easy tracking and eye appeal. Extra large sheets, 9½" x 4", available in red, black, gold or white. Specify color and check size when ordering. Shipping weight 1 oz.
Cat. No. 651-D-7 $ .25 each

¾" CHECKERBOARDS: Big ¾" square checks for your large models. Cut out special patterns for even more striking effects. Large 9½" x 4" sheets, available in red, black, white, gold or silver. Specify color and check size when ordering. Shipping weight 1 oz.
Cat. No. 651-D-8 $ .25 each

COLOR STRIPES: Put vertical stripes and horizontal rings on models the easy way. Each sheet has ten stripes, 1/32" through ½" wide and 9½" long. Available in red, black or yellow. Specify color when ordering. Shipping weight 1 oz.
Cat. No. 651-D-9 $ .25 each

LAUNCH PANEL DECAL: Identify controls and circuits on your launch panel with this easy-to-apply, pressure sensitive decal sheet. Aluminum letters on black background are easy to read, add extra eye appeal. Self-adhesive, just cut out and press in place. Extra-stong mylar sheet measures 3½" x 4¼". Shipping weight 1 oz.
Cat. No. 651-D-10 $ .50 each

DECORATING TAPE: Thin, tough, black pressure sensitive plastic tape is perfect for stripes, bars and other decorations. Easy to apply and only 0.0015 inch thick; decorating tape comes in ⅛ inch wide and 144 inch long rolls, can be cut with knife and straightedge for special sizes. Shipping weight 5 oz.
Cat. No. 651-DT-1 $ .25 each
MODELING TOOLS

PRECISION KNIFE SET: Includes one 4½" long #1 aluminum handle and one each #1A cutting blade, #1B punch blade, and #1C gauge blade. Recommended for precision work. Shipping weight 2 oz.
Cat. No. 651-KNS-1 $ .75 each

RETRACTABLE BLADE KNIFE: Heavy duty #2 aluminum handle, 4¼" long, with one double ended #2D Blade. Blade retracts into handle for safe carrying. For general cutting. Shipping weight 4 ounces.
Cat. No. 651-KNS-2 $1.00 each

UTILITY KNIFE: Includes 5½" long #3 steel handle and one #3E general purpose blade. Shipping weight 3 ounces.
Cat. No. 651-KNS-3 $ .30 each

HEAVY DUTY KNIFE: Set of one 4½" long #4 plastic handle with metal chuck and one general purpose knife blade similar to #4G. Shipping weight 6 ounces.
Cat. No. 651-KNS-4 $1.20 each

REPLACEMENT BLADES

Fits #1 handle only: For cutting balsa and paper.
Cat. No. 651-KNB-1A .50 each 3 for $1.50

Punch and scribe.
Cat. No. 651-KNB-1B $ .25 each

Fits #2 and #4 handles. For general cutting and trimming.
Cat. No. 651-KNB-4H $ .50 each 3 for $1.50

Fits #2 handle only: Double ended, for general cutting.
Cat. No. 651-KNB-2D $ .35 each

Fits #2 and #3 handles: Double ended, for general cutting.
Cat. No. 651-KNB-3E $ .15 each

EMERY BOARDS: Perfect for cleaning micro-clips, shaping airfoils, turning nose cones, etc. 4½" x ¾", medium abrasive on one side, fine abrasive on other. Shipping weight 1 ounce.
Cat. No. 651-EB-1 $ .30 each

TWEEZERS: For 1,001 uses in handling small parts, attaching shock cords, etc. Steel, 3½" long, ½" jaw. Shipping weight 2 ounces.
Cat. No. 651-T-1 $ .20 each

MODELING KITS

KNIFE CHEST: Small, medium and heavy duty knives plus 9 assorted extra blades — one for practically every cutting job. In a handy, natural finish wood chest. Shipping wt. 1 lb. 8 oz.
Cat. No. 651-KNS-82 $ 4.50 each

KNIFE AND TOOL SET: Contains small, medium and heavy duty knives and an entire assortment of blades, gauges, routers, and punches. Has planer, 1" sander, spokeshave and balsa shaper. In wooden box, complete with see-through cover and fitted plastic tray insert that holds and shows every tool. Shipping wt. 2 lbs.
Cat. No. 651-KNS-84 $11.00 each

COMPLETE HOBBY DEN TOOL CABINET: A truly complete tool set for the model rocketeer. Has a full assortment of hobby tools, knives and blades against a blueprint silhouette background of each tool for easy replacement. Comes in a sturdy wooden fitted cabinet with a sliding, see-thru cover. (Size 13½ x 21⅛ x 3") Shipping weight 9 pounds.

