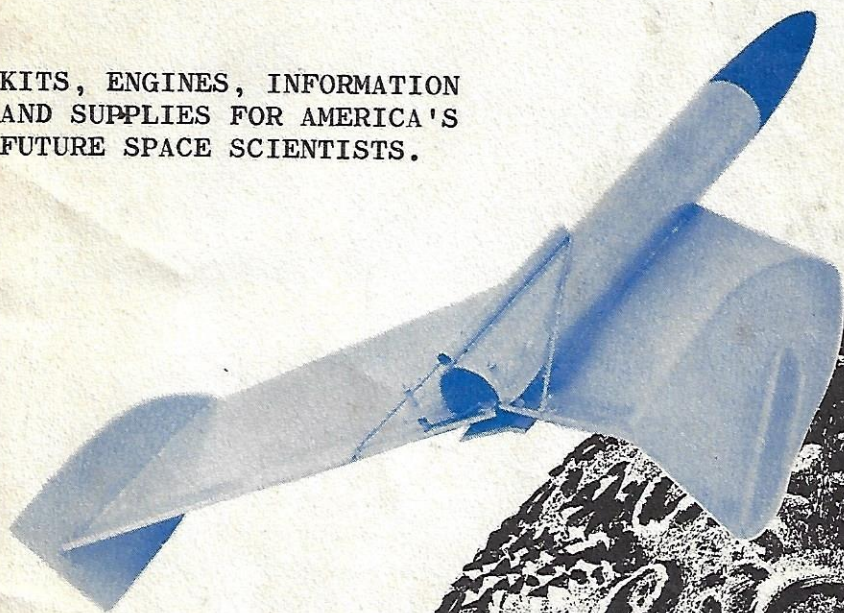


ESTES

MODEL Rocket Supplies

KITS, ENGINES, INFORMATION
AND SUPPLIES FOR AMERICA'S
FUTURE SPACE SCIENTISTS.



Catalog
No. 631

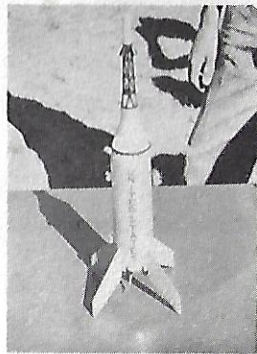
PRICE - 25¢

Estes Industries, Inc.

BOX 227
PENROSE, COLORADO

Devoted to . . . Safety . . . Education . . . Enjoyment . . . in rocketry

WHAT IS MODEL ROCKETRY?



Imagine the thrill of pressing the firing 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 streamer or parachute blossoms out, returning the rocket to the earth undamaged, ready for another flight.

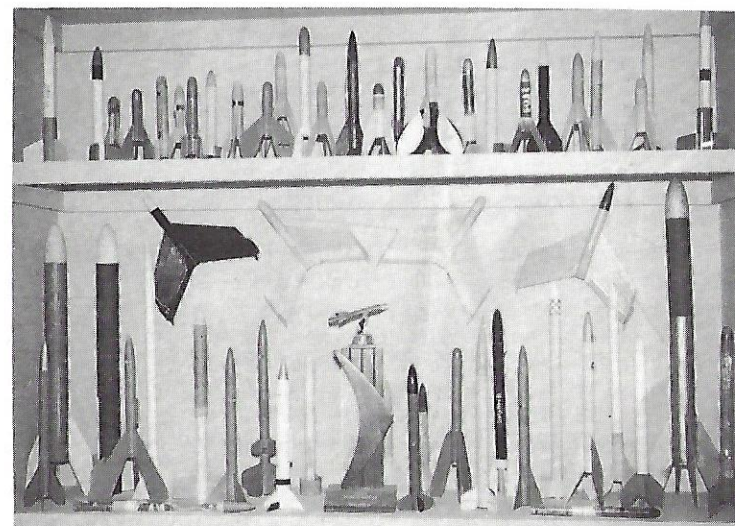
But there is more to model rocketry than this. Not only is it thrilling, but it provides an unexcelled opportunity to study and learn space science, to begin studying for a career dedicated to pushing man's frontiers farther and farther towards the stars. Scores of young rocketeers today are finding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

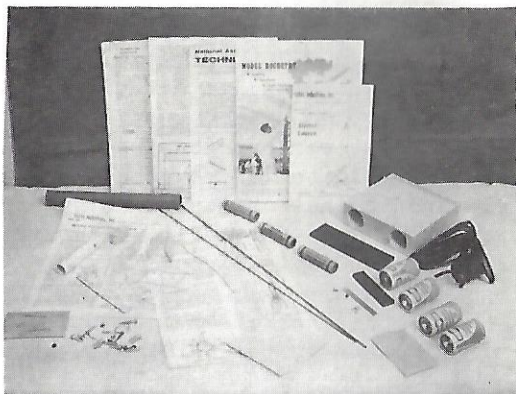
How does model rocketry accomplish this? A model rocket itself is a highly specialized mechanism, light in weight, utilizing nonmetallic materials such as paper, plastic, and balsa. By using these materials, the model rocketeer gains the highest performance from a prepackaged commercial engine, and is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

The model rocketeer does not fabricate 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 is necessary if this country is to survive the coming years of the Cold War and, if it should ever arise, a major war. Practical experience, gained from working with the same principles, theories, and ideas which will be used in his profession, is necessary if today's youth are to be motivated to study for vital careers in the space sciences. As such, they become pioneers, pioneers of the greatest frontier man has ever faced.



Getting Started in Model Rocketry



Model rocketry can be simple or it can be a complex business. It can involve the use of calculus to determine the speed of a model rocket at any instant of its flight, it can involve the construction of a smoke tunnel to study exact air flow characteristics, the construction of analog computers, or it can lead into any one of the hundreds of other areas of science. No matter what the young scientist's special interest, he can find that model rocketry will fit in perfectly with it.

While the results of a model rocketry program can be, and often are, advanced scientific research programs, beginning in model rocketry is a very easy thing. There is, in fact, only one way to get started in model rocketry--by building and launching model rockets. To make this first step easier and more convenient, Estes Industries has prepared two Beginners Specials.

The first of these specials, and the most complete, is the \$6.00 Beginners Special, which contains all the materials necessary for a successful start in model rocketry. It consists of a kit for the construction of America's most flown rocket, the Astron Scout, three engines for launching this rocket, a launcher to ignite the engine and guide the rocket during the initial portion of its flight, batteries for the launcher, and the Design Booklet, the most complete collection of information on model rocketry available in one cover. The only other things needed are a pair of pliers, a screw driver, some glue, paint, and sandpaper.

The Astron Scout rocket kit introduces the young scientist to the methods of constructing model rockets and illustrates vividly the important principles of balance involved in the flight of model rockets. With the three rocket engines included in the kit, the rocketeer can fly his rocket to altitudes of up to 1,000 feet and learn the relation of engine impulse to rocket performance.

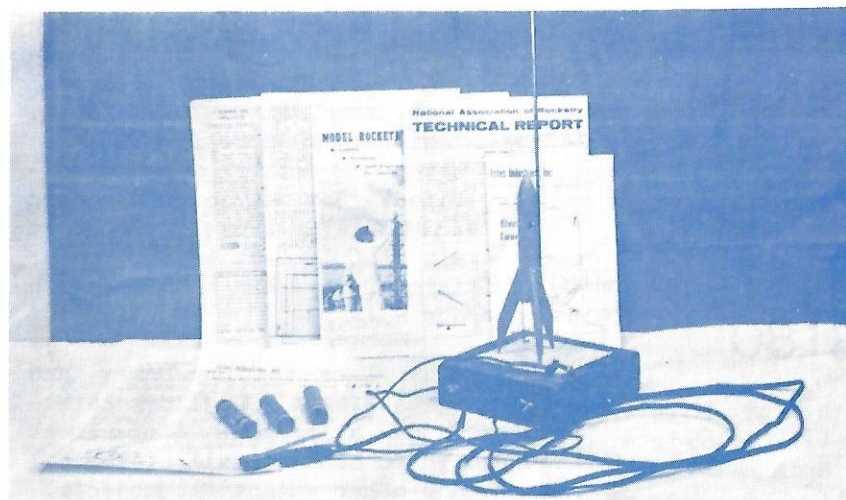
The Electro-Launch and batteries included in the special not only enable the rocketeer to launch his rockets with relative safety and convenience, but also form a permanent part of his rocketry equipment. The Electro-Launch is durable, and will last for hundreds of launchings. While building and using his Electro-

Launch the rocketeer learns about the best methods of igniting rocket engines.

The Design Booklet included with the rocket and the launcher includes plans for seven single and multi-stage rockets, information on the design and operation of model rockets, including technical report TR-1 which describes completely the factors involved in rocket stability and technical report TR-2 which covers completely the subject of multi-stage model rocket design and construction.

With the materials and information contained in the \$6.00 Beginners Special the young scientist can quickly and easily make his entry into the study of model rocketry. There is also a \$2.00 Beginners Special available. This special is the same as the \$6.00 Beginners Special except it does not contain the Electro-Launch and batteries. With this set the rocketeer must design and construct his own electrical launching system.

Either of these assortments provides for an easy entry into, and rapid learning of, model rocketry. So why delay? Pick the set that is best for you and join the ranks of America's young scientists who are preparing for tomorrow with model rocketry.



\$6.00 BEGINNERS SPECIAL

CONTAINS:

- 1 ASTRON SCOUT KIT #631-K-1
- 1 DESIGN BOOKLET #631-P-1
- 1 A.8-3 ENGINE #631-A.8-3
- 1 1/2A.8-2 ENGINE #631-1/2A.8-2
- 1 1/4A.8-2 ENGINE #631-1/4A.8-2
- 1 ELECTRO-LAUNCH #631-FS-1
- 4 BATTERIES #631-PFB-1

Cat. No. 631-BS-6 \$6.00 each
Shipping Weight 3 lbs

\$2.00 BEGINNERS SPECIAL

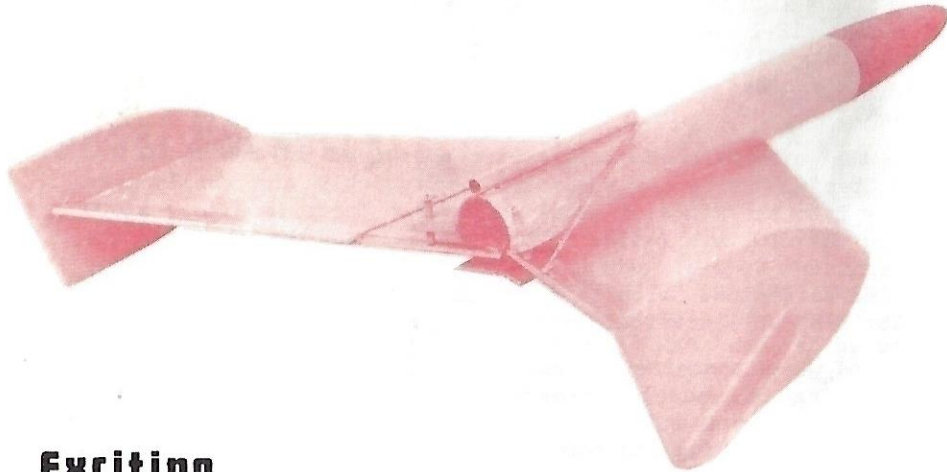
CONTAINS:

- 1 ASTRON SCOUT KIT #631-K-1
- 1 DESIGN BOOKLET #631-P-1
- 1 A.8-3 ENGINE #631-A.8-3
- 1 1/2A.8-2 ENGINE #631-1/2A.8-2
- 1 1/4A.8-2 ENGINE #631-1/4A.8-2

Cat. No. 631-BS-2 \$2.00 each
Shipping Weight 8 oz

ASTRON SPACE PLANE

patent pending



Exciting Rocket Glider

Rocket powered glider--ascends vertically, then glides to a gentle landing. The most successful boost glider ever developed. Winner of more first places than all other designs combined. Set new world's record at NARAM-4, broke the record again at COLREG-1. Every Senior division record has been set with a Space Plane.

KIT PRICE

(COMPLETE EXCEPT FOR ENGINES)

\$1.80

Length	10 in	accurate adjustment of glide characteristics and a payload compartment large enough to handle small biological specimens and other scientific objects.
Body Dia.	.765 in	
Wing Span	9 in	
Weight	.5 oz	

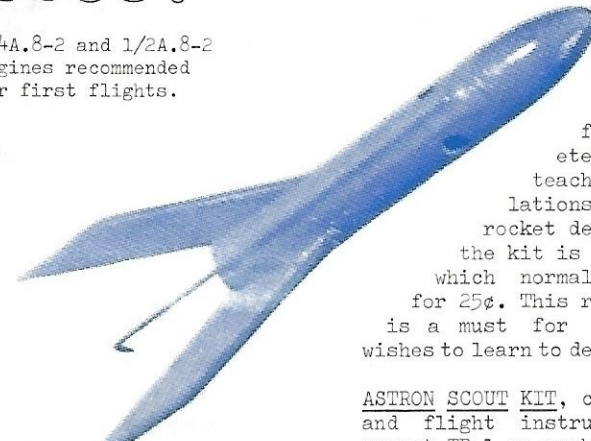
The Astron Space Plane is easy to launch, and with proper care can last for over fifty flights. This kit is recommended for the experienced modeler, and must be assembled with precision and care.

