

ESTES

Model Rocket Supplies

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



*Catalog
No. 641*

Estes Industries, Inc.

BOX 227
PENROSE, COLO. 81240

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

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PRICE - 25¢

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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.

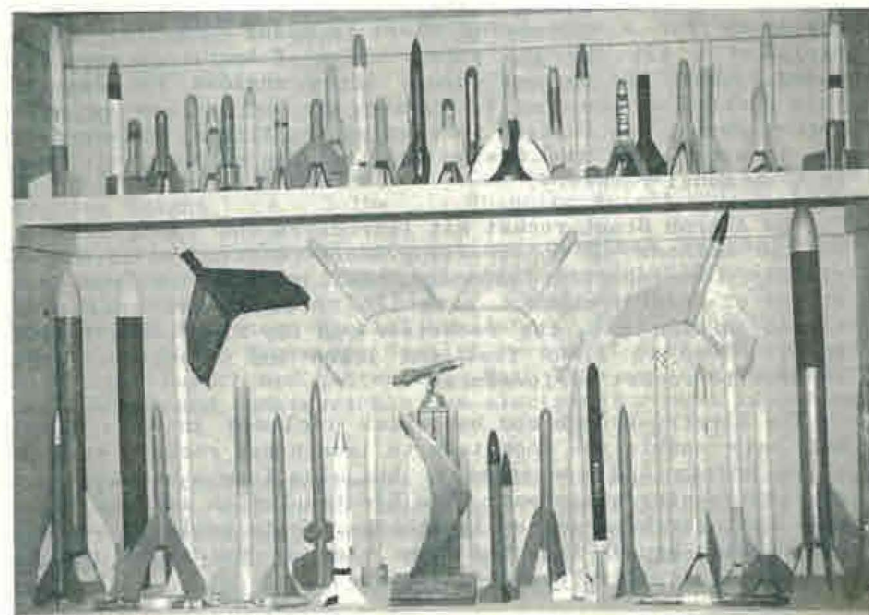
How does model rocketry accomplish this? A model rocket itself is a highly specialized mechanism, light in weight, utilizing nonmetallic materials such as paper, plastic,



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 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.





GETTING STARTED IN MODEL ROCKETRY

Model rocketry can be simple or it can be a complex activity. 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 a model rocketry program can often result in an even more advanced scientific research program, it is easy to start in model rocketry. There is one way to do this--by building and flying models. To make this important first step 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 model 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 authoritative handbook on model rocketry.

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 this 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 also learns about the best methods of igniting rocket engines.

The Design Booklet included with the rocket and the launcher includes plans for single and multi-stage rockets, information on the design and operation of model rockets, and information on rocket construction. Also included in this handbook are technical report TR-1 giving basic information on rocket stability, technical report TR-2 on multi-stage techniques and operation, and technical report TR-3 on determining rocket altitudes.



\$6.00 BEGINNERS SPECIAL

CONTAINS:

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

Cat. No. 641-B5-6 \$6.00 each
Shipping Weight 3 lbs

\$2.00 BEGINNERS SPECIAL

CONTAINS:

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

Cat. No. 641-B5-2 \$2.00 each
Shipping Weight 10 oz

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 rocket launching system.

Either of these assortments provides for an easy entry into model rocketry and rapid learning of the important areas of this scientific sport. Get the most from model rocketry now! Pick the set that is best for you and join America's young scientists who are preparing for tomorrow with model rocketry.

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 more basic subjects.

- ① Build and fly the Astron Scout. 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 Build and fly the Astron Sky Hook to learn about parachute recovery.
- ③ Design, build and fly your own single stage bird, applying the things you learned in steps 1 and 2.
- 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 engined boost-gliders and gain further experience in the art of balancing gliders 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 Get started on your own special research program. 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 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.

Astron Drifter

**GREAT FOR
COMPETITION
AND
SPORT
FLYING!**

**2
BIG
'CHUTES**

Spectacular in upward flight and recovery, the Astron Drifter combines low weight with a large 'chute capacity. Perfect in any competition with it's 24" 'chute, the Astron Drifter is a great performer with it's 12" 'chute for test and sport flying too! Parachutes are easily interchanged.

Cat. No. 641-K-14 **\$1.75 each**
Shipping weight..... 8 Oz.

Body Dia.: 1"
Length: 14.3"
Weight: 1 Oz.

Recommended engines are: 1/2A.8-2, A.8-3, B.8-2 and B.8-4.

(Engines are not included in kit)

**Only
\$1.75**



Easy
to
Build

Great
for
Flying
and
Display

WAC CORPORAL

Flying
Scale Model!

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

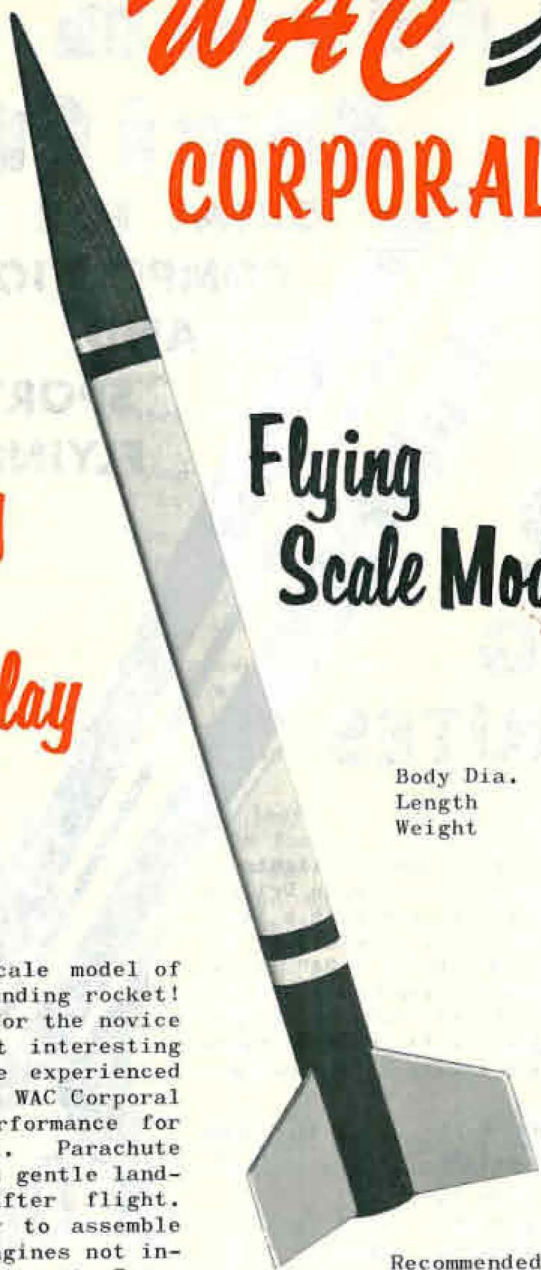
High-flying scale model of the famous sounding rocket! Easy enough for the novice to build, yet interesting enough for the experienced rocketeer, the WAC Corporal gives top performance for a scale model. Parachute recovery gives gentle landings flight after flight. Comes in easy to assemble kit form.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

Cat. No. 641-K-11 \$1.50 each

Recommended Engines

1/4A.8-2	1/2A.8-2
A.8-3	B.8-4

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



Astron Scout

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. 641-K-1

\$.70 each

Patent No.
3,114,317

Only \$.70 P.P.

Tumble Recovery
Easy to Build
Educational

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

Recommended Engines

1/4A.8-2
1/2A.8-2
A.8-3
B.8-4

 (Use 1/4A.8-2 for first flights.)



The next
step for the
beginner.

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. 641-K-2
P.P. Price - \$1.25

**Streamer
Recovery**

**Astron
Mark**
**Ideal for Sport
& Demonstration
Flying**

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

Recommended Engines

1/4A.8-2	1/2A.8-2
A.8-3	B.8-4

 B 3-5
 (Use 1/2A.8-2 for first flights.)