CONTENTS

1. Planer
2. Hammer (with extra beads)
3. Bench Vice
4. Assorted Gauges
5. Assorted Routers
6. Punches
7. Knives (with blades)
8. Hobbycraft Saw (with extra blades)
9. Tweezers
10. Screw Drivers
11. "C" Clamps
12. Tweezer
13. Tweezer
14. 3⁄8" Mandrel
15. Drill Bits
16. Driver Bits
17. Sandpaper
18. Razor Saw Blades
19. Chucks
20. Complete — $25.00

Plus Free copy of the 35¢ "PROJECT HANDBOOK AND HOBBY TOOL GUIDE" by X-ACTO.

Cat. No. 651-KNS-88N $25.00 each

Shipping weight on saw blade is 6 oz.
all other blades, 1 oz.
LITTLE ITEMS THAT GIVE BIG RESULTS IN ROCKETY

PHANTOM ENGINE: For display and demonstrations, here's 1/2 an engine, cut the long way to show placement of nozzle, propellant, etc. Helps explain model rocket operation. Soft, uses only non-combustible materials. Shipping weight 1 oz.

Cat. No. 651-CE-1 ........................................... $ .50 each

ENGINE HOLDER: Flat spring steel design gives easy installation and low drag. Recommended for sport and demonstration models built from BT-20 and BT-30, the engine holder is 2.8” long, 0.1” wide and only 0.025” thick. Mount it on the model with gauze and glue as shown on page 51. Net weight 0.032 oz. Shipping weight 1 oz.

Cat. No. 651-EH-2 ........................................... $ .15 each 3 for $ .30

SHORT ENGINE HOLDER: Specially designed for use with Series III engines and BT-20 and BT-30 body tubes, this holder is 1.8” long and 0.1” wide for the same easy installation and low drag as the standard model. Net weight 0.022 oz. Shipping weight 1 oz.

Cat. No. 651-EH-3 ........................................... $ .15 each 3 for $ .30

PAYLOAD: How high can your rocket lift an ounce of lead? This 1 oz. payload weight, ¾” in diameter, is used in some altitude competition events. Shipping weight 2 oz.

Cat. No. 651-PL-1 ........................................... $ .50 each 3 for $ 1.00

NOSE CONE WEIGHT: Balance rockets for perfect stability with these 11/16” diameter lead weights. Center hole for easy attachment and alignment. Stack several for more weight, cut with scissors for less. Each weighs 0.12 oz. Shipping weight 1 oz.

Cat. No. 651-NCW-1 ........................................... 3 for $ .25

NOSE CONE WEIGHT: 7/16” diameter brass washers for delicate balancing. ¼” center hole, weight 0.023 oz. Attach up to four weights to nose cone by threading them on the screw eye. Shipping wt. 1 oz.

Cat. No. 651-NCW-2 ........................................... 10 for $ .15

BALANCING WEIGHT: Flexible lead strip makes glider trimming a snap. Great for other balancing purposes too. Comes in 3” x 1/4” x 0.02” strips, net weight 0.085 oz. Shipping weight 1 oz.

Cat. No. 651-NCW-3 ........................................... 5 for $ .10

FOAM PADDING: Protect payload specimens, pad payload capsules with plastic foam. Pieces are 6” x 6” x 1/4”. Can be cut and secured in place with white glue. Net weight 0.08 oz. Shipping weight 1 oz.

Cat. No. 651-PSP-1 ........................................... $ .20 each 3 for $.50

LAUNCH LUGS: Super strength laminated launch lugs feature mylar plastic core for durability, paper outer layer for easy gluing. Inside diameter 5/32”, fit ½” rod. Shipping weight 1 oz.