ORDER. . . ASTRON SPACE PLANE - Cat. No. 631-K-3 \$1.80
Shipping Weight. 6 oz
1/4A.8-2 and 1/2A.8-2 engines recommended for first flights.

ASTRON SCOUT

recommended for beginners
favorite of experts

1/4A.8-2 and 1/2A.8-2 engines recommended for first flights.



The Astron Scout kit provides excellent experience for the beginning rocketeer. It dynamically teaches the important relationships of balance in rocket designs. Included with the kit is technical report TR-1 which normally sells separately for 25¢. This report, included free, is a must for every rocketeer who wishes to learn to design his own rockets.

ASTRON SCOUT KIT, complete with assembly and flight instructions and technical report TR-1 on rocket stability,

Length 7 in
Body Dia. .765 in
Weight .28 oz

Cat. No. 631-K-1 \$1.70 each
Shipping Weight 2 oz

EASY TO BUILD - FUN TO FLY!

ASTRON MARK

Use 1/2A.8-2 engines for first flights.

\$1.25

(COMPLETE EXCEPT FOR ENGINES)



The Astron Mark is excellent for the beginner in model rocketry. This kit is easy to build, and acquaints the rocketeer with the methods of streamer recovery. Ideal for demonstrations and sport flying.

ASTRON MARK KIT complete with assembly and flight instructions,
Cat. No. 631-K-2 \$1.25 each
Shipping Weight. 5 oz

Length 9.12 in
Body Dia. .765 in
Weight .65 oz

Astron Apogee

High performance two stage rocket. The Astron Apogee is the first two stage kit designed specifically for payload research. Kit comes with large capacity transparent payload compartment! Now you can launch payloads to high altitudes and observe the condition of the payload without removing it from the rocket. Excellent for use with science fair projects. The Astron Apogee gives thrilling performance because of its superior aerodynamic form and extremely light weight--only 1/2 ounce with booster, payload section, and parachute in place. The Astron Apogee kit comes complete with parachute, payload section, and full instructions for assembly and flight. May be flown either with or without payload section.

Cat. No. 631-K-5 \$2.00 each
Shipping Weight 6 oz

Weight .55 oz
Body Dia. .736 in
Length 12.2 in

**CARRIES PAYLOADS TO
2000' AND OVER!**

(Complete except for engines 1/4A.8-4 upper stage engine and 1/4A.8-0 booster engine recommended for the first flights.)



Astron Ranger

SPECTACULAR PERFORMANCE!

A REAL THRILL TO FLY!

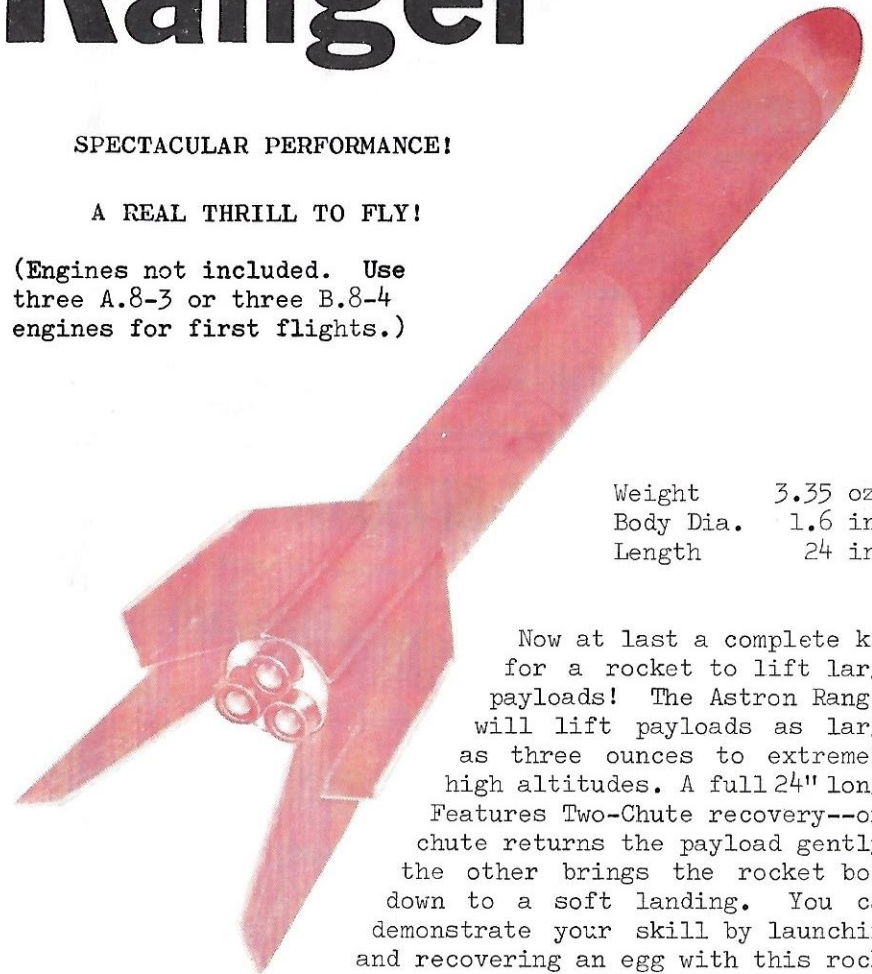
(Engines not included. Use three A.8-3 or three B.8-4 engines for first flights.)

Weight 3.35 oz
Body Dia. 1.6 in
Length 24 in

Now at last a complete kit for a rocket to lift large payloads! The Astron Ranger will lift payloads as large as three ounces to extremely high altitudes. A full 24" long. Features Two-Chute recovery--one chute returns the payload gently, the other brings the rocket body down to a soft landing. You can demonstrate your skill by launching and recovering an egg with this rocket! The ideal vehicle to carry a small camera aloft. The Astron Ranger kit comes complete with all necessary parts, assembly and flight instructions. This rocket is a "must" for the experienced rocketeer!

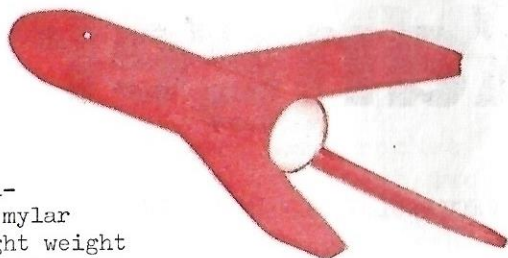
Cat. No. 631-K-6
Shipping Weight

\$3.75 each
13 oz



ASTRON STREAK

(Engines not included)



The ultimate pee wee!
Extremely light weight-- weighs only 1/8 ounce without engine. Uses special mylar body tube to give this light weight with high strength. Ideal kit for contests and records, will reach altitudes up to 2000 feet. Recommended engine for normal flying is 1/4A.8-2. Kit complete with all parts and easy to follow instructions.

Cat. No. 631-K-4
Shipping Weight

\$.50 each
4 oz

Weight .125 oz
Body Dia. .72 in
Length 5.6 in

ASTRON PHANTOM

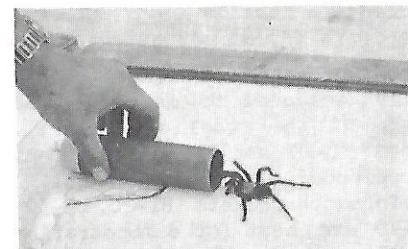
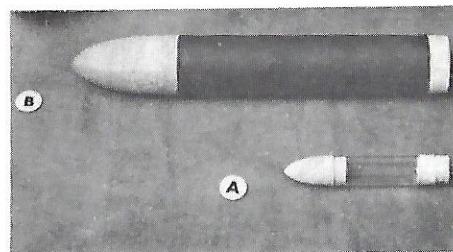


This bird will never fly, but it will certainly help get your science fair project or special demonstration off the ground! The Astron Phantom shows clearly the inside parts of a model rocket, including recovery system, engine block, engine, and the other items necessary to fly a rocket, all plainly visible through the transparent body tube. The engine is this rocket is something special: It is one half of an actual engine, cut lengthwise to show its components vividly. The engine uses a special clay mixture instead of fuel, so it is perfectly safe. Different colors of clay indicate the different propellant compositions. With the Astron Phantom you can easily answer your friends' and teachers' questions on the operation of model rockets. Kit comes complete with all parts and assembly instructions, but without fins.

Weight .72 oz
Body Dia. .736 in
Length 8.7 in

Cat. No. 631-K-7 \$2.00 each
Shipping Weight 5 oz

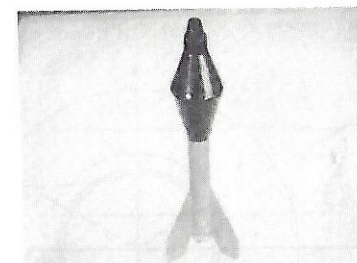
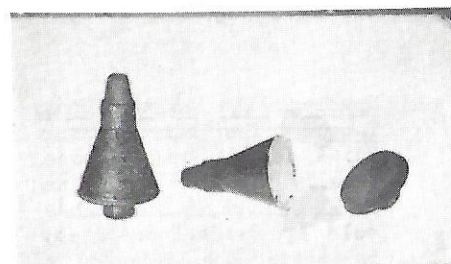
Payload Sections



Cat. No.	Type	Net Weight	Uses Cone #	Fits	Dimensions			Price Each
					A	B	C	
631-PS-20A	Clear Plastic	.16 oz	BNC-20A	BT-20	.710"	2"	4.00"	\$.80
631-PS-30B	Standard Tube	.24 oz	BNC-30D	BT-30	.725"	2"	3.75"	\$.65
631-PS-40A	Clear Plastic	.32 oz	BNC-40D	BT-40	.765"	2"	3.75"	\$.85
631-PS-50B	Standard Tube	.36 oz	BNC-50K	BT-50	.950"	3"	6.50"	\$.85
631-PS-60B	Standard Tube	.90 oz	BNC-60L	BT-60	1.595"	6"	10.5"	\$1.25

Dimension "A" is inside diameter, "B" is inside length, and "C" is overall length. Payload sections come complete with all needed parts, including nose cone, body tube, nose block, and screw eye. Shipping weight for PS-20A, 30B, and 40A is 1 oz., for PS-50B, 4 oz., and for PS-60B, 11 oz.

Mercury Capsule



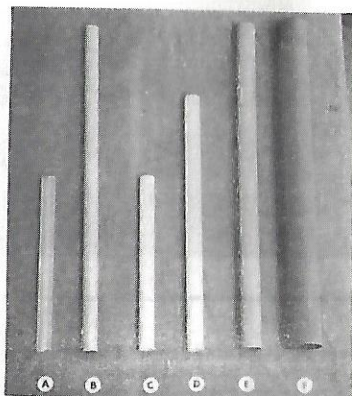
Now a special payload compartment to add a special touch to your rockets. This is a model Mercury Capsule, 1.8 inches in diameter and 3.2 inches high, equipped with a removable end so that the large capacity payload area is easily accessible. The Astron Mercury Capsule comes in easy to assemble kit form, and includes adapters to fit the capsule to all sizes of body tubes sold by Estes Industries. Kit comes complete with all parts and complete assembly instructions. Be the first in your neighborhood to launch a Mercury Capsule!

Cat. No. 631-PSM-1
Shipping Weight

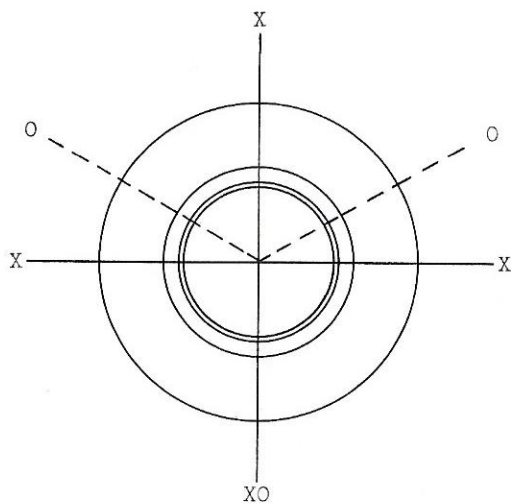
\$1.00 each
5 oz

Body Tubes

The body tubes below have been carefully selected to meet all normal needs of the model rocketeer. Body tubes BT-10 and BT-20 are especially recommended for light weight, high performance rockets, BT-20, BT-30, and BT-40 are best for demonstration and small payload rockets, BT-50 is recommended for medium payload and demonstration rockets, while BT-60 is the best body tube for cluster power applications and larger payloads.