Astron Space Plane



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. 641-K-3

\$1.80 Each

patent pending

Body Dia. .765 in
Length 10 in
Wing Span 9 in
Weight .5 oz

Recommended Engines

$\frac{1}{4}$ A.8-2	$\frac{1}{2}$ A.8-2
A.8-3	B.8-4
	B.8-2

(Use $\frac{1}{4}$ A or $\frac{1}{2}$ A engines
for first flights.)

Fascinating Rocket Glider

ASTRON FALCON

ROCKET GLIDER



Only \$1.00

Get sky-high performance with the new Astron Falcon boost-glider. Beautiful climb--glide durations up to and over 1-1/2 minutes on $\frac{1}{4}$ A engines, even more with larger engines. A great bird for the experienced rocketeer. Glide recovery brings it back gently, ready for a fresh engine and another flight. Kit comes complete with all parts and instructions (engines not included). Shipping wt. 5 ounces.

Cat. No. 641-K-13 \$1.00 P.P.

Length 12 in
Wing Span 10 in
Weight .40 oz

Recommended Engines

$\frac{1}{4}$ A.8-2	$\frac{1}{2}$ A.8-2
A.8-3	B.8-4
	B.8-2

**Climbs
Straight
Up!**

**Flat
Glide -**

**Long
Duration!**

For normal flying only $\frac{1}{4}$ A and $\frac{1}{2}$ A engines are recommended--the Astron Falcon can easily glide out of sight with larger engines if it is built and balanced carefully.

ASTRON FARSIDE

Three Stages

Choice of two Distinctive Payload Units

Advanced Stage Coupling

A sophisticated ultra-high altitude probe or a workhorse vehicle for high altitude studies with large payloads--take your choice with the new Astron Farside. 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 (#641-K-12) or with extra large 1-1/2" dia. capsule for large payloads (#641-K-12X). Be sure to specify model type when ordering. Kit comes complete with all parts and assembly instructions (but no engines). Shipping wt. 8 ounces.



← Standard Model:

Cat. No. 641-K-12
\$2.75 Each

Large Payload Model: →

Cat. No. 641-K-12X
\$3.00 Each

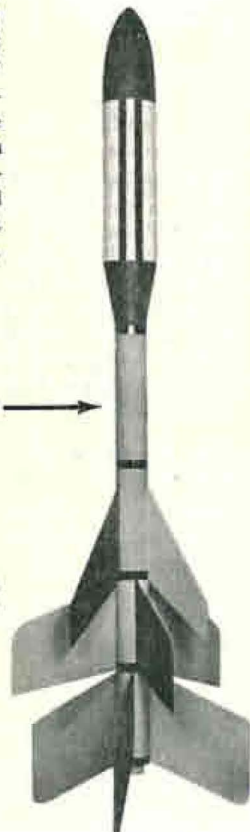
Specifications:

	K-12	K-12X
Length	21.5 in	25 in
Weight	2.0 oz	2.5 oz
Diameter	1 in	1.5 in

Recommended Engines

First Stage	Second Stage	Top Stage
1/4A.8-0	1/4A.8-0	1/4A.8-4
1/2A.8-0	1/2A.8-0	1/2A.8-4
B 3-0	A.8-0	A.8-4
	B.8-0	B.8-6
	C.8-0	B 3-5
	B 3-0	

NOTE: Orion booster engine may be used if there is an stud.



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.

Recommended Engines

Booster	Upper Stage
1/4A.8-0	1/4A.8-4
1/2A.8-0	1/2A.8-4
A.8-0	A.8-4
B.8-0	B.8-6
C.8-0	B 3-5
B 3-0	

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.

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

Cat. No. 641-K-5 \$2.00 each

Spectacular Single Engine Performance!

Soars to over
2,000 ft.!

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



ASTRON STREAK

Low weight and wind cheating design give the Astron Streak fantastic performance. Uses mylar body tube for high strength and low weight--only 1/8 ounce without engine. Ideal for contests and records. Recommended engine for normal flying is the 1/4A.8-4. Kit comes complete with all parts and instructions (but no engines). Shipping weight 4 oz.

Recommended Engines

1/4A.8-4 1/2A.8-4
A.8-4 B.8-6

Cat. No. 641-K-4 \$.50

Astron PHANTOM

DEMONSTRATES
BASIC BUILD-
ING RULES.

Great for
classroom
or fair!



COMPLETE Cutaway ROCKET

This bird will never fly, but it will certainly help you 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.

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

Cat. No. 641-K-7A

\$1.75

Astron SKY HOOK

• EASY TO BUILD

• PARACHUTE RECOVERY
• TERRIFIC PERFORMER

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. 641-K-8 \$1.35 P.P.

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



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

Recommended Engines
1/4A.8-2 1/2A.8-2
A.8-3 B.8-4
(Use 1/4A.8-2 engines
for first flights.)

Only
\$1.35

Recommended
Engines
1/4A.8-2
1/2A.8-2
A.8-3
B.8-4
B 3-5
(For first
flights use
1/4A.8-2 en-
gines.)

Astron SPACEMAN

A real odd ball of a rocket, you'll get a big "kick" out of building and flying the Astron Space Man. Featherweight recovery brings him back close to the pad, ready for a new engine and another flight. Kit comes complete with all parts and instructions (but no engines). Shipping weight 7 oz.

Cat. No. 641-K-9

\$1.75 P.P.

Astron RANGER

BIG
2
'CHUTES

**3 ENGINE
WALLOP!**

**EXTRA LARGE
PAYLOAD SECTION**

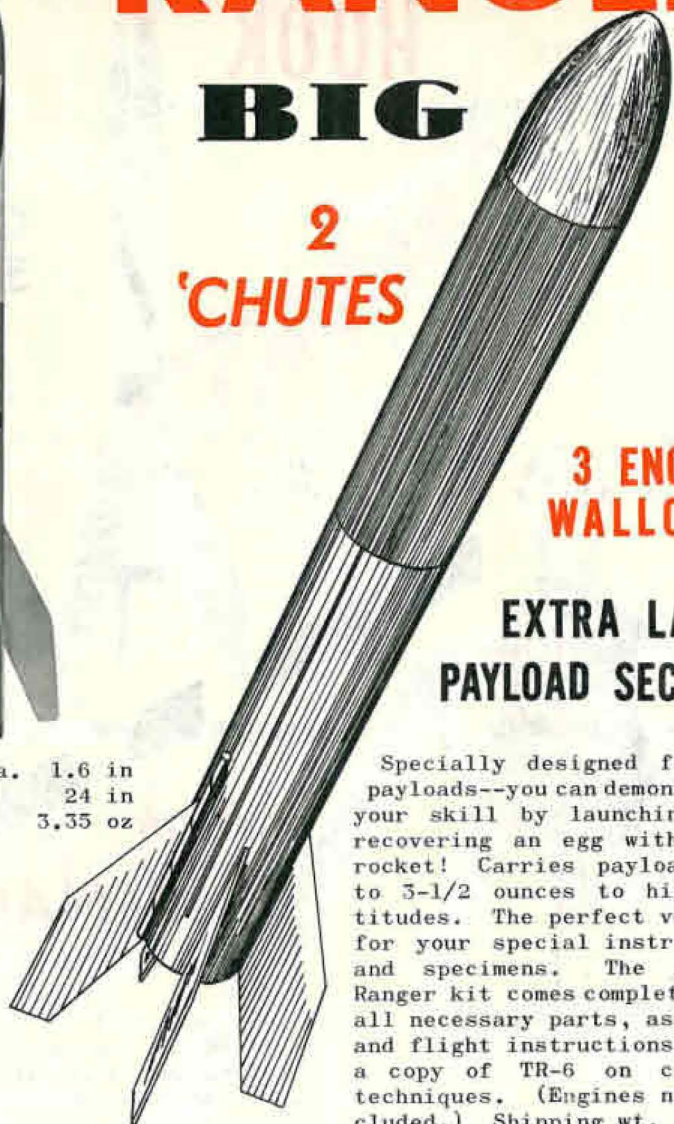
Specially designed for big payloads--you can demonstrate your skill by launching and recovering an egg with this rocket! Carries payloads up to 3-1/2 ounces to high altitudes. The perfect vehicle for your special instruments and specimens. The Astron Ranger kit comes complete with all necessary parts, assembly and flight instructions, plus a copy of TR-6 on cluster techniques. (Engines not included.) Shipping wt. 13 oz.