1¼” long: ........................................... Cat. No. 651-LL-2A 5 for $ .10
2½” long: ........................................... Cat. No. 651-LL-2B 5 for $ .15
5” long: ........................................... Cat. No. 651-LL-2C 3 for $ .15
8” long: ........................................... Cat. No. 651-LL-2D 2 for $ .15

GAUZE REINFORCING: Attach shock cords, reinforce fin joints with unmarked gauze. Comes in 3” x 12” sheets. Apply by spreading a thin layer of glue over the area to be reinforced, smooth gauze down over the glue and spread one or more layers of glue over the gauze. Shipping weight 1 oz.

Cat. No. 651-GR-2 ........................................... $ .15 each 3 for $ .30

PAPER REINFORCING: Double fin strength with this easy to use self-adhesive treated paper. Cut to shape, strip off protective backing and press on the balsa. Apply to both sides of the balsa for best results. Provides smooth white surface for painting. In 3” x 9” sheets, shipping weight 1 oz.

Cat. No. 651-PRM-1 ........................................... $ .10 each 3 for $ .20

TAPE HINGES: Easy to use elevon hinges for boost-gliders. Treated paper, 4½” x ¾”, adhesive coated on one side. Strip off protective backing, apply to wing. Shipping weight 1 oz.

Cat. No. 651-TM-1 ........................................... 2 for $ .10

ELASTIC THREAD: Strong elastic thread, use as a spring to actuate elevons on boost-gliders. Each thread is 6” long, 1/32” diameter. Shipping weight 1 oz.

Cat. No. 651-ET-1 ........................................... 3 for $ .10

NYLON SCREWS: Extra light, high strength screws for elevon adjustment on boost-gliders. ½” long, 1/16” thread diameter. Read TR.4 for information on gliders and their design. Shipping weight 1 oz.

Cat. No. 651-AS-1 ........................................... 5 .10 each

STYROFOAM BALLS: Featherweight 3” diameter styrofoam balls for “odd ball” designs. Use white glue for best results in attaching legs, antennas, stabilizers, etc. Net weight 0.2 oz., shipping weight 5 oz.

Cat. No. 651-SB-3 ........................................... $ .25 each

DOWELS: Extra strong, light weight ½” x 18” seasoned maple dowels. Shipping weight 5 oz.

Cat. No. 651-WD-1 ........................................... 4 for $ .20
BATTERY PACK: Durable plastic cased 12 volt battery pack, ideal for use as a booster for the Electro-Launch, a power supply for other launchers, phone systems or any other range power application. Can be set up to deliver 3, 6, 9, or 12 volts. Requires 2, 4, 6, or 8 size D cells (not included) depending on voltage desired. Comes in kit form with complete instructions. Shipping weight 1 pound.
Cat. No. 651-BF-2 ................................ $1.50 each

TWO PIECE ROD: Handy collapsible two piece rod for portable launchers. Pieces slip together to make a 36" long rod. Base rod has a diameter of ⅛". Shipping weight 6 oz.
Cat. No. 651-LR-1 ................................ $ .35 each 3 for $ .70

ADD-ON ROD: Sturdy ½" diameter, 18" long launch rod section expands two piece rod (see above) to 52" length, gives extra control of flight path — especially with heavier models. To assemble, separate two piece rod, insert tapered end of add-on rod into hole in lower rod, insert upper rod into hole in add-on section. For a constant ¼" diameter launch rod, join two or three add-on sections together. Shipping weight 6 oz.
Cat. No. 651-LR-3 ................................ $ .20 per section

DELUXE BLAST DEFLECTOR: Durable pressed steel plate deflects engine blast out and away from launcher. Two inches wide, five inches long. Ideal for launchers that receive extensive use. Shipping weight 5 oz.
Cat. No. 651-BD-1 ................................ $ .60 each

BLAST DEFLECTOR PLATE: Slip-on metal deflecting plate fits any launcher using ½" rod, protects launcher base from rocket blast. Four inch diameter. Shipping weight 5 oz.
Cat. No. 651-BD-2 ................................ $ .35 each