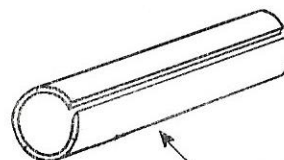
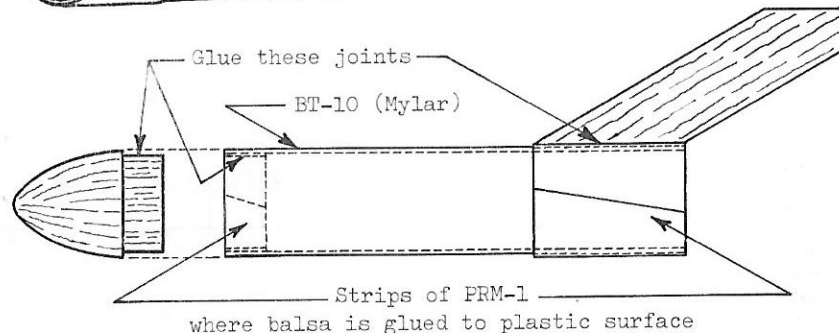
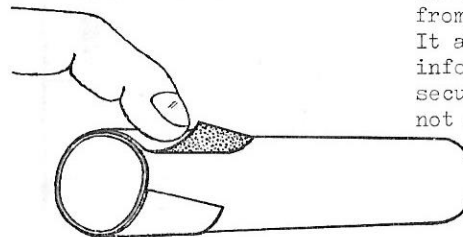
Cat. No.	Length	Ill.	Inside Diameter	Wall Thickness	Weight Per Inch	Ship. Wt.	Price	
							Each	3/for
631-BT-10	9"	A	.710"	.005"	.0098 oz	4 oz	\$.25	\$.50
631-BT-20	18"	B	.710"	.013"	.016 oz	11 oz	\$.35	\$.70
631-BT-30	9"	C	.725"	.021"	.030 oz	4 oz	\$.25	\$.50
631-BT-40	13.75"	D	.765"	.028"	.043 oz	7 oz	\$.30	\$.60
631-BT-50	18"	E	.950"	.013"	.021 oz	11 oz	\$.40	\$.90
631-BT-60	18"	F	1.595"	.021"	.068 oz	11 oz	\$.60	\$1.40



Fin Spacing Guide

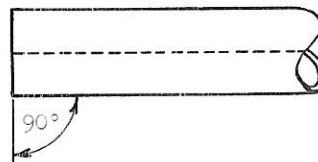
Spacing Fins on the Body Tube: The Fin Spacing Guide is set up to space equally three or four fins on all sizes of body tubes sold by Estes Industries. To space the fins on a rocket, place the tube so that it is centered in the circles, then mark the tube at the proper points, indicated by the X lines for four fins and by the O lines for three fins. With the marks on the tube in the proper place, draw the necessary lines on the tube as shown in the bottom drawing on the next page.

BT-10 is an ultra-light weight mylar tube for use with the feather weight recovery system only. It will not withstand the heat of the ejection charge when the engine is not ejected from the rocket body by the charge. It also requires the use of paper reinforcing material as shown below to secure glued parts, as the glue will not stick to the mylar tube.

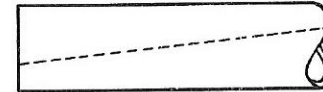


2 to 3 inch piece of body tube

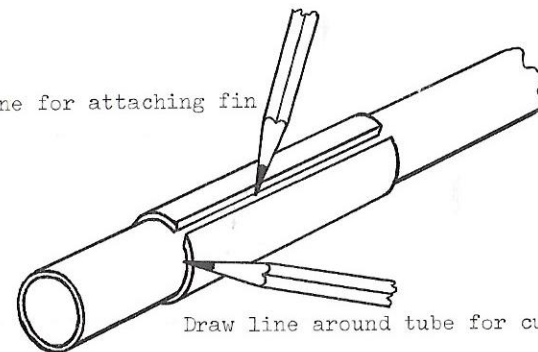
Slit straight for straight fins



Slit at angle for spin fins



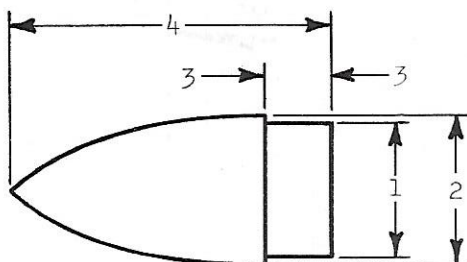
Set marker to draw line for attaching fin



Draw line around tube for cutting

NOSE CONES

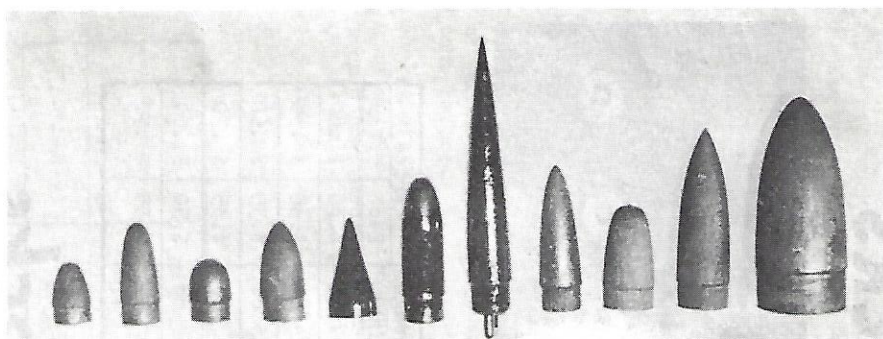
Cat. No.	Dimensions				Material	Ill.	Fits Body Tube	Average Weight	Ship. Wt.	Price	
	1	2	3	4						Each	3/for
631-BNC-10A	.702"	.728"	1/4"	1 1/16"	Balsa	A	BT-10	.03 oz	1 oz	\$.25	\$.50
631-BNC-10B	.702"	.728"	5/16"	2"	Balsa	B	BT-10	.05 oz	1 oz	\$.25	\$.50
631-BNC-20A	.710"	.736"	1/4"	1 1/16"	Balsa	A	BT-20	.03 oz	1 oz	\$.25	\$.50
631-BNC-20B	.710"	.736"	5/16"	2"	Balsa	B	BT-20	.05 oz	1 oz	\$.25	\$.50
631-BNC-30C	.725"	.767"	3/8"	1 1/8"	Balsa	C	BT-30	.04 oz	1 oz	\$.30	\$.60
631-BNC-30D	.725"	.767"	3/8"	1 7/8"	Balsa	D	BT-30	.06 oz	1 oz	\$.30	\$.60
631-BNC-30E	.725"	.767"	7/16"	2 5/8"	Balsa	E	BT-30	.07 oz	1 oz	\$.40	\$.80
631-BNC-40D	.765"	.822"	3/8"	1 7/8"	Balsa	D	BT-40	.06 oz	1 oz	\$.30	\$.60
631-PNC-40F	.822"	.922"	1/4"	1 7/8"	Plastic	F	BT-40	.08 oz	1 oz	\$.30	\$.60
631-PNC-40G	.765"	.822"	1/2"	5"	Plastic	G	BT-40	.71 oz	5 oz	\$.75	\$2.25
631-PNC-40H	.765"	.822"	1/2"	2 3/4"	Plastic	H	BT-40	.40 oz	2 oz	\$.35	\$.80
631-BNC-50J	.950"	.976"	1/2"	1 7/8"	Balsa	J	BT-50	.07 oz	4 oz	\$.40	\$.80
631-BNC-50K	.950"	.980"	1/2"	3 1/4"	Balsa	K	BT-50	.13 oz	4 oz	\$.50	\$.90
631-BNC-60L	1.595"	1.637"	5/8"	4"	Balsa	L	BT-60	.18 oz	4 oz	\$.75	\$1.50
631-BNC-MTD	.937"	1.002"	3/8"	1 7/8"	Balsa	D	Mailing Tube	.06 oz	4 oz	\$.30	\$.60



NOTE: Dimensions may vary by .003". The nose cone for the mailing tube may have some slight imperfections due to the fact that it is made from a standard size piece of wood which is a few thousandths of an inch smaller than it should be. These imperfections are not usually noticeable after the rocket is completed.

CAUTION: If using light weight balsa nose cones be sure to study TR-1 on rocket balance and stability.

Don't forget to order screw eyes and nose cone weights.

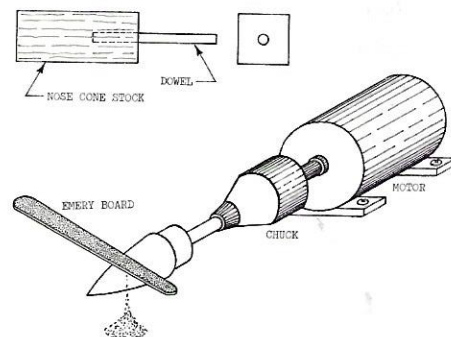


A B C D F H G E J K L

NOSE CONE STOCK: 4" to 6" lengths of balsa block for making nose cones of your own design. These balsa blocks are cut-off pieces from our nose cone manufacturing operation, and have damaged corners which will not interfere with their usability. Available in two sizes, 1" x 1" and 2" x 2".

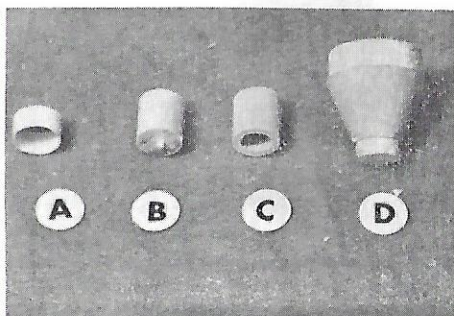
1" x 1" nose cone stock:
 Cat. No. 631-NCS-1 \$.15 each
 Shipping Weight 1 oz

2" x 2" nose cone stock:
 Cat. No. 631-NCS-2 \$.20 each
 Shipping Weight 3 oz



Nose Blocks

Light weight balsa wood nose blocks. Used to prevent hot ejection charge gases from escaping into payload sections. Also used to provide solid bulkhead to retain engine in designs such as the Astron Space Plane. Shipping weight for 1 to 3 nose blocks, engine blocks, or couplers fitting BT-40 or smaller is one ounce, 1 to 3 fitting larger sizes, 4 ounces.



Cat. No.	Fits	O. D.	Length	Average Weight	Price	
					Each	3/for
631-NB-20	BT-20	.710"	3/4"	.014 oz	\$.30	\$.60
631-NB-30	BT-30	.725"	3/4"	.014 oz	\$.30	\$.60
631-NB-40	BT-40	.765"	3/4"	.015 oz	\$.30	\$.60
631-NB-50	BT-50	.950"	1"	.04 oz	\$.35	\$.70
631-NB-60	BT-60	1.595"	1 1/2"	.23 oz	\$.50	\$1.00
631-NB-1MT	Mailing Tube	.937"	1"	.04 oz	\$.35	\$.70

Engine Blocks

Cat. No.	Fits	O. D.	I. D.	Length	Average Weight	Material	Price	
							Each	3/for
631-EB-20A	BT-20	.708"	.650"	1/4"	.009 oz	Paper	\$.10	\$.20
631-EB-30A	BT-30	.724"	.650"	1/4"	.010 oz	Paper	\$.10	\$.20
631-EB-40A	BT-40	.763"	.650"	1/4"	.011 oz	Paper	\$.10	\$.20
631-EB-20	BT-20	.710"	.460"	3/4"	.007 oz	Balsa	\$.30	\$.60
631-EB-30	BT-30	.725"	.460"	3/4"	.007 oz	Balsa	\$.30	\$.60
631-EB-40	BT-40	.765"	.460"	3/4"	.007 oz	Balsa	\$.30	\$.60
STAGE COUPLERS								
631-JT-20C	BT-20	.708"	.650"	3/4"	.027 oz	Paper	\$.10	\$.20
631-JT-30C	BT-30	.724"	.650"	3/4"	.030 oz	Paper	\$.10	\$.20
631-JT-40C	BT-40	.763"	.650"	3/4"	.033 oz	Paper	\$.10	\$.20
631-JT-50C	BT-50	.950"	.920"	1"	.051 oz	Paper	\$.15	\$.30
631-JT-60C	BT-60	1.595"	1.550"	1 1/2"	.124 oz	Paper	\$.15	\$.30

Adapters

Adapters, such as the one shown in figure D on the opposite page, are used to provide a transition from one size body tube to another. Estes Industries supplies two types of adapters, paper and balsa. The balsa adapters are turned pieces of high grade balsa wood, with fittings at one end to mate a smaller diameter tube and fittings at the other end to mate a larger diameter tube. These adapters are made to match BT-20 to BT-50, BT-20 to BT-60, and BT-50 to BT-60. The catalog number of the part indicates which tubes it will mate, so the TA-2050 is designed to match BT-20 to BT-50. Adapters whose smaller end is designed for BT-20 may be used with BT-30 and BT-40 by simply building the end of the adapter up slightly with tape. If a hollow adapter is desired to provide a passage for ejection charge gases or upper stage ignition gases, the passage may be made with a knife or drill. The knife (KN-1) and the type C gouge blade make excellent tools for this work. If the balsa should crack or break while it is being hollowed, it may be glued together again easily, resulting in a part that is stronger than before.