Cat. No. 641-K-6 \$3.75 Each

Recommended Engines
A.8-3 B.8-4

Body Dia. 1.6 in
Length 24 in
Weight 3.35 oz

**IDEAL FOR
PAYLOAD
EXPERIMENTS!**



ASTRON COBRA

**STABILITY
is
"Built in"**

Dependable

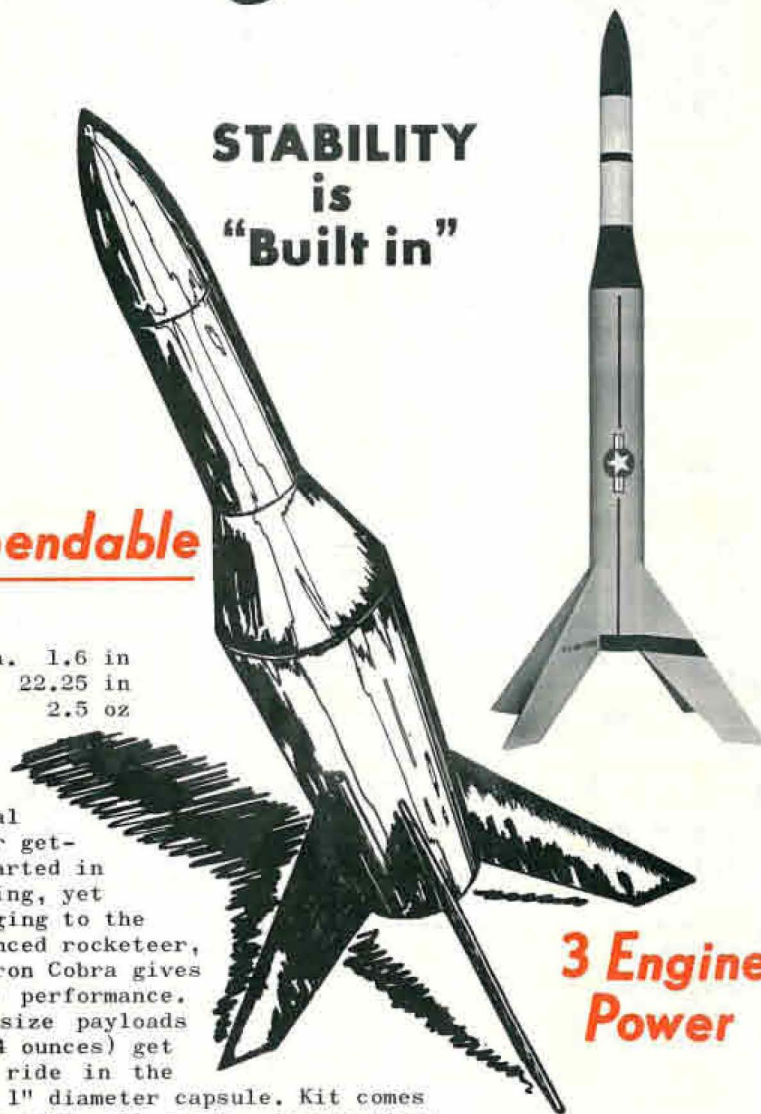
Body Dia. 1.6 in
Length 22.25 in
Weight 2.5 oz

The ideal bird for getting started in clustering, yet challenging to the experienced rocketeer, the Astron Cobra gives you top performance. Medium size payloads (up to 4 ounces) get a real ride in the Cobra's 1" diameter capsule. Kit comes complete with all parts, instructions, and a copy of technical report TR-6 on cluster techniques. (Engines not included.) Shipping weight 13 ounces.

**3 Engine
Power**

Cat. No. 641-K-10 \$3.50 Each

Recommended Engines
A.8-3 B.8-4



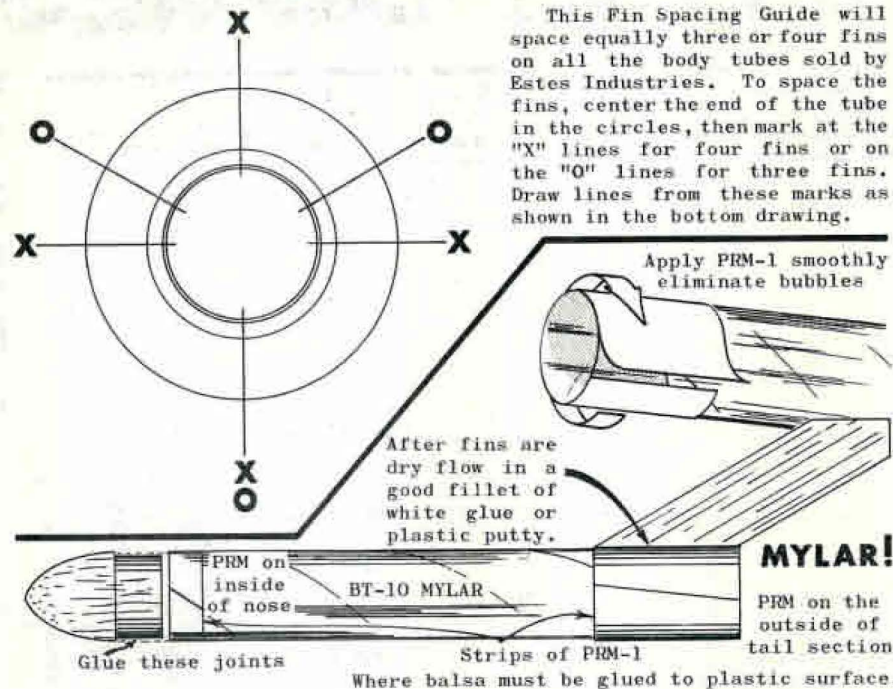
BODY TUBES



Cat. No.	Wall Thickness	Length	Weight in Ounces			Price	
			Net	Per in.	Ship.	Each	3 for
.710" INSIDE DIA. MYLAR TUBE - BT-10							
541-BT-10	.005"	9"	.088	.0098	4	\$.25	\$.50
641-BT-10H	.005"	3.062"	.029	.0098	1	\$.10	\$.25
.710" INSIDE DIA. SPIRAL-WOUND PAPER TUBE - BT-20							
641-BT-20	.013"	18"	.288	.016	11	\$.30	\$.65
641-BT-20B	.013"	8.65"	.138	.016	4	\$.15	\$.35
641-BT-20D	.013"	6.5"	.104	.016	4	\$.15	\$.30
641-BT-20G	.013"	3.5"	.056	.016	4	\$.10	\$.20
641-BT-20J	.013"	2.75"	.044	.016	4	\$.10	\$.20
641-BT-20M	.013"	2.25"	.036	.016	4	\$.10	\$.20
.725" INSIDE DIA. PARALLEL-WOUND PAPER TUBE - BT-30							
641-BT-30	.021"	9"	.270	.030	4	\$.25	\$.50
641-BT-30F	.021"	7"	.210	.030	4	\$.25	\$.50
641-BT-30B	.021"	6.125"	.184	.030	4	\$.20	\$.45
641-BT-30C	.021"	5.5"	.165	.030	4	\$.20	\$.40
641-BT-30A*	.021"	3.5"	.105	.030	4	\$.30	---
641-BT-30J	.021"	2.75"	.082	.030	4	\$.10	\$.25
.765" INSIDE DIA. PARALLEL-WOUND PAPER TUBE - BT-40							
641-BT-40	.028"	13.75"	.591	.043	5	\$.30	\$.60
.950" INSIDE DIA. SPIRAL-WOUND PAPER TUBE - BT-50							
641-BT-50	.013"	18"	.378	.021	11	\$.40	\$.90
641-BT-50H	.013"	7.75"	.163	.021	4	\$.25	\$.50
641-BT-50S	.013"	4"	.084	.021	4	\$.15	\$.30
641-BT-50J	.013"	2.75"	.058	.021	4	\$.15	\$.30
1.595" INSIDE DIA. SPIRAL-WOUND PAPER TUBE - BT-60							
641-BT-60	.021"	18"	.960	.053	11	\$.60	\$ 1.40
641-BT-60D	.021"	11"	.583	.053	11	\$.45	\$ 1.10
641-BT-60K	.021"	7"	.371	.053	6	\$.35	\$.70
641-BT-60R	.021"	5"	.265	.053	6	\$.25	\$.50
641-BT-60J	.021"	2.75"	.146	.053	6	\$.15	\$.30
.710" INSIDE DIA. CLEAR PLASTIC TUBE - FITS BT-20							
641-PST-20	.013"	8"	.168	.021	4	\$.30	\$.60
641-PST-20J	.013"	2.75"	.058	.021	4	\$.15	\$.30
.765" INSIDE DIA. CLEAR PLASTIC TUBE - FITS BT-40							
641-PST-40D	.040"	2.807"	.180	.064	4	\$.25	\$.60