PIVOT: Adjustable launch rod mounting pivots up to 25° to compensate for tilt of launcher base, windage, etc. Easy-to-assemble, mounts to launcher base with 2 #4 screws. (Rod not included.) Shipping weight 2 oz.
Cat. No. 651-LP-1 ................................ $ .35 each

IGNITERS: Easy-to-use, extra reliable igniters — the same as are supplied with all Estes engines. Suitable for ignition systems using 6 volts or more, see engine instructions for installation procedure. (Patent pending.) Shipping weight 1 oz.
Cat. No. 651-NW-1 ................................ 6 for $ .15

NICHROME WIRE: Electrical heating wire for model rocket ignition. #30 recommended for use with car batteries, #32 for use with other power supplies. Shipping weight 1 oz.
#30, 15 FOOT ROLL: Cat. No. 651-NW-30A ................................ $ .50 each
#32, 15 FOOT ROLL: Cat. No. 651-NW-32A ................................ $ .50 each

BATTERIES: Extra powerful size D photoflash batteries pack the energy needed for rocket launching. These are the type specified for the Electro-Launch, deliver up to 16 amperes of current on a complete short when fresh. Shipping weight 4 oz. each.
Cat. No. 651-PFB-1 ................................ $ .30 each

MASKING TAPE: Use to secure engines in models, mask for painting, etc. Strong, flexible ⅛" wide tape comes in 30' rolls. Shipping weight 5 oz.
Cat. No. 651-MT-1 ................................ $ .30 each

MICRO-CLIPS: Equip your launcher with the best. Spring-loaded solid copper clips attach lead wires to igniters. Easy to clean and highly conductive with flat contact surfaces. Only 1.1 inches long. Attach to leads with or without solder. Shipping weight 1 oz.
Cat. No. 651-MC-1 ................................ 2 for $ .25

GIANT BATTERY CLIPS: Heavy duty clips connect battery terminals up to 1" in dia. Clips are 3" long, available with red or black insulators. Specify color when ordering. Shipping weight 5 oz.
Cat. No. 651-BC-1 ................................ $ .40 each 2 for $ .75

BATTERY CLIP: Spring brass battery clips for special battery installations, replacement part for the Electro-Launch. Fit size D cells, can be trimmed to fit smaller batteries. Shipping weight 1 oz.
Cat. No. 651-BC-2 ................................ 2 for $ .20

LEAD WIRE: Flexible, durable size 18 two conductor insulated wire. Ideal as a lead from firing panel to launcher, zip the conductors apart for wiring inside the panel. In 12 foot lengths. Shipping weight 5 oz.
Cat. No. 651-LW-12 ................................ $ .70 each

Same quality lead wire as above, in 250 foot spools. Shipping weight 6 lb. Specify length when ordering.
Cat. No. 651-LW-250 ................................ $7.50 each

TERMINAL LUGS: Tiny ⅛" long solderless lugs make electrical connections a snap — insert bare wire into the end of the lug and crimp in place with pliers. ⅛" hole for terminal. Shipping weight 1 oz.
Cat. No. 651-TL-1 ................................ $ .05 each 3 for $ .10
**Electrical EQUIPMENT**

**PILOT LIGHT HOLDER:** Add visual control to your launch panel by wiring in an arm or continuity check pilot light. Holder is steel with ½" red plastic jewel, mounts in 7/16" hole. Takes either 6 or 12 volt bulbs, bulb not included. Shipping weight 4 oz.

Cat. No. 651-LH-1 $ .45 each

**6 VOLT BULB:** Fits holder No. LH-1. Shipping weight 1 oz. (Type 51.)

Cat. No. 651-AL-6 $ .20 each

**12 VOLT BULB:** Fits holder No. LH-1. Shipping weight 1 oz. (Type 53.)

Cat. No. 651-AL-12 $ .20 each

**KEY SAFETY SWITCH:** A must for every control panel. Prevents accidental launching of rockets. SPST, turns on key, must be turned off to remove key. Mounts in ½" hole. One key included with switch. Shipping weight 4 oz.