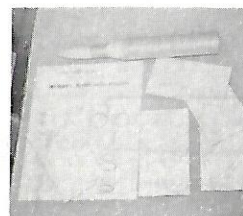
The paper tube adapters, TA-1, are especially useful for centering one size of tube inside another and for making a light weight transition from a clustered booster to a single engined upper stage. Any adapter which is to carry an ejection or ignition charge should be coated on the inside with silicate of soda, or if it is not available, enamel paint or white glue will work quite well.

Balsa Adapters

Cat. No.	Mates	Length	Mating Surface	Taper Length	Material	Price Each
631-TA-2050	BT-20 to BT-50	3"	1/2"	2"	Balsa	\$.40
631-TA-2060	BT-20 to BT-60	3"	1/2"	2"	Balsa	\$.60
631-TA-5060	BT-50 to BT-60	3"	1/2"	2"	Balsa	\$.60

Shipping weight, 1 to 3 adapters, 4 ounces.

Paper Adapters



TUBE ADAPTERS: Sold in sets only. Set includes the listed adapter rings, instructions, and 3 universal tapered shrouds. Ideal for building scale models, cluster powered lower stages, and many other uses. Two rings each are provided for centering BT-20, BT-30, and BT-40 in BT-50, and two each for centering BT-20, BT-30, BT-40, and BT-50 inside BT-60. Two off center rings are provided for building cluster booster adapters

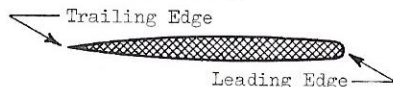
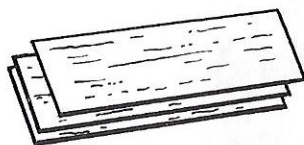
using BT-20 and BT-60. The perfect collection for the rocketeer who wants to build those special purpose rockets. Does not include body tubes or nose cones.

Cat. No. 631-TA-1
Shipping Weight

\$.35 each set
2 oz

Fin Stock

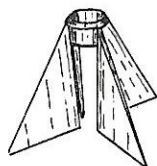
High grade balsa sheeting in various sizes and thicknesses for use in making fins for model rockets. For maximum strength, the grain of the balsa should follow the leading edge of the fin, running from the body joint to the tip in such a manner that the grain may be followed from any point on the fin to the body. If additional strength is desired, reinforcing material PRM-1 may be used. To achieve the best performance from a fin unit, it should be shaped so that the leading edge is rounded and the trailing edge pointed, as in the drawing below. Shipping weight for three sheets, four ounces.



Cat. No.	Dimensions			Weight Each	Major Use	Price 3/for
631-BFS-10	1/32"	3"	9"	.065 oz	High Performance	\$.35
631-BFS-20	1/16"	3"	9"	.130 oz	High Performance	\$.40
631-BFS-20B	1/16"	1/2"	6"	.015 oz	Space Plane Elevon	\$.20
631-BFS-30	3/32"	3"	9"	.150 oz	Demonstration/Sport	\$.45
631-BFS-40	1/8"	3"	9"	.200 oz	Cluster Rockets	\$.50
631-BFS-60S	3/16"	1/2"	3 5/8"	.020 oz	Scout Replacement	\$.15

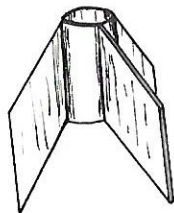
BODY AND WING STOCK: 17" x 2" x 1/4" piece of unfinished balsa stock for use as the body for designs such as the Sky Slash II, wings in other boost-glider designs, or fins on very large models. Net weight for one sheet is one ounce, shipping weight is 12 ounces.

Cat. No. 631-BFS-80 \$.30 each 3 for \$.60

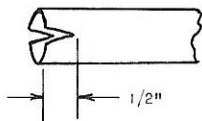


PLASTIC FIN: white molded plastic fin unit for use with body tube BT-40. These fins provide a quick, easy and durable means of constructing model rockets. This is the fin unit used on the Sky Bird and the Dirty Bird. Fin area is large enough to adequately stabilize most model rockets. An ideal unit for beginners. Net Weight .48 oz.

Cat. No. 631-PF-40A \$.50 each 3 for \$1.20
Shipping Weight Each: 4 oz



SPIN FIN: This is the fin unit used on the Bug-A-Bye payload rocket. It is a complete polyethylene unit and is practically indestructible. This is an excellent unit for experimenters and beginners. Fins are set at an angle so the rocket will spin in flight. Use with body tube No. BT-40. To obtain proper fit, slot the tube on opposite sides as shown in the drawing at right. Net weight of each is .35 ounces.



Cat. No. 631-PF-40B \$.50 each 3 for \$1.20
Shipping Weight Each: 4 oz



SANDPAPER: 3" x 3" sheets of high grade sandpaper for use in finishing work on model rockets. Comes in three grades, medium, for rapid shaping of balsa parts, fine, for medium smooth surfaces, and extra fine, for high quality finishing.

6 Sheets Fine: Cat. No. 631-SPF-2 \$.10

6 Sheets Extra Fine: Cat. No. 631-SPEF-2 \$.10

6 Sheets Medium: Cat. No. 631-SPM-2 \$.10

18 Sheets Assorted (six of each): Cat. No. 631-SPA-2 \$.25

Shipping Weight, 6 Sheets, 1 oz

EMERY BOARDS: 4 1/2" long by 1/2" wide abrasive boards for use in cleaning clips on launchers, shaping airfoils on fins, and turning nose cones. These boards have a medium abrasive on one side, and a fine abrasive on the other. A valuable addition to any range kit.

Cat. No. 631-BE-1 3 for \$.10
Shipping Weight 1 oz



PAINT BRUSHES: For applying dope and paint to model rockets, these brushes are hard to beat. Brushes are six inches long, with quality camel hair bristles set in nickled ferrules. Available only in sets of three, including one no. 1 brush for extra fine work, one no. 4 brush for medium fine work, and one no. 6 brush for rapid covering of larger areas.

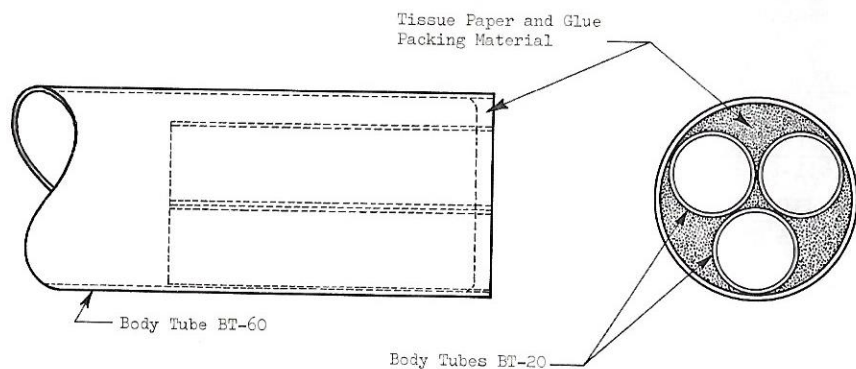
Cat. No. 631-PB-3 \$.30 per set
Shipping Weight 2 oz

PART NUMBERS

Some part identification numbers used by Estes Industries have been changed. Not all of the literature and plans published by Estes Industries have the new part numbers on them as yet. To enable you to quickly identify the correct new catalog number of an item, we have prepared this chart of old and new part numbers.

OLD	NEW	OLD	NEW	OLD	NEW
BT-1	BT-40	PNC-1	PNC-40F	PF-2	PF-40B
BT-3	BT-30	PNC-2	PNC-40G	PS-1A	PS-30B
BNC-1	BNC-30D	EB-1	EB-40	CR-1	SC-1
BNC-1A	BNC-40D	EB-1A	EB-30	BFS-1	BFS-30
BNC-2A	BNC-30C	NB-1	NB-40	BFS-2	BFS-20
BNC-3A	BNC-30E	NB-1A	NB-30	NW-1A	NW-30
		PF-1	PF-40A		

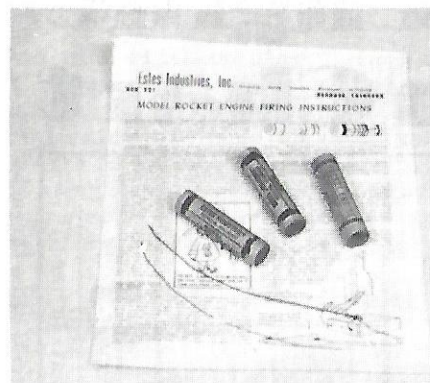
Mounting Engine Tubes in Cluster Rockets



Rocket Engine Prices

Sufficient ignition material, instructions, and a parachute or streamer protector is included with each rocket engine (any quantity) ordered from Estes Industries. Shipping weight of each engine is 1 ounce.

1/4A.8-0	Cat. No. 631-1/4A.8-0	\$.25 ea	3/for \$.65	12 or more 21¢ ea
1/4A.8-2	Cat. No. 631-1/4A.8-2	\$.25 ea	3/for \$.65	12 or more 21¢ ea
1/4A.8-4	Cat. No. 631-1/4A.8-4	\$.25 ea	3/for \$.65	12 or more 21¢ ea
1/2A.8-0	Cat. No. 631-1/2A.8-0	\$.30 ea	3/for \$.70	12 or more 23¢ ea
1/2A.8-2	Cat. No. 631-1/2A.8-2	\$.30 ea	3/for \$.70	12 or more 23¢ ea
1/2A.8-4	Cat. No. 631-1/2A.8-4	\$.30 ea	3/for \$.70	12 or more 23¢ ea
A.8-0	Cat. No. 631-A.8-0	\$.35 ea	3/for \$.80	12 or more 26¢ ea
A.8-3	Cat. No. 631-A.8-3	\$.35 ea	3/for \$.80	12 or more 26¢ ea
A.8-4	Cat. No. 631-A.8-4	\$.35 ea	3/for \$.80	12 or more 26¢ ea
B.8-0	Cat. No. 631-B.8-0	\$.40 ea	3/for \$.90	12 or more 30¢ ea
B.8-2	Cat. No. 631-B.8-2	\$.40 ea	3/for \$.90	12 or more 30¢ ea
B.8-4	Cat. No. 631-B.8-4	\$.40 ea	3/for \$.90	12 or more 30¢ ea
B.8-6	Cat. No. 631-B.8-6	\$.40 ea	3/for \$.90	12 or more 30¢ ea
B.8-0(P)	Cat. No. 631-B.8-0(P)	\$.45 ea	3/for \$.95	12 or more 31¢ ea
B 3-0	Cat. No. 631-B 3-0	\$.50 ea	3/for \$1.00	12 or more 33¢ ea
B 3-5	Cat. No. 631-B 3-5	\$.50 ea	3/for \$1.00	12 or more 33¢ ea
C.8-0	Cat. No. 631-C.8-0	\$.45 ea	3/for \$.95	12 or more 31¢ ea



Rocket Engines

ENGINE CLASSIFICATION: All engines sold by Estes Industries are classified according to the following system: On the rocket engine is stamped a designation, for example, 1/2A.8-2. The first part of this designation, 1/2A, represents the total impulse (total amount of power produced) of the engine. Estes Industries manufactures engines in five classes, 1/4A engines, 1/2A engines, A engines, B engines, and C engines. The 1/4A class includes engines with total impulses ranging from 0 to .175 lb/sec., the 1/2A class includes engines ranging from .176 to .35 lb/sec., the A class includes engines from .351 to .70 lb/sec., the B class includes engines from .701 to 1.15 lb/sec., and the C class includes engines from 1.16 to 2.0 lb/sec. For the exact total impulse of Estes engines, see the engine selection chart.

The second part of the designation, .8, represents the average thrust of the engine in pounds. It will be noted that the average thrust of all Series I engines is rated at eight tenths of a pound, while the average thrust of the Series II engines is rated at three pounds. The final part of the designation, -2, stands for the length of time in seconds between the burnout of the engine and the instant the ejection charge actuates the recovery mechanism. A B.8-4 engine would have a time delay of 4 seconds between burnout and the activation of the ejection charge.

QUALITY CONTROL: One out of every hundred engines is static tested on a recording type of test stand which graphically makes a precise record of the maximum thrust, thrust variations, minimum thrust, overall thrust duration, length of time delay, and the strength of the ejection charge. Any batch of engines which does not meet rigid standards is discarded. In addition, the engine production machine automatically rejects all engines which do not contain the correct amount of propellant. Tolerances are kept as small as possible so that these engines make excellent propellants for contests and exhibitions.