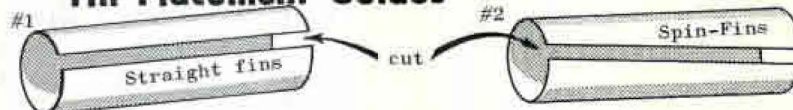
* Replacement part for the Astron Scout, with holes punched. Be sure to give correct catalog number and length when ordering!

CONSTRUCTION TIPS

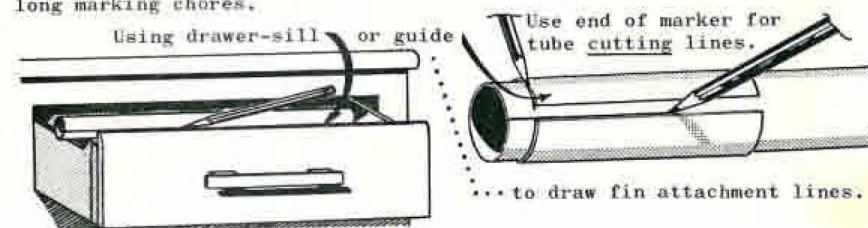


BT-10 is an ultra-light mylar tube for use with the featherweight recovery system. It will withstand the heat of an ejection charge only when the engine is ejected from the rocket body by the charge. Paper reinforcing material must be used to glue parts to the tube, as ordinary glue will not stick to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

Fin Placement Guides

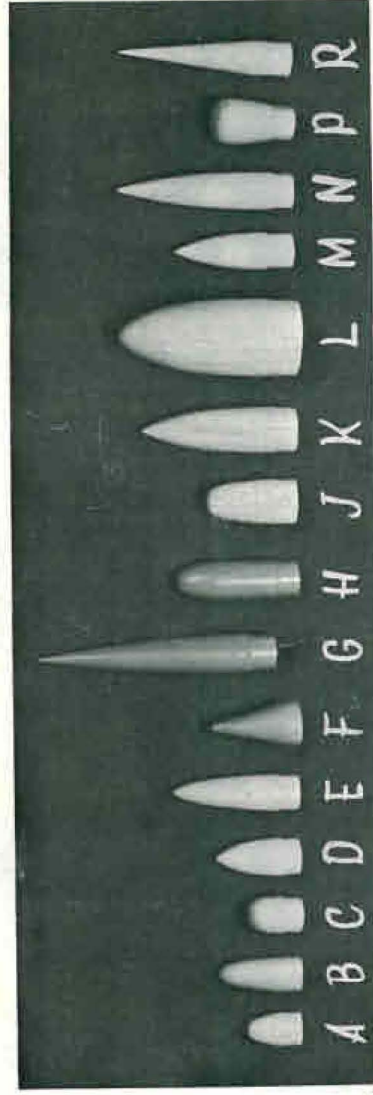
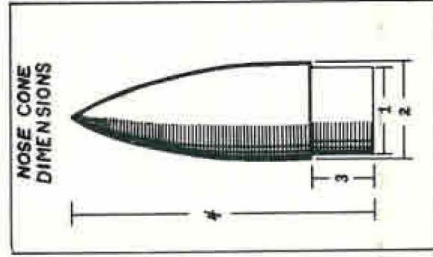


Straight or spin-fin placement can be marked with these easy-to-make guides. Select a 2 or 3 inch piece of the same size body tube you are using for the rocket body. Illustrations #1 and #2 show how each guide is first cut. A quicker way of marking straight fins using the "Vee"-top of a drawer sill is also shown and is especially good for those extra long marking chores.



NOSE CONES

Catalog No.	Dimensions			Material	Ill.	Average Weight	Ship. Wt.	Price	
	1	2	3					4	Each
PERFECT FOR BT-10									
641-BNC-10A	.702"	.728"	1/4"	1-1/16"	A	.03 oz.	1 oz.	\$.25	\$.50
641-BNC-10B	.702"	.728"	5/16"	2"	B	.05 oz.	1 oz.	\$.25	\$.50
VARIETY FOR A BT-20									
641-BNC-20A	.710"	.736"	1/4"	1-1/16"	A	.03 oz.	1 oz.	\$.25	\$.50
641-BNC-20B	.710"	.736"	5/16"	2"	B	.05 oz.	1 oz.	\$.25	\$.50
641-BNC-20N	.710"	.736"	1/2"	3-1/4"	N	.08 oz.	2 oz.	\$.45	\$.90
641-BNC-20P	.710"	.900"	7/16"	1-3/4"	P	.07 oz.	4 oz.	\$.25	\$.50
641-BNC-20R	.710"	.736"	3/8"	3-1/8"	R	.07 oz.	2 oz.	\$.40	\$.80
BALSA BEAUTIES FOR BT-30									
641-BNC-30C	.725"	.767"	3/8"	1-1/8"	C	.04 oz.	1 oz.	\$.30	\$.60
641-BNC-30D	.725"	.767"	5/8"	1-7/8"	D	.06 oz.	1 oz.	\$.30	\$.60
641-BNC-30E	.725"	.767"	7/16"	2-3/8"	E	.07 oz.	1 oz.	\$.40	\$.80
641-BNC-30M	.725"	.767"	1/2"	2"	M	.06 oz.	1 oz.	\$.40	\$.80
641-BNC-30N	.725"	.767"	1/2"	3-1/4"	N	.08 oz.	2 oz.	\$.45	\$.90
PLASTIC AND BALSA FOR BT-40									
641-BNC-40D	.765"	.822"	3/8"	1-7/8"	D	.06 oz.	1 oz.	\$.30	\$.60
641-BNC-40N	.765"	.822"	1/2"	3-1/4"	N	.08 oz.	2 oz.	\$.45	\$.90
641-PNC-40F	.822"	.922"	1/4"	1-7/8"	F	.08 oz.	1 oz.	\$.30	\$.60
641-PNC-40G	.765"	.822"	1/2"	5"	G	.71 oz.	5 oz.	\$.75	\$2.25
641-PNC-40H	.765"	.822"	1/2"	2-3/4"	H	.40 oz.	2 oz.	\$.35	\$.80
DESIGNED FOR THE BT-50									
641-BNC-50J	.950"	.976"	1/2"	1-7/8"	J	.08 oz.	4 oz.	\$.40	\$.80
641-BNC-50K	.950"	.976"	1/2"	3-1/4"	K	.13 oz.	4 oz.	\$.50	\$.90
EXCLUSIVELY FOR THE BT-60									
641-BNC-60L	1.595"	1.637"	5/8"	4"	L	.18 oz.	4 oz.	\$.75	\$1.50
ESPECIALLY FOR OUR ENGINE MAILING TUBE									
641-BNC-MTD	.937"	1.002"	3/8"	1-7/8"	D	.06 oz.	4 oz.	\$.30	\$.60



NOTES: Dimensions may vary .003". Nose cone for mailing tube may have slight imperfections since it is made from a standard size piece of wood which is a few thousandths of an inch smaller than the outside diameter of the tube. The imperfections are not usually noticeable on a finished rocket.