Cat. No. 651-KSW-1 $ 2.05 each

**EXTRA KEY:**... Cat. No. 651-KSW-1K $ .25 each

**PUSH BUTTON SWITCH:** Heavy duty construction momentary type, SPST, normally open. Excellent for use as a firing switch. Mounts in ½" hole. Shipping weight 4 oz.

Cat. No. 651-SWM-1 $ .90 each

**ROTARY SWITCH:** Twelve position single pole rotary switch - just right for use as a selector switch with firing systems using more than one launcher. With twelve positions, this switch should handle almost any need. Non-shorting, mounts in ¾" hole. Shipping weight 5 oz.

Cat. No. 651-SWR-1 $ 1.35 each

**DIAL PLATE:** Numbered 12 position plate for use with rotary switch No. SWR-1. Mounts on panel with same nut used to hold switch. Etched aluminum on black background. Shipping weight 1 oz.

Cat. No. 651-DP-1 $ .25 each

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**DRAFTING AND DESIGNING EQUIPMENT**

**TRIANGLE SET**

Clear plastic triangles are perfect for drafting and designing work. Set includes one 6" 45° triangle and one 8" 30°-60° triangle. Beveled edges - accurate - precise. Recessed lifts from both sides permit clean, easy pick-up. Shipping weight 6 oz.


**FRENCH CURVE**

Precision-made with sleek-finished edges of hairline accuracy. Perfect for designing nose cones, plotting curves, etc. Shipping weight 4 oz.

Cat. No. 651-DC-1 $ .25 each p.p.

**SCALE**

Precision 12" clear plastic scale is graduated in 1/32" on one side and in .050" on the other for easy, accurate measuring. Ideal for scale model and design work. Shipping wt. 11 oz.

Cat. No. 651-DR-1 $ .75 each p.p.

**PROTRACTOR**

Large 6" clear plastic protractor makes angle measurements a "snap." Features sharp graduations, accurate 6" ruler at the base. Shipping weight 4 oz.


**12" T-SQUARE**

Precision-made, clear plastic 12 inch T-square is accurate and easy to use. Smooth straight edges are marked in inches and millimeters. Shipping weight 11 oz.

Cat. No. 651-DR-2 $ .30 each p.p.

**METAL COMPASS**

Sheet metal German tool does double duty - can be used as pencil compass or divider. Includes metal capsule of leads. Shipping weight 4 oz.

Cat. No. 651-DC-2 $ .35 each p.p.

**BOW COMPASS**

Grant bow compass features thumb screw adjustment, interchangeable points for use as divider, ink or pencil compass. Heavy gauge nickel plated steel. Shipping weight 6 oz.

Cat. No. 651-DC-3 $ 5.10 each p.p.
BOOKS AND LITERATURE

DESIGN BOOKLET
Make sure you have this up to date and authoritative model rocket design and plan booklet. Contains complete plans for the Arrow-C, Orange Bullet, and many other well-known and much-flown model rockets. Also includes basic tech reports and lots of information on rocket construction. Thoroughly illustrated, this is a "must" for all beginners and a good review and reference book for experienced rocketeers. Shipping wt. 4 oz.
Cat. No. 651-P-1 ........................................................................................................... $ .50 each 3 for $1.00

WHY MODEL ROCKETRY?
A 28 page booklet presenting clearly why model rocketry was developed. An ideal aid to explain your activities to a non-modeler. Shipping wt. 2 oz.
Cat. No. 651-BK-1 ........................................................................................................... $ .20 each
Note: HB-1, HB-2, and HB-3 may not be included in discount orders.