Rocket Engine Selection Chart

NAR Type	Initial Weight	Total Impulse	Thrust Duration	Time Delay	Label Color	Maximum Rocket Weight**	
						Single Stage	Multi-Stage
SINGLE STAGE ENGINES							
¼A.8-2	0.53 oz	0.17 lb sec	0.15 sec	2-2½ sec	Green	2.0 oz	-
½A.8-2	0.55 oz	0.35 lb sec	0.4 sec	2-3 sec	Blue	2.5 oz	-
A.8-3	0.6 oz	0.7 lb sec	0.9 sec	3-3½ sec	Purple	3.0 oz	-
B.8-4	0.7 oz	1.15 lb sec	1.4 sec	4-4½ sec	Red	3.5 oz	-
B 3-5*	0.7 oz	1.15 lb sec	0.35 sec	5-5½ sec	Red	4.0 oz	-
UPPER STAGE ENGINES (OR SINGLE STAGE ENGINES IF USED IN VERY LIGHT ROCKETS)							
¼A.8-4	0.53 oz	0.17 lb sec	0.15 sec	4-4½ sec	Green	1.0 oz	-
½A.8-4	0.55 oz	0.35 lb sec	0.4 sec	4-4½ sec	Blue	1.5 oz	-
A.8-4	0.6 oz	0.7 lb sec	0.9 sec	4-4½ sec	Purple	1.5 oz	-
B.8-6	0.7 oz	1.15 lb sec	1.4 sec	6-6½ sec	Red	1.5 oz	-
BOOSTER ENGINES							
¼A.8-0	0.53 oz	0.17 lb sec	0.15 sec	none	Green	Don't Use	2.0 oz
½A.8-0	0.55 oz	0.35 lb sec	0.4 sec	none	Blue	Don't Use	2.0 oz
A.8-0	0.6 oz	0.7 lb sec	0.9 sec	none	Purple	Don't Use	2.5 oz
B.8-0	0.7 oz	1.15 lb sec	1.4 sec	none	Red	Don't Use	3.0 oz
B 3-0*	0.7 oz	1.15 lb sec	0.35 sec	none	Red	Don't Use	5.0 oz
C.8-0	0.75 oz	1.5 lb sec	2.0 sec	none	Black	Don't Use	3.0 oz
SPECIAL PURPOSE ENGINES							
B.8-2	0.7 oz	1.15 lb sec	1.4 sec	2-3 sec	Red	Special Designs	
B.8-0(P)	0.7 oz	1.15 lb sec	1.4 sec	none	Red	Static Test Engine	

* Series II engine

** With engine(s)

(P) Denotes plug to prevent blow through.

(For interchangeability all engines have the same outside dimensions. Higher impulse engines contain more propellant than lower impulse engines, since total impulse is directly related to the amount of propellant.)

SUGGESTIONS FOR BEGINNERS: Most beginners start their rocket studies and experiments with single stage rockets because they are easier to build and are generally more dependable. We would suggest that until you have built at least a half dozen or so rockets that you stick to single stage designs. For single stage flights we offer five primary rocket engines. They are the ¼A.8-2 for general testing, the ½A.8-2 for low altitude flights, the A.8-3 for medium altitude flights, the B.8-4 for high altitude flights, and the B 3-5 for high acceleration high altitude flights. These five engines are the most popular for general usage. When you have become more experienced you may want to select other rocket engines which are designed for specific purposes.

FIRST TESTS: When running the first tests on a new rocket design it is advisable to use the smallest engine(s) possible. If you have goofed on your design and the rocket is not stable in flight it will present less hazard. If you have built a high performance rocket and use the largest engines, you are likely to see your rocket soar off into the wild blue yonder, never to be seen again--quite a disappointment if you spent hours constructing it. For most designs we recommend the ¼A and ½A engines for the first test flights. Remember that a well designed high performance rocket can approach an altitude of 1,000 feet when propelled by a ½A engine.

RECOVERY FIELD: The altitude to which you fly your rocket should not be higher than is practical for the size range which you have for flying. If you are in a town or city, flying in a very limited area, the ¼A and ½A engines are best. In large open park areas the A engines are all right, and in large open areas the B engines and two or three stage rockets are okay. A general rule to follow is that you should have a field or flying area at least as large as the altitude to which you intend to fly your rocket. If you are flying your rocket to 500' you should launch your rocket from the center of a field which is 500' by 500'.

SERIES II ENGINES: The wallop packed by the B3-0 and B3-5 engines makes them a little more difficult to handle than the Series I engines. Extra caution should be exercised to be sure your rocket is going to be stable. The first flight of any rocket should, if possible, be made using a Series I engine. Extra caution should be taken to be sure the fins are extra durable and well secured to the rocket body. The Series II engine must be mounted against a secure bulkhead so that a sudden force of 9 pounds will not force it forward in the rocket body. With a Series II engine, a light weight model rocket will be traveling about 400 miles per hour in just 70 feet from the launcher. Use extra caution.

SAFETY: Rocket engines are not toys. They are scientific devices. When used with common sense and close adherence to the safety rules they are as safe as any other sport, hobby, or scientific study. When used carelessly they can be dangerous, as can model airplanes, baseball, or swimming. Remember, if you get hit by a model rocket traveling 300 or more miles per hour, you are going to get hurt. Don't be the first one to spoil our nearly perfect record of safety.

ROCKET ENGINE DESIGN

This rocket engine design and performance information is given for educational purposes only. We believe that if you understand how your rocket engine works you are in a better position to design your rockets for specific purposes such as drag racing, altitude events, payload events, etc. We DO NOT grant permission for you to attempt to copy our design nor do we recommend that you attempt to build your own rocket engines.

The Series I engine is a solid propellant type which basically has an end burning grain. There is a slight center bore at the very tip of the nozzle end of the grain which serves two purposes. First, it provides for easy ignition. Second, as you will note from the Series I graph, this special design produces a high initial thrust of 23 oz., thus stabilizing your rocket more quickly. Data from wind tunnel tests show this dual thrust level to be the most effective design for rocket engines which are used to propel lightweight model rockets at sub-sonic speeds.

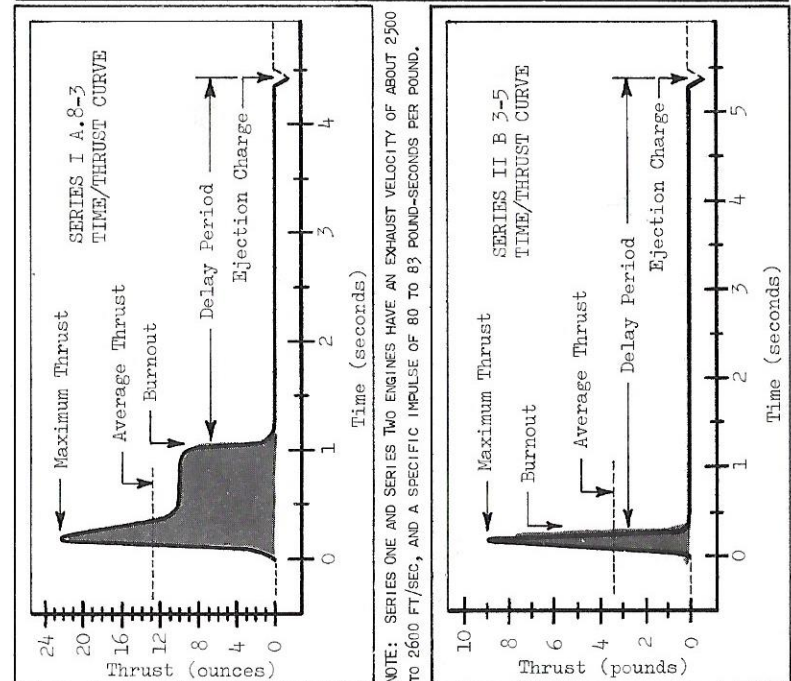
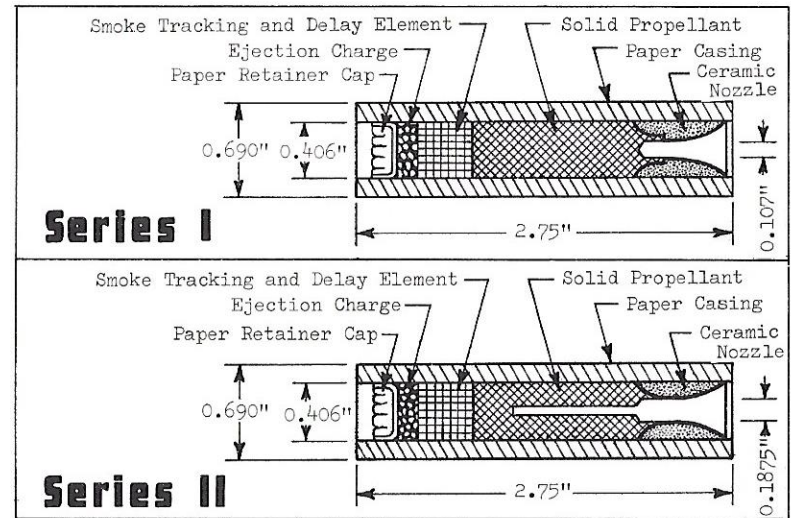
The slow burning delay and tracking charge is ignited at the burnout of the propellant grain. This slow burning, smoke producing charge provides no thrust, permitting the rocket to coast upward to its peak altitude. After the burnout of the delay charge a recovery system ejection charge is ignited which pressurizes the forward end of the rocket body tube activating the recovery system. For further information, see the Series I performance graph and cutaway drawing.

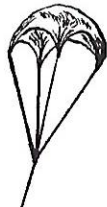
The Series II engine is a solid propellant type which basically has a center burning grain. This provides a greater propellant burning area, which results in more thrust being produced during a shorter period of time. The total thrust duration of a Series II engine is slightly under .35 sec. This makes the thrust characteristics of the engine somewhat like a sledge hammer blow--thrust rises to over 9 pounds in a fraction of a second, then drops off again, as is shown in the Series II performance graph. The average thrust of the Series II engines is 3.4 pounds. The result is that the Series II engine is ideal for acceleration studies, as a booster on heavy multi-stage rockets, and for drag racing. Delay charge and ejection charge operation are the same in the Series I and Series II engines.

MAKING ROCKET ENGINES

At our plant rocket engines are made automatically, under controlled conditions, with limited amounts of propellant being measured by explosion proof metering devices. If you wish to attempt to build your own engines "safely," we would recommend that you have in reserve a few thousand dollars in cash for special equipment, a college degree, a safe place to work (not in a garage or basement), protective clothing and some specialized training. If

you build rocket engines with less than the above you may find as some chemistry teachers, students, and many others have, that through the rest of your life you will be without a finger, hand, arm, eye, ear, face, or you may well be badly burned or even killed. Our country needs live rocket scientists and engineers who have all their fingers and hands. We are looking forward to fellows like you to fulfill this need. P.S. Better take out a big life insurance policy, too.



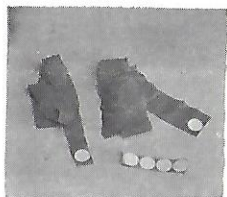


PARACHUTE MATERIAL: 10" x 10" square sheet of red polyethylene parachute material (Includes four 3/4" pressure sensitive tape discs for securing shroud lines to parachute. Shroud lines not included.). Red color gives maximum visibility. Net weight each .07 oz.

Cat. No. 631-PM-1 \$.20 each 3 for \$.35
Shipping Weight .5 oz

PARACHUTE MATERIAL: A square yard of high strength black polyethylene plastic parachute material for use especially with larger rockets. Can be cut to make round or square parachutes of any size up to 36".

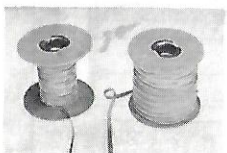
Cat. No. 631-PM-2 \$.45 each 5 oz
Shipping Weight



STREAMER MATERIAL: Seven and a half foot lengths of bright orange flame resistant crepe paper for use in making streamers. Comes in two sizes, 1" wide and 2" wide. Each strip is sufficient for from two to four streamers. Net weight 1" strip: .14 oz, 2" strip: .28 oz. Shipping weight 1 oz.

1" Wide Strip:
Cat. No. 631-SM-1 \$.15 each 3 for \$.30

2" Wide Strip:
Cat. No. 631-SM-2 \$.20 each 3 for \$.40



SHOCK CORD: Convenient 18 inch lengths of model airplane contest rubber for use in attaching rocket body to recovery mechanism. Available in two sizes, 1/8" x .03" for use in smaller rockets, 1/4" x .03" for use in cluster powered rockets. Shipping weight 1 oz.

1/8" x .03" x 18" Shock Cord:
Cat. No. 631-SC-1 \$.10 each 3 for \$.20

1/4" x .03" x 18" Shock Cord:
Cat. No. 631-SC-2 \$.15 each 3 for \$.20



TAPE DISCS: 3/4" pressure sensitive treated paper tape discs used for fastening shroud lines to plastic parachutes.

Cat. No. 631-TD-1 12 for \$.15 roll of 1000 \$4.00
4 for \$.10 Shipping Weight, 12: 1 oz



TAPE STRIPS: Rectangular 1/4" x 3/4" tape strips for attaching shroud lines to plastic parachutes. These strips will give maximum strength with minimum weight and bulk. Come in sheets of 35--enough for several 'chutes and streamers.