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

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

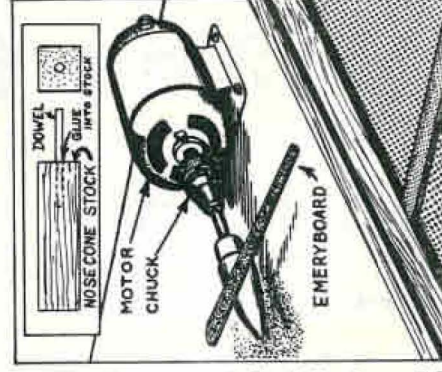
NOSE CONE STOCK: 4" to 6" lengths of balsa block for making nose cones of your own design. Cut-off pieces from our nose cone manufacturing process, they have damaged corners which will not interfere with their usability.

1" x 1" Blocks: Shipping Weight 1 oz
Cat. No. 641-NC5-1 \$.15 each

2" x 2" Blocks: Shipping Weight 3 oz
Cat. No. 641-NC5-2 \$.20 each

NOSE CONE DOWELS: Use as shown in the drawing. Hardwood, 1/4" dia., 2" long.

Shipping Weight 2 oz
Cat. No. 641-NCD-2 3 for \$.10



Nose Blocks

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



Cat. No.	Dimensions		Fits	Weight oz.		Price	
	O. D.	Length		Net	Ship.	Each	3 for
641-NB-20	.710"	3/4"	BT-20	.014	1	\$.30	\$.60
641-NB-30	.725"	3/4"	BT-30	.014	1	\$.30	\$.60
641-NB-40	.765"	3/4"	BT-40	.015	1	\$.30	\$.60
641-NB-50	.950"	1"	BT-50	.040	4	\$.35	\$.70
641-NB-60	1.595"	1-1/2"	BT-60	.190	4	\$.50	\$1.00
641-NB-1MT	.937"	1"	Mailing Tube	.040	4	\$.35	\$.70

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.



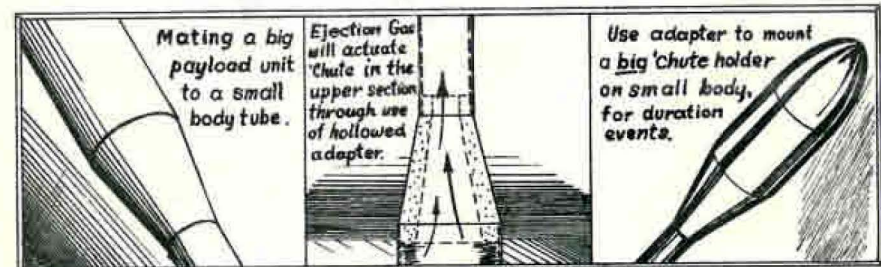
Cat. No.	Dimensions			Fits	Weight oz.		Price	
	O.D.	I.D.	Length		Net	Ship.	Each	3 for
BALSA ENGINE BLOCKS								
641-EB-20	.710"	.46"	3/4"	BT-20	.007	1	\$.30	\$.60
641-EB-30	.725"	.46"	3/4"	BT-30	.007	1	\$.30	\$.60
641-EB-40	.765"	.46"	3/4"	BT-40	.008	1	\$.30	\$.60
PAPER ENGINE BLOCKS								
641-EB-20A	.708"	.65"	1/4"	BT-20	.009	1	\$.10	\$.20
641-EB-30A	.724"	.65"	1/4"	BT-30	.010	1	\$.10	\$.20
641-EB-40A	.763"	.65"	1/4"	BT-40	.011	1	\$.10	\$.20

BALSA ADAPTERS

There's no limit to design ideas when you use these precision-made balsa adapters. 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, and any adapter may be hollowed with a knife or drill to make a passage for ejection gases or upper stage ignition charge. All adapters have a 1/2" mating surface on each end.



Catalog No.	Mates	Length	Taper Length	Weight oz.		Price Each
				Net	Ship.	
641-TA-2050	BT-20 to BT-50	3"	2"	.15	4	\$.40
641-TA-2050A	BT-20 to BT-50	2"	1"	.11	4	\$.35
641-TA-2060	BT-20 to BT-60	3"	2"	.20	4	\$.60
641-TA-5060	BT-50 to BT-60	3"	2"	.23	4	\$.60



PAPER ADAPTERS



Add still another dimension in rocket design. This adapter set is a "must" for the imaginative rocketeer. Get 16 rings for positioning BT-20, BT-30, and BT-40 in BT-50; and BT-20, BT-30, BT-40, and BT-50 in BT-60, plus instructions and 3 universal tapered shrouds. Combine light weight and versatility! (Does not include body tubes or nose cones.) Shipping weight 2 oz.

Cat. No. 641-TA-1

\$.35 each

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. .05 oz. Shipping wt. 5 oz.

Cat. No. 641-EH-2040 \$.15 each

EH-2050 Fits BT-50, Includes BT-20J, EB-20A, 2 rings for centering holder tube, and JT-50C for positioning rings. Net weight 0.1 oz. Shipping weight 5 oz.

Cat. No. 641-EH-2050 \$.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.

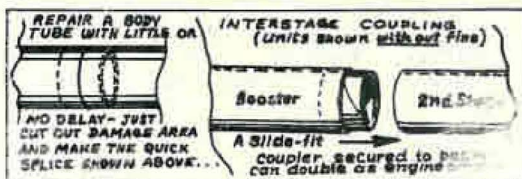
Cat. No. 641-EH-2060 \$.35 each



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-20C, 30C, and 40C, 1 oz., JT-50C and 60C, 5 oz.

Cat. No.	Dimensions			Fits	Average Weight	Price	
	O. D.	I. D.	Length			Each	5 for
641-JT-20C	.708"	.650"	3/4"	BT-20	.027 oz	\$.10	\$2.20
641-JT-30C	.724"	.650"	3/4"	BT-30	.030 oz	\$.10	\$2.20
641-JT-40C	.763"	.650"	3/4"	BT-40	.033 oz	\$.10	\$2.20
641-JT-50C	.949"	.920"	1"	BT-50	.051 oz	\$.15	\$3.50
641-JT-60C	1.59"	1.55"	1-1/2"	BT-60	.124 oz	\$.15	\$3.50



RANGE KIT SPECIAL

\$9.00 Value Look What You Get! **Only \$6.00**



A Complete Range Kit!

Carry it with you when you fly rockets. Get a sturdy, all-metal range box loaded with all these most needed items.

1 15' Roll Nichrome	#NW-32A	1 Parachute	#PK-18A
1 Bottle White Glue	#WG-1	2 Parachutes	#PK-12A
1 Knife Handle	#KN-1	1 Streamer Material	#SM-1
1 Knife Blade	#KNB-1A	3 Snap Swivels	#SV-12
1 Knife Blade	#KNB-1B	3 Shock Cords	#SC-1
1 Knife Blade	#KNB-1C	1 Shock Cord	#SC-2
1 Tweezers	#T-1	3 Screw Eyes	#SE-1
1 Whetstone	#W-1	3 Nose Cone Weights	#NCW-1
1 Engine Holder	#EH-1	1 Roll Masking Tape	#MT-1
1 Reinforcing Mat'l.	#PRM-1	1 Balsa Fin Stock	#BFS-20
1 Roll Shroud Lines	#SLT-1	1 Balsa Fin Stock	#BFS-30
1 Sheet Tape Strips	#TD-2	3 Launching Lugs	#LL-1C
1 Pack Flameproof		18 Sheets Sandpaper	#SPA-2
Recovery Wadding	#RP-1	1 Emery Board	#BE-1
1 Parachute	#PK-24A	2 Micro-Clips	#MC-1

Sorry, no substitutions. Not available on quantity discount purchases. Shipping weight 3 pounds. **Cat. No. 641-RBK-1A \$6.00**

Range Box



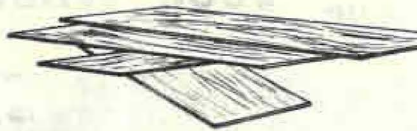
Good-looking, roomy, tough all metal box--the same as included with the special above. A big 11 1/2" x 5 1/4" x 4", complete with a three compartment tray for small parts. Has full-drawn seamless body, snap catch with eye for padlock. Shipping wt. 2 pounds.