SPACE VOLUNTEERS By Terrence Kay
A fascinating introduction to Space Medicine. Tells the story of the tests leading up to the first manned flights into space, of the unsung heroes who risked their lives to make space travel safer. Shipping weight 1 lb., 6 oz.
Cat. No. 651-HB-1 ........................................................................................................... $3.20 each

ROCKETS AND YOUR FUTURE By Stanley Beiler
Looking for a space-age career? Rockets and Your Future is an information-packed career guide and an easy-to-read manual on basic astronautics. You'll want this one on your bookshelf for sure. Shipping weight 1 lb., 6 oz.
Cat. No. 651-HB-2 ........................................................................................................... $3.75 each

GUIDE TO ROCKETS, MISSILES AND SATELLITES
By Homer F. Newell
Written by the Director of the Office of Space Sciences, NASA, this book tells all about the big birds, Aelius to Zuni, and over 100 in between. Filled with clear pictures and basic information on size, thrust, range, etc., this book is a must for the scale model builder and the student of astronautics. Shipping weight 1 lb., 6 oz.
Cat. No. 651-HB-3 ........................................................................................................... $3.50 each

TECHNICAL REPORTS

ROCKET STABILITY: All about rocket stability. Easy to read, tells how to design your rockets to fly properly. No rocketeer will want to miss this one. Shipping weight 1 oz.
Cat. No. 651-TR-1 ........................................................................................................... $ .25 each 3 for $ .50

Cat. No. 651-TR-2 ........................................................................................................... $ .25 each 3 for $ .50

ALTITUDE TRACKING: The classic work on simple altitude tracking for model rocketeers. Covers thoroughly tracking and altitude computation. Easy to understand and apply. Shipping weight 1 oz.
Cat. No. 651-TR-3 ........................................................................................................... $ .25 each 3 for $ .50

REAR ENGINE BOOST-GLIDERS: Basic information to help you understand the operation of rear-engine boost-gliders and design your own. Covers design and construction for proper upward flight and good glide characteristics. Shipping weight 1 oz.
Cat. No. 651-TR-4 ........................................................................................................... $ .25 each 3 for $ .50

BUILDING A WIND TUNNEL: Full plans and information for building a wind tunnel to study rocket stability. Covers motor and handpowered versions, finding center of pressure, checking multi-stage rockets, etc. Great for clubs and experienced modelers - science fair projects too. Shipping weight 2 oz.
Cat. No. 651-TR-5 ........................................................................................................... $ .25 each 3 for $ .50

CLUSTER TECHNIQUES: The complete report on clustering engines in model rockets. Thoroughly illustrated, easy to understand. Especially valuable for the modeler who wishes to loft larger payloads. Shipping weight 1 oz.
Cat. No. 651-TR-6 ........................................................................................................... $ .25 each 3 for $ .50

FRONT ENGINE BOOST-GLIDERS: Valuable information on designing, building and flying front engine boost-gliders. Fully illustrated, recommended reading for anyone who wishes to build better gliders or get the best performance from the ones he has. Shipping weight 1 oz.
Cat. No. 651-TR-7 ........................................................................................................... $ .25 each 3 for $ .50

MODEL ROCKERY STUDY GUIDE: Presents a logical program for model rocketeers who want to get the most good from their activities. Includes a listing of recommended books on subjects relating to model rocketry. Shipping weight 1 oz.
Cat. No. 651-TR-8 ........................................................................................................... $ .25 each 3 for $ .50

DESIGNING STABLE ROCKETS: Based on standard engineering practices, this report presents a method of designing rockets for proper stability on paper before any cutting or gluing is done. Worthwhile reading for beginner and experienced rocketeers alike. Shipping weight 1 oz.
Cat No. 651-TR-9 ........................................................................................................... $ .25 each 3 for $ .50
MODEL ROCKET NEWS

Here’s the number one source for valuable information and ideas on model rocketry. Get these back issues for useful tips ‘n’ hints, rocket plans, technical reports and interesting and enjoyable reading. Sorry, separate issues from Volumes 1 and 2 are not available. Shipping weight on each MRN is 2 ounces.

Sixteen pages packed with the best in ideas, plans and information from Volumes 1 and 2. Includes plans for the Bug-A-Bye, Dirty Bird III and Cloud Buster, stories on the Crickenafts and “Guppies into Inner Space,” Model Rocket Glossary, two full pages from the Idea Box and info on underwater rockets. Shipping weight 3 oz.

Cat. No. 651-MRN-1 ........................................... $ .50 each

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