Cat. No. 631-TD-2 \$.30 per sheet
Shipping Weight 1 oz



SHROUD LINES: 72 yard spool of a special, fine surface thread especially selected for use in making shroud lines. This cord is light in weight, strong, and will not tangle or foul easily. Ideal also for use in making rogallo wings and other special recovery devices. Available in red or white. Specify color when ordering. Shipping Wt. 5 oz.

Red Cord: Cat. No. 631-SLT-1R \$.25 each

White Cord: Cat. No. 631-SLT-1W \$.25 each

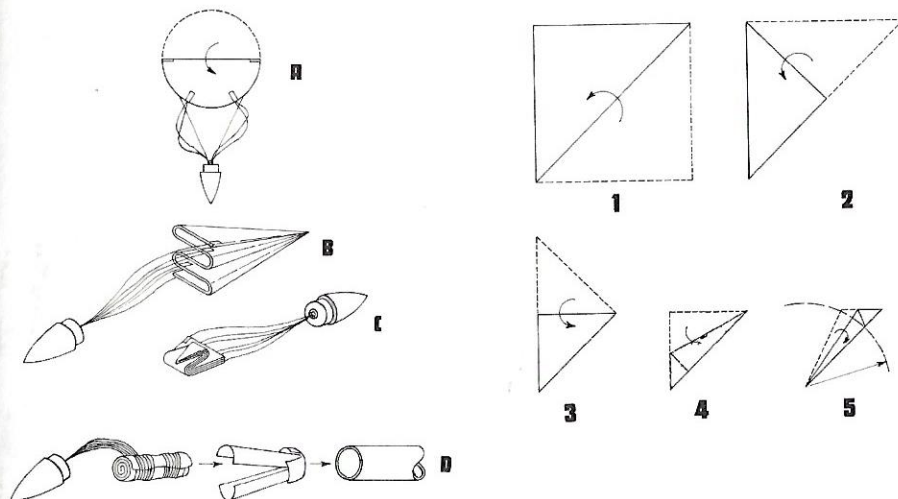
PARACHUTES

The parachute material (PM-1 and PM-2) may be used in almost any desired size from 6" square or round to 36". If a square parachute is desired four shroud lines are used, one attached at each corner. The shroud lines should be at least as long as the diagonal distance across the chute.

To cut a round parachute from a square piece of material fold the square sheet five times and cut as indicated in the illustration. When employing a round chute a minimum of six shroud lines must be used. Space the lines evenly around the parachute circumference.

Attach the shroud lines using either a tape disc or a tape strip (TD-2) positioned with the length of the strip pointing toward the center of the chute. When the parachute is finished the adhesive strips should be on the upper (outside) of the chute.

To fold a round parachute first lay out the chute on a flat surface. Then fold it in half as indicated at (A). Next, using the center as a pivot point, fan fold the chute into five to eight equal fans as shown in (B). Then fan fold in the opposite direction, into 3 to 5 fans as shown at (C) to form the final length desired. Then again fan fold in the opposite direction forming the parachute into the smallest possible cylindrical shaped package. Wrap the shroud lines tightly around the folded chute. Protect the chute from the hot ejection gases before inserting into the rocket.



DOWELS: 2" cut lengths of 1/4" dowel, especially prepared for use in turning balsa nose cones from nose cone stock NCS-1 and NCS-2. These dowels are hardwood, and after being glued in place in the nose cone stock, provide for easy shaping of nose cones with a drill or drill press.

Cat. No. 631-NCD-1 3 for \$.10
Shipping Weight 2 oz



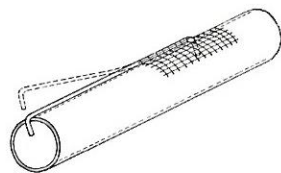
LAUNCHING LUGS: Cut lengths of thin wall paper tube to be glued to the body of the rocket to guide it on the launching rod. These are soda straws, and are stocked only for the convenience of our customers. Available in three sizes, all with an inside diameter of 5/32". Shipping weight on all, 1 ounce.

1 1/4" long:
Cat. No. 631-LL-1A 5 for \$.10

2 3/8" long:
Cat. No. 631-LL-1B 4 for \$.10

5" long:
Cat. No. 631-LL-1C 3 for \$.10

ENGINE HOLDER: Used as shown in the diagram at right to hold engines in body tubes. Permits easy replacement of rocket engines. Upper third of wire holder must be reinforced with gauze and glue. By running forward instead of rearward from the rocket engine, it can also be used as a substitute for the engine block in removable fin rockets such as the Sky Bird. Should be used only in ET-20 and ET-30. Net weight .05 oz.



Cat. No. 631-EH-1 \$.15 each 3 for \$.30
Shipping Weight Each: 1 oz



BALSA DUST: An indispensable item for the experienced modeler. When mixed with glue it forms a hard drying putty for making strong, lightweight fillets. Ideal for filling out dents in balsa pieces, reinforcing fins to body tubes, and many other uses. Comes in a plastic bag containing approximately 1/3 oz. of finely divided balsa. Shipping weight 3 oz.

Cat. No. 631-FD-1 \$.25 each



WHITE GLUE: This is the glue especially recommended for use in constructing model rockets. It sets quickly, and will give a super strength joint with all porous materials such as wood, paper, and cloth. Comes in a reusable plastic squeeze bottle containing approximately two ounces. Shipping weight is 6 ounces.

Cat. No. 631-WG-1 \$.40 each



MASKING TAPE: 1/2" wide by 30' long roll of strong masking tape for use with model rockets. Ideal for securing engines in body tubes, masking areas on rockets which are not to be painted, and many other uses. Shipping weight is 5 ounces. Cat. No. 631-MT-1 \$.30 ea



SCREW EYES: Metal screw eyes used to attach wood nose cones or nose blocks to rocket bodies and recovery systems. Come in two sizes, 1 inch long and 3/4 inch long, suitable for any rocket design in which the nose cone is separated from the body for recovery. Net weight each is .04 ounces for the 1 inch eye and .03 ounces for the 3/4 inch eye. Shipping weight for 3 eyes is 1 ounce.

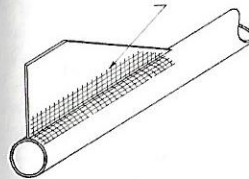
1 Inch Eye:
Cat. No. 631-SE-1 3 for \$.10 12 for \$.35

3/4 Inch Eye:
Cat. No. 631-SE-2 3 for \$.10 12 for \$.35



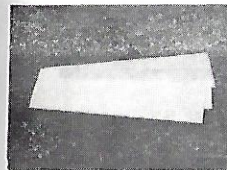
TAPE HINGES: A treated, self-adhesive paper for use as elevon hinges on boost gliders. Suitable for use with almost all designs. 4 1/2" long by 3/4" wide, with protective paper backing on adhesive side.

Cat. No. 631-TH-1 2 for \$.10
Shipping Weight 1 oz



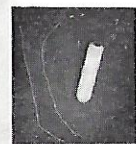
GAUZE REINFORCING MATERIAL: Unmarked gauze reinforcing material in 3" x 12" sheets. Used in fastening fins and other parts to rocket bodies. To apply, put a thin layer of glue evenly spread on the area to be reinforced, press the gauze down on the glue, and then put one or more additional layers of glue over the gauze.

Cat. No. 631-GR-2 \$.15 each 3 for \$.30
Shipping Weight 1 oz



PAPER REINFORCING MATERIAL: Treated paper material with adhesive on one side for reinforcing balsa surfaces. When applied to both sides of the balsa sheet, it doubles the strength of the part, and provides a smooth surface for painting. Comes in 3" x 9" sheets.

Cat. No. 631-PRM-1 \$.10 each 3 for \$.20
Shipping Weight 1 oz



ELASTIC THREAD: A strong, elastic thread for use as a spring to actuate elevons on boost gliders. This is a replacement part for the Space Plane. Thread measures eight inches long with a 1/32" diameter. Can also be used as a shock cord with certain designs.

Cat. No. 631-ET-1 3 for \$.10
Shipping Weight 1 oz



NYLON SCREWS: Glide adjusting screws for boost gliders. Combine extra light weight with high strength. 1/2" long with an approximate 1/16" thread diameter.

Cat. No. 631-AS-1 \$.10 each
Shipping Weight 1 oz



PAYLOAD: This is a lead cylinder 3/4" in diameter, weighing one ounce, used in certain altitude competition events. How high can your rocket lift a payload? Current official record altitude, using a B engine, is 980 feet, and was set by one of the girls here at Estes Industries.

Cat. No. 631-PL-1 \$.50 each 3 for \$1.00
Shipping Weight 2 oz



NOSE CONE WEIGHT: 11/16" diameter, round lead weight to be attached to the lower end of balsa nose cones to add to the stability of rockets when needed. Two or three weights can be glued together or one weight may be cut to provide the exact amount of weight needed. Net weight is .13 oz. each.

Cat. No. 631-NCW-1 3 for \$.25
Shipping Weight 1 oz

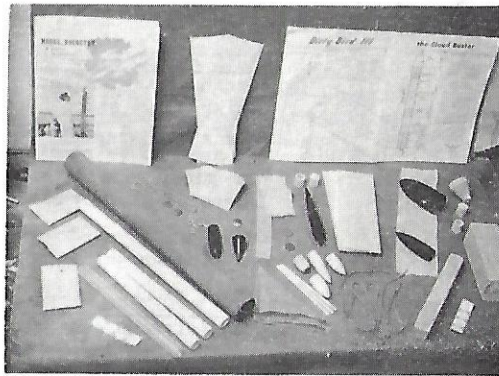


NOSE CONE WEIGHT: A small brass washer, 7/16" in diameter, with a 1/8" hole in the center. Weighs .02 ounces, and is ideal for use in delicate balancing work. Up to four of these weights may be held in place by the recovery system attachment screw eye on the nose cone.

Cat. No. 631-NCW-2 10 for \$.15
Shipping Weight 1 oz

ASSORTMENTS

These assortments have been carefully selected to give the most modeling enjoyment possible. Each offers you a saving of over 20% of the list price of the items included, and enables the rocketeer to build several rockets of his own design. The \$5.00 Scientists Special alone contains enough materials to build at least 8 model rockets of the rocketeer's own design. Pounded for pound and cent for cent these assortments bring you the best possible value in model rocketry today. All make ideal Christmas and birthday gifts for the space-minded person, and are also perfect for the ambitious rocketeer who wants to build several rockets for competition, demonstrations, science fair projects, or sport flying. One look at the list of contents of the different assortments is proof of this.



Because of the large discount already made on these assortments, they may not be included on discount purchases. Postage on all is paid by Estes Industries to any point within the United States. Order your Special by heading and catalog number.

Contest Special \$10.00

1 Parachute	#631-PM-2	1 Body Tube	#631-BT-60
3 Streamers	#631-SM-1	2 Body Tubes	#631-BT-30
1 Sheet Tape Strips	#631-TD-2	1 Body Tube	#631-BT-20
9 Screw Eyes	#631-SE-1	1 Body tube	#631-BT-10
1 Sheet Gauze Reinforcing Material	#631-GR-2	1 Nose Cone	#631-BNC-60L
1 Payload Weight	#631-PL-1	1 Nose Cone	#631-BNC-30C
3 Sheets Paper Reinforcing Material	#631-PRM-1	1 Nose Cone	#631-BNC-30E
1 Design Booklet	#631-P-1	1 Nose Cone	#631-BNC-20A
3 Engine Holders	#631-EH-1	1 Nose Cone	#631-BNC-10B
3 Launching Lugs	#631-LL-1C	1 Nose Block	#631-NB-60
3 Nose Cone Weights	#631-NCW-1	1 Nose Block	#631-NB-30
9 Nose Cone Weights	#631-NCW-2	2 Nose Blocks	#631-NB-20
3 Shock Cords	#631-SC-1	2 Engine Blocks	#631-EB-30
1 Shock Cord	#631-SC-2	2 Engine Blocks	#631-EB-20
1 Nose Cone Stock	#631-NCS-1	1 Adapter	#631-TA-2060
1 Nose Cone Stock	#631-NCS-2	1 Sheet Fin Stock	#631-BFS-10
3 Dowels	#631-NCD-1	2 Sheets Fin Stock	#631-BFS-20
1 Set Tube Adapters	#631-TA-1	3 Sheets Fin Stock	#631-BFS-30
		2 Sheets Fin Stock	#631-BFS-40
		1 Parachute	#631-PM-1

CONTEST SPECIAL:

Cat. No. 631-ES-10
Shipping Weight

\$10.00 each
27 oz

Scientists Special \$5.00

2 Parachutes	#631-PM-1	1 Set Tube Adapters	#631-TA-1
1 Streamer	#631-SM-1	1 Design Booklet	#631-P-1
1 Body Tube	#631-BT-20	1 Plastic Fin Unit	#631-PF-40A
1 Body Tube	#631-BT-30	3 Sheets Fin Stock	#631-BFS-10
2 Body Tubes	#631-BT-40	1 Nose Cone Stock	#631-NCS-1
1 Body Tube	#631-BT-50	1 Dowel	#631-NCD-1
1 Balsa Nose Cone	#631-BNC-20A	4 Shock Cords	#631-SC-1
1 Balsa Nose Cone	#631-BNC-20B	6 Screw Eyes	#631-SE-1
1 Balsa Nose Cone	#631-BNC-30E	4 Launching Lugs	#631-LL-1C
1 Balsa Nose Cone	#631-BNC-40D	3 Nose Cone Weights	#631-NCW-1
1 Plastic Nose Cone	#631-PNC-40F	1 Sheet Gauze Reinforcing Material	
1 Balsa Nose Cone	#631-BNC-50K	1 Nose Block	#631-NB-40
1 Nose Block	#631-NB-50	3 Engine Holders	#631-EH-1

SCIENTISTS SPECIAL:

Cat. No. 631-ES-5
Shipping Weight

\$5.00 each
19 oz

Club Special \$15.00

1 Body Tube	#631-BT-60	1 Adapter	#631-TA-5060
1 Body Tube	#631-BT-50	3 Sheets Fin Stock	#631-BFS-10
1 Body Tube	#631-BT-40	3 Sheets Fin Stock	#631-BFS-20
3 Body Tubes	#631-BT-30	3 Sheets Fin Stock	#631-BFS-30
1 Body Tube	#631-BT-20	3 Sheets Fin Stock	#631-BFS-40
1 Body Tube	#631-BT-10	3 Parachutes	#631-PM-1
1 Balsa Nose Cone	#631-BNC-60L	1 Parachute	#631-PM-2
1 Balsa Nose Cone	#631-BNC-50K	3 Streamers	#631-SM-1
1 Plastic Nose Cone	#631-PNC-40H	6 Shock Cords	#631-SC-1
1 Balsa Nose Cone	#631-BNC-40D	3 Shock Cords	#631-SC-2
1 Balsa Nose Cone	#631-BNC-30C	1 Sheet Tape Strips	#631-TD-2
1 Balsa Nose Cone	#631-BNC-30D	12 Screw Eyes	#631-SE-1
1 Balsa Nose Cone	#631-BNC-30E	3 Nose Cone Weights	#631-NCW-1
1 Balsa Nose Cone	#631-BNC-20A	10 Nose Cone Weights	#631-NCW-2
1 Balsa Nose Cone	#631-BNC-20B	1 Gauze Reinforcing	#631-GR-2
1 Balsa Nose Cone	#631-BNC-10A	3 Paper Reinforcing	#631-PRM-1
1 Balsa Nose Cone	#631-BNC-10B	18 Sheets Sandpaper	#631-SPA-2
1 Nose Block	#631-NB-60	3 Engine Holders	#631-EH-1
1 Nose Block	#631-NB-50	3 Launching Lugs	#631-LL-1C
1 Nose Block	#631-NB-40	3 Dowels	#631-NCD-1
3 Nose Blocks	#631-NB-30	1 Nose Cone Stock	#631-NCS-1
2 Nose Blocks	#631-NB-20	1 Nose Cone Stock	#631-NCS-2
1 Engine Block	#631-EB-40B	1 Payload Section	#631-PS-20A
3 Engine Blocks	#631-EB-30B	1 Bag of Balsa Dust	#631-FD-1
1 Adapter	#631-TA-2060	1 Design Booklet	#631-P-1
1 Adapter	#631-TA-2050	1 Set Tube Adapters	#631-TA-1

CLUB SPECIAL:

Cat. No. 631-ES-15
Shipping Weight

\$15.00 each
33 oz



KNIFE: Pencil size modeling knife with four inch handle and three replaceable blades. Perfect for cutting balsa and paper model rocket parts. An indispensable tool for the modeler. Knife with three type A blades:

Cat. No. 631-KN-1 \$.60 each
Shipping Weight 2 oz



KNIFE BLADES: Razor sharp high carbon steel replacement blades for the knife above. These blades are especially ground and shaped for use in modeling work. Three types of blades are available, type A, which is identical to the blades which come with the knife set and is pictured with the knife handle, type B, pictured on the left above, which is a needle point for punching holes for shock cords, etc., and type C, pictured on the right above, which is a special round body, flat face gouge for use in hollowing balsa parts.

Type A cutting blade:

Cat. No. 631-KNB-1A 3 for \$.25 10 for \$.60
Shipping Weight 1 oz

Type B punch blade:

Cat. No. 631-KNB-1B \$.20 each
Shipping Weight 1 oz

Type C gouge blade:

Cat. No. 631-KNB-1C \$.20 each
Shipping Weight 1 oz



WHETSTONE: The perfect instrument for keeping knife blades sharp for the best body tube and balsa cutting. Pocket

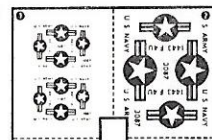
size, measures 3 1/2" x 3/4" x 3/8". Used with oil for the best results.

Cat. No. 631-W-1 \$.25 each
Shipping Weight 3 oz



TWEEZERS: For 1,001 uses in handling small parts, attaching shock cords, and removing thorns obtained by sticking your hand into a cactus plant to retrieve a rocket. These English steel tweezers are 3 inches long with a 1/8" jaw.

Cat. No. 631-T-1 \$.20 each
Shipping Weight 2 oz



DECALS: Decorate your rocket with these special decals. Four types of decal sheets are available, two with military insignia and two with numbers and letters, all in colors designed to distinguish your rocket. Decals come in a protective envelope with instructions for use.

U.S. Military Insignia: This sheet contains 12 red, white, and blue 1 1/4" U.S. Military insignia in full color. Ideal for the fins and bodies of smaller rockets. Sheet measures approximately 2 1/2" x 4 1/2".

Cat. No. 631-D-1 \$.15 each
Shipping Weight 1 oz

Insignia and Designations: Special sheet contains two large 2" full color U.S. Military insignia, two medium size 1 3/4" U.S. Military insignia, and appropriate designations, including the words "U.S. Army, U.S. Navy, etc. Allows for a special touch to scale model rockets.

Cat. No. 631-D-2 \$.15 each
Shipping Weight 1 oz

Large Numbers and Letters: Large 3/8" high numbers and letters. Allow you to put your NAR number, special rocket designation, name, or other lettering on your rocket. The easy route to professional looking results. Available in either white or black letters. Specify color when ordering.

Black:

Cat. No. 631-D-3B \$.15 each
Shipping Weight 1 oz

White:

Cat. No. 631-D-3W \$.15 each
Shipping Weight 1 oz

Small Numbers and Letters: Smaller 1/4" numbers and letters. Ideal for smaller rockets and extensive detail on larger rockets. Enough numbers and letters to put most NAR numbers on a rocket at least twice, sufficient for other special rocket designations. Available in either white or black letters. Specify color when ordering.

Black:

Cat. No. 631-D-4B \$.15 each
Shipping Weight 1 oz

White:

Cat. No. 631-D-4W \$.15 each
Shipping Weight 1 oz



SPRAY FLUORESCENT PAINT: Glowing fluorescent colors for easier visual tracking and locating of model rockets. Quick drying. For maximum brightness first use Glossy White Enamel (EP-1W) as an undercoat. In handy, 6 oz. spray cans. Specify color when ordering. Shipping weight each is 16 oz.

Cerise:
Cat. No. 631-FP-1C \$1.40 each, post paid

Yellow Orange:
Cat. No. 631-FP-1YO \$1.40 each, post paid

SPRAY ENAMEL PAINT: This high quality spray enamel dries in minutes. Makes beautiful, "professional" appearing display models. Popular colors in 6 oz. spray cans. Not fluorescent. Specify color when ordering. Shipping weight each is 16 oz.

Glossy Black:
Cat. No. 631-EP-1GB \$1.20 each, post paid

Glossy White:
Cat. No. 631-EP-1W \$1.20 each, post paid

Cherry Red:
Cat. No. 631-EP-1R \$1.20 each, post paid

Books

Space Volunteers — Terence Kay

Tells about the many tests made on the ground to determine man's reaction to space travel conditions in preparation for the first manned flights into space. Fascinating reading for anyone interested in space travel, and especially recommended for those interested in Space Medicine.

Cat. No. 631-HB-1 \$3.20
Shipping Weight 1 lb., 6 oz.

Rockets and Your Future — Stanley Beitler

This book is especially recommended for any young person interested in a space-age career. It covers the principles of astronautics, the elements of different career fields, and tells the rocketeer about the courses he will need in high school and college in preparation for his career. Profusely illustrated, this is a valuable item for any rocketeer's bookshelf.

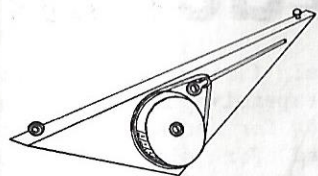
Cat. No. 631-HB-2 \$3.75
Shipping Weight 1 lb., 6 oz.

Guide to Rockets, Missiles and Satellites — Homer E. Newell

Written by the Director of the Office of Space Sciences, NASA, this book describes space vehicles and missiles from Aeolus to Zuni, has a chronology of satellites and space probes to July, 1961, and explanations of space terms and principles. Contains many clear pictures of the actual rockets, as well as the vital statistics on them. This book should be very useful for the scale model builder.

Cat. No. 631-HB-3 \$3.50
Shipping Weight 1 lb., 6 oz.

NOTE: Because of the low mark-up on these books, they may not be included on discount orders, but must be purchased at the list price.



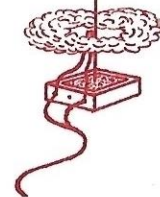
ALTISCOPE

- DETERMINES HEIGHTS AND ALTITUDES
- TEACHES MATH AND TRIGONOMETRY
- COMPLETE WITH INSTRUCTIONS
- SIMPLE TO BUILD AND USE

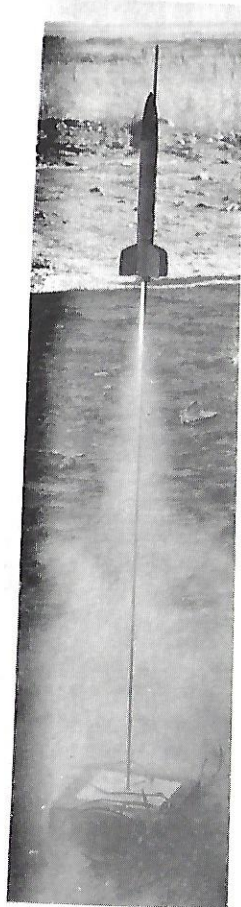
Low priced
at only
\$2.50

A high quality, accurate instrument designed especially for determining the altitudes achieved by model rockets. Only one instrument is required for determining approximate altitudes (usually within 90%). Two instruments when used together will provide for even greater accuracy. This instrument can also be used for determining heights of other objects such as trees, buildings, mountains, poles, etc. The Altiscope comes complete with instructions, trig tables, and our Technical Report TR-3 on altitude tracking. Requires only a few minutes to assemble

Shipping Weight 20 oz.
Cat. No. 631-A-1
Postpaid price \$2.50



Electro-Launch

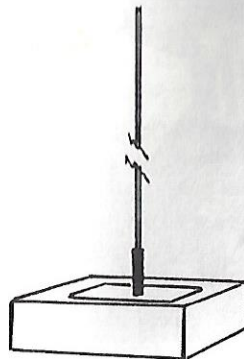
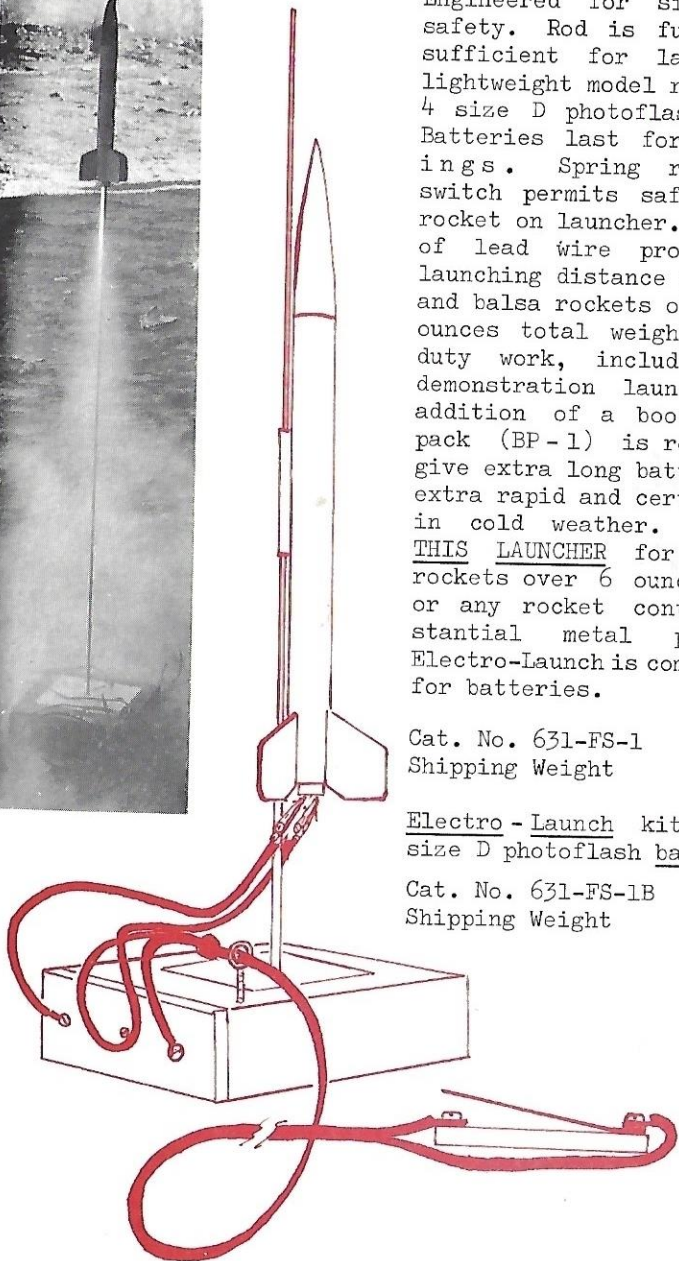