Cat. No. 641-RB-1

\$2.50 Each

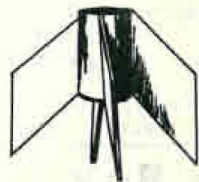
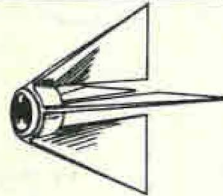
Fin Stock

Top quality balsa sheeting for making fins for model rockets. For maximum strength, grain of wood should follow the leading edge of fin. For more information, read FINS in Vol. 3, No. 3 of the Model Rocket News.



Catalog No.	Dimensions (In Inches)	Weight oz.		Major Use	Price
		Net	Ship.		
641-BFS-10	1/32" x 5" x 9"	.065	4	High Performance	3 for \$.35
641-BFS-20	1/16" x 5" x 9"	.130	4	High Performance	3 for \$.40
641-BFS-20B	1/16" x 1/2" x 6"	.015	2	Boost-Glide Elevation	2 for \$.10
641-BFS-30	3/32" x 5" x 9"	.150	4	Sport Models	3 for \$.45
641-BFS-40	1/8" x 5" x 9"	.200	4	Cluster Rockets	3 for \$.50
641-BFS-60S	3/16" x 1/2" x 3.7"	.020	2	Scout Replacement	3 for \$.15
641-BFS-80	1/4" x 2" x 17"	1.00	12	Sky Slash Body	50¢ each 3 for 60¢

Plastic Fin Tough white plastic fin unit. Build models the quick, easy, durable way. Fits body tube BT-40. The unit used on the Sky Bird and the Dirty Bird, fins are large enough to stabilize most models. Great for beginners. Net weight .48 oz. Shipping weight 4 oz.
Cat. No. 641-PF-40A \$.50 each 3 for \$1.20



Spin Fin Use this unit with the fins set at an angle to make the rocket spin. Made of molded polyethelene, fits body tube BT-40. Ideal for beginners and experimenters. For the best fit, slot the body on opposite sides as shown above. Net weight .35 oz. Shipping weight 4 oz.

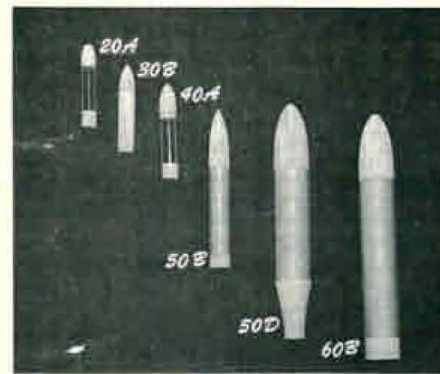
Cat. No. 641-PF-40B \$.50 each 3 for \$1.20

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. 641-PP-2 \$.25 each 3 for \$.50



PAYLOAD SECTIONS



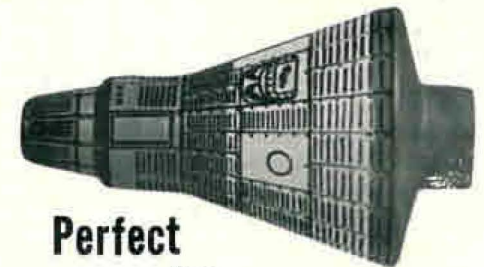
Ideal for payload launchings! Carry instruments, biological specimens, etc., in these lightweight, high capacity payload sections. These capsules come complete with all needed parts, including nose cone, body tube, nose block, and screw eye. PS-50D includes stand-off and launching lug for rocket's main body. Dimension "A" is inside diameter, "B" is inside length, and "C" is overall length.

Cat. No.	Type	Weight oz.		Fits	Dimensions			Price Each
		Net	Ship.		A	B	C	
641-PS-20A	Clear Plastic	.16	1	BT-20	.710	2	4.00	\$.80
641-PS-30B	Regular Tube	.24	1	BT-30	.725	2	3.75	\$.65
641-PS-40A	Clear Plastic	.32	1	BT-40	.765	2	3.75	\$.85
641-PS-50B	Regular Tube	.36	4	BT-50	.950	3	6.50	\$.85
641-PS-50D	Regular Tube	.95	11	BT-50	1.59	4	10.5	\$1.25
641-PS-60B	Regular Tube	.90	11	BT-60	1.59	6	10.5	\$1.25

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. Start your own Project Mercury!

Shipping weight 3 ounces.



Perfect
for Payloads!

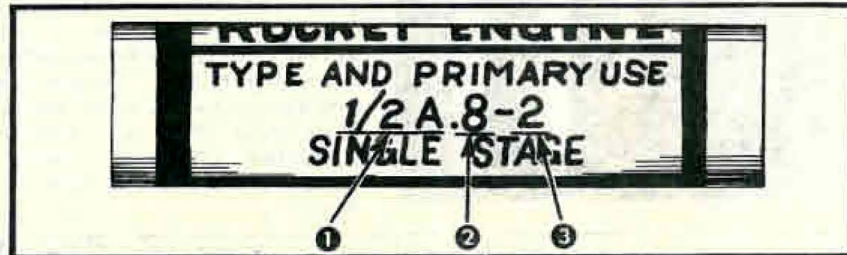
Cat. No. 641-PSM-1 Only \$1.00

ENGINE CLASSIFICATION

All engines sold by Estes Industries are stamped with a code designation which, when understood, will give the rocketeer important and useful data on the engine's performance capabilities.

Here's how to read this coding:

- ① This portion gives you the "total impulse" or total power produced by the engine as in the chart below.

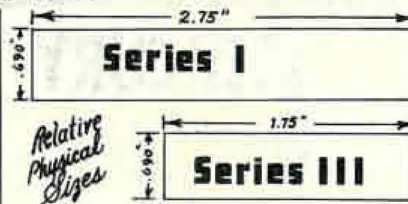


- ② This portion is the engine's average thrust in pounds. Series I and Series III engines are rated at .8 lb. average, Series II engines at 3 pounds. Series I and Series III engines are for normal flying, Series II engines are for lifting larger payloads and for high acceleration studies.

- ③ This number gives you the delay in seconds between burnout and ejection charge activation. Engines with "-0" have no delay charge, no ejection charge, and are for use in booster stages only.

Series III engines are identical in performance to the corresponding Series I engines. Series III engines have a final "S" in their code.

TOTAL IMPULSE CLASSIFICATION	
Code	Total Impulse
1/4A	0-.175 lb-sec
1/2A	.176-.350 lb-sec
A	.351-.700 lb-sec
B	.701-1.20 lb-sec
C	1.21-2.00 lb-sec



QUALITY CONTROL: One out of every hundred engines made by Estes Industries is static tested on a recording type of test stand which graphically records 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 propulsion units for contests and exhibitions.

Tips for Flying Model Rockets

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 suggest that you use single stage designs for your first half dozen rockets. There are five primary rocket engines for single stage flying, the 1/4A.8-2 for general testing, the 1/2A.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 are the most popular engines for general use. When you have mastered their use you may select other engines which are designed for specific purposes.

FIRST TESTS: It is best to use the smallest engine(s) possible for the first tests on a new rocket design. If the design is bad and the rocket is not stable it presents less hazard. If you have a high performance rocket and use the largest engines first, you are likely to see it soar off into the wild blue yonder, never to be seen again--quite a disappointment if you spent hours building it. For most designs 1/4A and 1/2A engines are best for the first test flights. A well designed high performance rocket can approach an altitude of 1,000 feet when powered by a 1/2A engine.

RECOVERY FIELD: The altitude to which you fly a rocket should not be greater than is practical for the size of the flying area. In a town or city, flying in a limited area, 1/4A and 1/2A engines are best. In large open park areas A engines are all right, and in open rural areas B engines and two or three stage rockets are okay. A general rule to follow is that the field should be at least as large as the altitude to which you intend to fly the model. When flying a rocket to 500', you should launch it from the center of a 500' by 500' field.

SERIES II ENGINES: The wallop packed by B 3-0 and B 3-5 engines makes them more difficult to handle than Series I engines. Extra care should be exercised to be sure the rocket is stable. Extra caution must be taken to be sure fins are extra durable and well secured to the rocket body. A Series II engine must be mounted against a secure bulkhead so a sudden force of 9 pounds will not force it forward in the rocket body. With a Series II engine, a light weight model will be traveling about 400 miles per hour in just 70 feet from the launcher. Use extra caution.

SAFETY: Rocket engines are not toys, but scientific devices. With common sense and close adherence to safety rules, model rocketry is as safe as any other sport, hobby, or scientific study: Carelessness can make it dangerous, as with model airplanes, baseball, or swimming. If you are hit by a model rocket traveling 300 or more miles per hour, you will be hurt. Don't spoil model rocketry's excellent record of safety.

ROCKET ENGINE SELECTION CHART

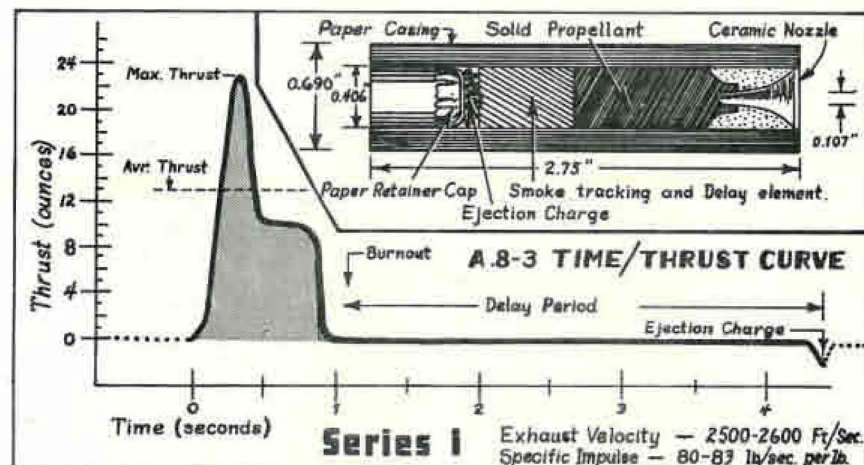
Cat. No. and Engine Type	Total Impulse	Thrust Duration	Maximum Thrust	Time Delay	Engine Length	Initial Weight	Label Color	Maximum Rocket Weight***			PRICES			
								Single Stage	Multi-Stage		Each	3 for	12 or more	
SINGLE STAGE ENGINES														
1/4A.8-2	0.17 lb-sec	0.15 sec	23 oz.	2-2½ sec	2.75 in.	0.50 oz.	Green	2.0 oz.	-	-	-	\$.25	\$.65	\$.21 each
1/4A.8-2S**	0.17 lb-sec	0.15 sec	23 oz.	2-2½ sec	1.75 in.	0.38 oz.	Green	2.0 oz.	-	-	-	\$.25	\$.65	\$.21 each
1/2A.8-2	0.35 lb-sec	0.40 sec	23 oz.	2-2½ sec	2.75 in.	0.54 oz.	Blue	2.5 oz.	-	-	-	\$.30	\$.70	\$.23 each
1/2A.8-2S**	0.35 lb-sec	0.40 sec	23 oz.	2-2½ sec	1.75 in.	0.42 oz.	Blue	2.5 oz.	-	-	-	\$.30	\$.70	\$.23 each
A.8-3	0.70 lb-sec	0.90 sec	23 oz.	3-3½ sec	2.75 in.	0.60 oz.	Purple	3.0 oz.	-	-	-	\$.35	\$.80	\$.26 each
B.8-4	1.15 lb-sec	1.40 sec	23 oz.	4-4½ sec	2.75 in.	0.71 oz.	Red	3.5 oz.	-	-	-	\$.40	\$.90	\$.30 each
B 3-5*	1.15 lb-sec	0.35 sec	9.0 lb.	5-5½ sec	2.75 in.	0.69 oz.	Red	5.0 oz.	-	-	-	\$.50	\$1.00	\$.33 each
UPPER STAGE ENGINES (OR SINGLE STAGE ENGINES IF USED IN VERY LIGHT ROCKETS)														
1/4A.8-4	0.17 lb-sec	0.15 sec	23 oz.	4-4½ sec	2.75 in.	0.51 oz.	Green	1.0 oz.	-	-	-	\$.25	\$.65	\$.21 each
1/4A.8-4S**	0.17 lb-sec	0.15 sec	23 oz.	4-4½ sec	1.75 in.	0.39 oz.	Green	1.0 oz.	-	-	-	\$.25	\$.65	\$.21 each
1/2A.8-4	0.35 lb-sec	0.40 sec	23 oz.	4-4½ sec	2.75 in.	0.55 oz.	Blue	1.5 oz.	-	-	-	\$.30	\$.70	\$.23 each
1/2A.8-4S**	0.35 lb-sec	0.40 sec	23 oz.	4-4½ sec	1.75 in.	0.43 oz.	Blue	1.5 oz.	-	-	-	\$.30	\$.70	\$.23 each
A.8-4	0.70 lb-sec	0.90 sec	23 oz.	4-4½ sec	2.75 in.	0.63 oz.	Purple	1.5 oz.	-	-	-	\$.35	\$.80	\$.26 each
B.8-6	1.15 lb-sec	1.40 sec	23 oz.	6-6½ sec	2.75 in.	0.73 oz.	Red	1.5 oz.	-	-	-	\$.40	\$.90	\$.30 each
BOOSTER ENGINES														
1/4A.8-0	0.17 lb-sec	0.15 sec	23 oz.	none	2.75 in.	0.46 oz.	Green	Don't Use	4.0 oz.			\$.25	\$.65	\$.21 each
1/4A.8-0S**	0.17 lb-sec	0.15 sec	23 oz.	none	1.75 in.	0.34 oz.	Green	Don't Use	4.0 oz.			\$.25	\$.65	\$.21 each
1/2A.8-0	0.35 lb-sec	0.40 sec	23 oz.	none	2.75 in.	0.49 oz.	Blue	Don't Use	3.5 oz.			\$.30	\$.70	\$.23 each
1/2A.8-0S**	0.35 lb-sec	0.40 sec	23 oz.	none	1.75 in.	0.37 oz.	Blue	Don't Use	3.5 oz.			\$.30	\$.70	\$.23 each
A.8-0	0.70 lb-sec	0.90 sec	23 oz.	none	2.75 in.	0.56 oz.	Purple	Don't Use	3.5 oz.			\$.35	\$.80	\$.26 each
B.8-0	1.15 lb-sec	1.40 sec	23 oz.	none	2.75 in.	0.63 oz.	Red	Don't Use	3.0 oz.			\$.40	\$.90	\$.30 each
B 3-0*	1.15 lb-sec	0.35 sec	9.0 lb.	none	2.75 in.	0.61 oz.	Red	Don't Use	6.0 oz.			\$.50	\$1.00	\$.33 each
C.8-0	1.50 lb-sec	2.00 sec	23 oz.	none	2.75 in.	0.71 oz.	Black	Don't Use	3.0 oz.			\$.45	\$.95	\$.31 each
SPECIAL PURPOSE ENGINES														
B.8-2	1.15 lb-sec	1.40 sec	23 oz.	2-3 sec	2.75 in.	0.68 oz.	Red	Gliders & Special Designs				\$.40	\$.90	\$.30 each
B.8-0(P)	1.15 lb-sec	1.40 sec	23 oz.	none	2.75 in.	0.66 oz.	Red	Static Test Engine				\$.45	\$.95	\$.31 each

NOTES: * Series II engine. ** Series III engine. *** With engine(s). (P) Denotes plug to prevent blow-through. Burnout weight on all Series I and Series II engines is .42 oz., on all Series III engines, .30 oz. Sufficient ignition material, instructions, and a streamer protector is included with each rocket engine (any quantity) ordered from Estes Industries. Shipping weight of each engine is 1 ounce.