Electrical firing system kit. First inexpensive firing system developed for model rocketry. Engineered for simplicity and safety. Rod is full 36" long--sufficient for launching most lightweight model rockets. Uses 4 size D photoflash batteries. Batteries last for over 50 firings. Spring return safety switch permits safe loading of rocket on launcher. Twelve feet of lead wire provide a safe launching distance for all paper and balsa rockets of less than 6 ounces total weight. For heavy duty work, including frequent demonstration launchings, the addition of a booster battery pack (BP-1) is recommended to give extra long battery life and extra rapid and certain ignition in cold weather. DO NOT USE THIS LAUNCHER for firing any rockets over 6 ounces in weight or any rocket containing substantial metal parts. The Electro-Launch is complete except for batteries.

Cat. No. 631-FS-1 \$3.00 each
Shipping Weight 30 oz

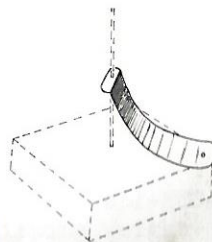
Electro-Launch kit with four size D photoflash batteries:

Cat. No. 631-FS-1B \$4.00 each
Shipping Weight 38 oz



ROD LAUNCHER: Designed for easy use with your own electric firing system. Consists of a 5 1/2" x 5 1/2" base block drilled for 1/8" launching rail, two piece 36" long launching rail, and asbestos deflector material.

Shipping Weight 27 oz
Cat. No. 631-RL-2 \$1.25



METAL BLAST DEFLECTOR PLATE: Deflects blast from engine out and away from the launcher. Two inches wide by five inches long. Especially recommended for club and section launchers which receive extensive use.

Shipping Weight 5 oz
Cat. No. 631-BD-1 \$.60



ASBESTOS DEFLECTOR: Four inch square sheet of asbestos paper for use as a blast deflector on rocket launchers. Should be glued to the base of the launcher with the launching rod set in the middle of the sheet.

Shipping Weight 1 oz
Cat. No. 631-AD-1 \$.20 each



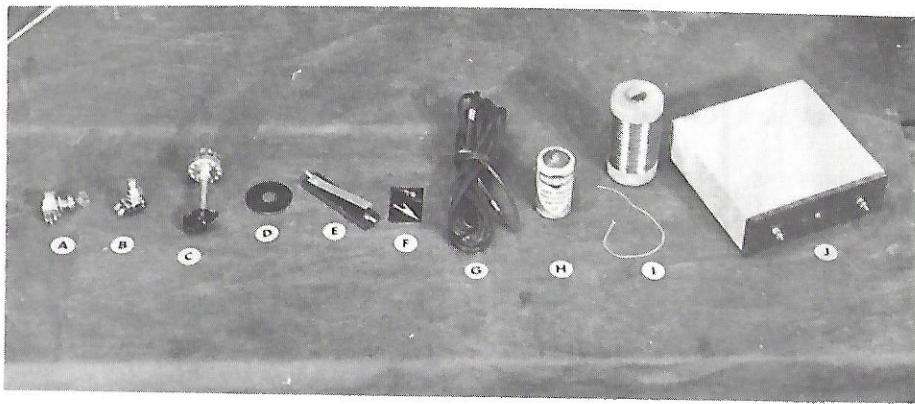
JETEX WICK: Sealed can containing 40" of Jetex Wick, for use with old Electro-Launch, cluster ignition, multi-stage ignition, and other model rocket systems.

Shipping Weight 1 oz
Cat. No. 631-JW-1 \$.35 each, 3 for \$.90



TWO PIECE ROD: Portable steel rod for rocket launchers. Comes in two pieces, slip together to make a rod 36" long. Base rod has a diameter of 1/8".

Shipping Weight 6 oz
Cat. No. 631-RLR-1 \$.35 each, 3 for \$.70



A KEY SAFETY SWITCH: A must for every firing panel. Prevents the possibility of firing rockets accidentally. This is a SPST switch which turns on only with a key, and must be turned off before the key can be removed. Mounts in a 1/2" hole, and comes with one key.

Cat. No. 631-KSW-1 \$2.05 each
Shipping Weight 4 oz

EXTRA KEY:

Cat. No. 631-KSW-1K \$.25 each

B PUSH BUTTON SWITCH: Momentary type, SPST, normally open. Excellent for use as a firing switch. Mounts in a 1/2" hole.

Cat. No. 631-SWM-1 \$.90 each
Shipping Weight 4 oz

C ROTARY SWITCH: Twelve position single pole rotary switch especially recommended for use as a selector switch for firing systems using several launchers. With twelve positions, this switch should handle almost any switching need. Non-shorting, mounts in 3/8" hole.

Cat. No. 631-SWR-1 \$1.35 each
Shipping Weight 5 oz

D DIAL PLATE: Numbered 12 position plate for use with rotary switch listed above. Mounts on panel with same nut used to hold switch in place. Etched aluminum on black background.

Cat. No. 631-DP-1 \$.25 each

E SPRING SWITCH: This is the switch used in the Electro-Launch. Consists of a masonite base piece, two terminal lugs, two self-tapping screws, and a contact strip. Can be used as a firing switch, phone switch, or other utility purpose.

Cat. No. 631-FSS-1 \$.35 each
Shipping Weight 1 oz

F MICRO-CLIPS: Spring-loaded copper clips with flat contact surfaces for use in attaching lead wires to igniters. These clips are 1.1 inches long, and can, if necessary, be attached without the use of solder.

Cat. No. 631-MC-1 2 for \$.25
Shipping Weight 1 oz

G LEAD WIRE: Flexible, durable size 18 two conductor insulated wire for use with firing systems. Ideal as a lead from firing panel to launcher.

Cat. No. 631-LW-1 12 feet for \$.70
Shipping Weight 5 oz

Cat. No. 631-LW-1B 250 foot spool for \$7.50
Shipping Weight 6 lb

H BATTERIES: High quality size D photoflash batteries, the type specified for use in the Electro-Launch. These batteries, when fresh, deliver up to 16 amperes of current on a dead short.

Cat. No. 631-PFB-1 \$.30 each pp
Shipping Weight 4 oz each

I NICHROME WIRE: Seven inch lengths of electrical heating element for use in model rocket ignition systems. The #30 wire is recommended for use with the old Electro-Launch system. The #32 wire is especially recommended for use with the current Electro-Launch and other firing systems using dry cell batteries. Shipping weight is 1 oz.

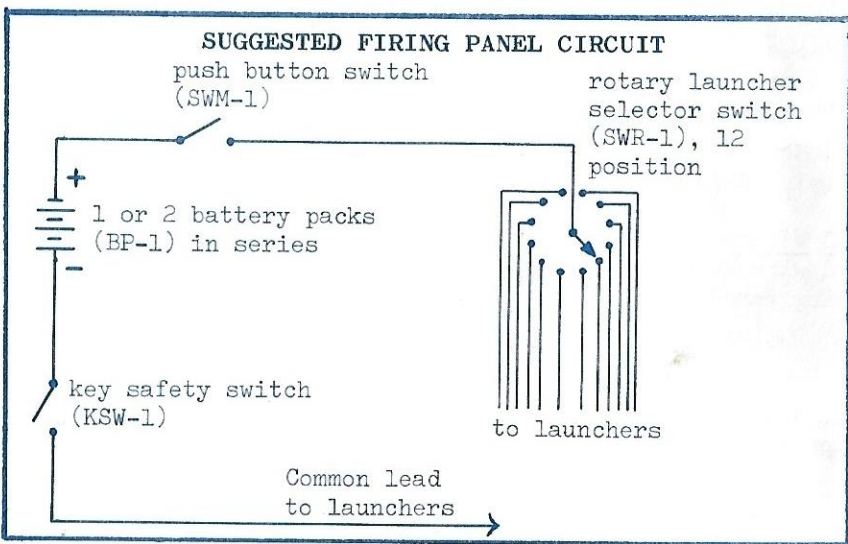
#30 wire, 7 inch lengths
Cat. No. 631-NW-30 3 for \$.15

#32 wire, 7 inch lengths
Cat. No. 631-NW-32 3 for \$.15

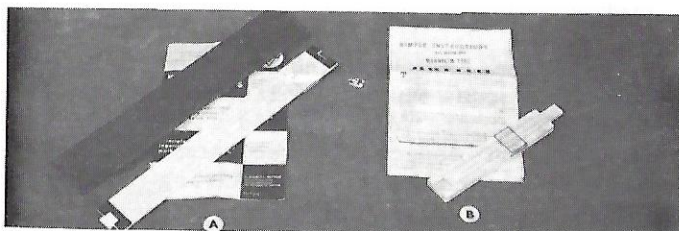
J BATTERY PACK: This is the ideal power pack for a booster for the Electro-Launch, for powering phone systems, and for the many other electrical requirements of the firing range. One pack used with the Electro-Launch doubles the power available, resulting in longer battery life, faster and more reliable ignition, and sufficient power for heating two igniters simultaneously for drag racing. Two battery packs used together will provide a 12 volt power supply suitable for use as a range power supply. The pack is essentially an Electro-Launch base block complete with end cap, all needed screws and terminals, and instructions for assembly and use. Requires four size D cells.

Cat. No. 631-BP-1 \$1.35 each
Shipping Weight 1 lb

Literature



Slide Rules



5" TRAINER SLIDE RULE: A five inch wood slide rule for beginners. Solves problems in multiplication, division, proportions, reciprocals, etc., instantly. Has A, B, C, D, CI, K scales on an accurately calibrated white face on well seasoned hardwood. An ideal companion to the Altiscope. Comes complete with easy to follow instructions.

Cat. No. 631-SR-1 \$.40 each, postpaid
Shipping Weight 5 oz

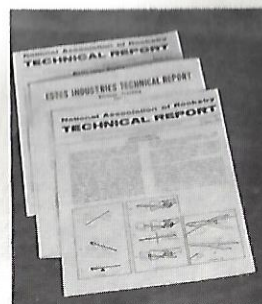
10" TRIG SLIDE RULE: A high quality 10" plastic slide rule with all nine basic scales: A, B, C, D, CI, K, S, T, L. The ideal instrument for quickly performing multiplications and divisions, computing altitudes, finding logarithms and many other mathematical operations. Use it in your math and science classes. An unbeatable instrument for use with one or two Altiscopes, computes altitudes almost instantly. Comes with case and complete instructions for use.

Cat. No. 631-SR-2 \$2.10 each, postpaid
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DESIGN BOOKLET: New revised and enlarged edition of the design and plan booklet titled "Model Rocketry." Gives complete plans for building seven model rockets, including the Arrow-C, the Sky Bird, and the Orange Bullet, as well as a host of additional information on rocket construction. Includes Technical reports TR-1 and TR-2, information on parachute recovery, pictures, drawings, and illustrations. A must for all beginners.

Cat. No. 631-P-1 \$.50 each 3 for \$1.00
Shipping Weight each 3 oz



STABILITY REPORT: A very detailed, illustrated technical report on rocket stability. Tells how to design your rocket so it will be stable in flight. Every beginner should have one. This report is included in the design booklet above.

Cat. No. 631-TR-1 \$.25 each, 3 for \$.35
Shipping Weight each 1 oz

MULTI-STAGE REPORT: This is the most complete and comprehensive report on the multi-staging of model rockets available. Covers ignition, stage coupling, stability of multi-stage rockets, booster recovery, types of engines, and the flying of multi-stage rockets. A necessity if you are going to design your own multi-stage rockets. This report is included in the design booklet above.

Cat. No. 631-TR-2 \$.25 each 3 for \$.35
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Cat. No. 631-V2-N3 \$.25 each
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