ROCKET ENGINE DESIGN

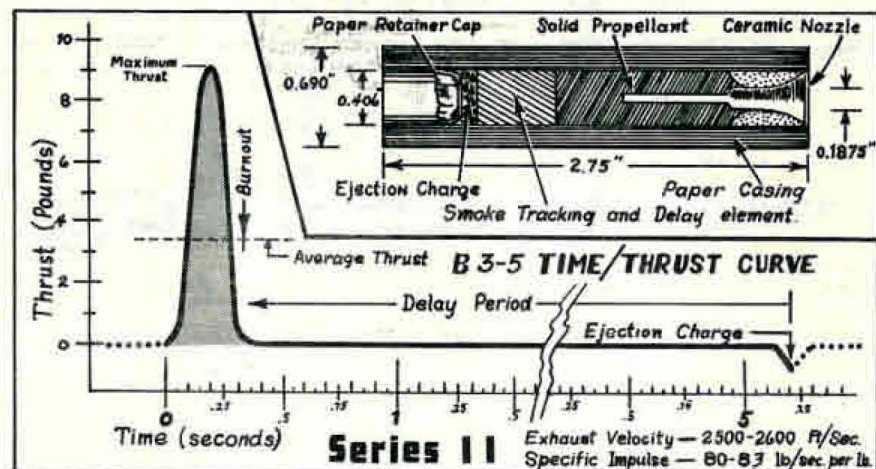
This rocket engine design and performance information is given for educational purposes only. We believe that if you understand how your rocket engine works you are in a better position to gain scientific knowledge from your activities and to design your rockets for specific purposes such as payload experimentation, altitude studies, drag racing, 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 with a dual thrust level design. 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 25 oz., thus stabilizing your rocket more quickly. This is because the slight center bore provides a relatively large burning area, resulting in faster consumption of the fuel. After this initial high thrust, a transition to



an end burning grain is made, and the thrust drops to a sustaining level of 10 oz. 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, but permits the rocket to coast upward to its peak altitude. At 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 with a center burning grain. This provides a greater propellant burning area, resulting in a higher thrust level than the Series I engines, but with a shorter thrust duration. 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 shown in the Series II performance graph. The average thrust of the Series II engine 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.

MODELING TOOLS



PRECISION KNIFE SET: Includes one 4-1/4" long #1 aluminum handle and one each #1A cutting blade, #1B punch blade, and #1C gouge blade. Recommended for precision work. Shipping weight 2 oz.

Cat. No. 641-KNS-1

\$.75 each



RETRACTABLE BLADE KNIFE: Heavy duty #2 aluminum handle, 4-3/4" long, with one double ended #2D blade. Blade retracts into handle for safe carrying. For general cutting. Shipping weight 4 ounces.

Cat. No. 641-KNS-2

\$1.00 each



UTILITY KNIFE: Includes 5-3/8" long #3 steel

handle and one #3E general purpose blade. Shipping weight 3 ounces.

Cat. No. 641-KNS-3

\$.30 each



HEAVY DUTY KNIFE: Set of one 4-3/4" long #4 plastic handle with metal chuck and one

general purpose knife blade similar to #4G. Shipping weight 6 ounces.

Cat. No. 641-KNS-4

\$1.20 each

REPLACEMENT BLADES

Fits #1 handle only: For cutting balsa and paper.

Cat. No. 641-KNB-1A \$.10 each 3 for \$.25

Fits #1 handle only: Punch and scriber.

Cat. No. 641-KNB-1B \$.25 each

Fits #1 handle only: Gouge for hollowing balsa nose cones, adapters, blocks, etc.

Cat. No. 641-KNB-1C \$.25 each



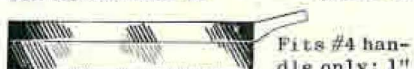
Fits #2 handle only: Double ended, for general cutting.

Cat. No. 641-KNB-2D \$.35 each



Fits #2 and #3 handles: Double ended, for general cutting.

Cat. No. 641-KNB-3E \$.15 each



Fits #4 handle only: 1" wide x 5" long razor saw blade for balsa and body tube cutting.

Cat. No. 641-KNB-4F \$.45 each

Shipping weight on saw blade is 6 oz., all other blades, 1 oz.

Fits #2 and #4 handles.

For general cutting and carving.

Cat. No. 641-KNB-4G \$.15 each 3 for \$.40

Fits #2 and #4 handles. For general cutting and trimming.

Cat. No. 641-KNB-4H \$.15 each 3 for \$.40

WHESTSTONE: Keep knife blades extra sharp for easy cutting. Pocket size, 3-1/2" x 3/4" x 3/8". Use with oil for best results. Shipping weight 3 oz.

Cat. No. 641-W-1 \$.25 each

EMERY BOARDS: Perfect for cleaning micro-clips, shaping airfoils, turning nose cones, etc. 4-1/2" x 1/2", medium abrasive on one side, fine abrasive on other. Shipping weight 1 ounce.

Cat. No. 641-BE-1 3 for \$.10

EMERY BOARDS: Perfect for cleaning micro-clips, shaping airfoils, turning nose cones, etc. 4-1/2" x 1/2", medium abrasive on one side, fine abrasive on other. Shipping weight 1 ounce.

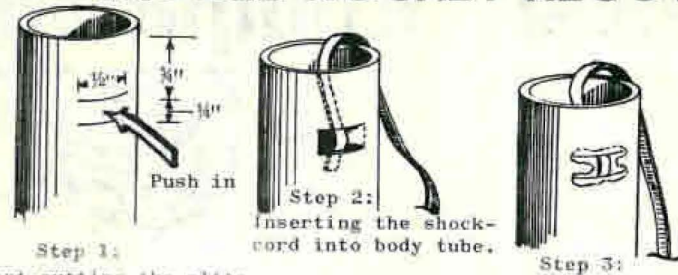
Cat. No. 641-BE-1 3 for \$.10



TWEEZERS: For 1,001 uses in handling small parts, attaching shock cords, etc. Steel, 3" long, 1/8" jaw. Shipping weight 2 ounces.

Cat. No. 641-T-1 \$.20 each

MODEL ROCKET RECOVERY

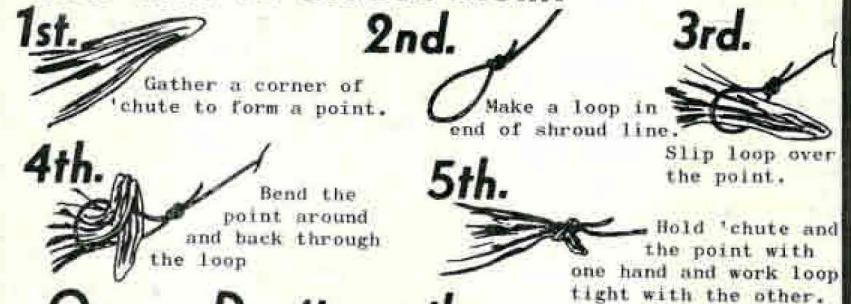


Step 1: Start cutting the slits

Step 2: Inserting the shock-cord into body tube.

Step 3: Restore slot to original tube contour, clamping shock cord in place. Cover area with glue

Shroud Lines ... and how to attach them.

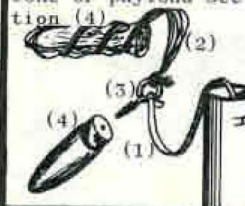


Or... Do it easily ...with our tape-strips!



Assembly and Use of Recovery System

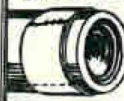
Tie shock cord (1) securely to screw eye (3). Tie shroud lines (2) to screw eye and screw it into nose cone or payload section (4).



Always repack your rocket with lots of wadding as soon as you can after a flight.

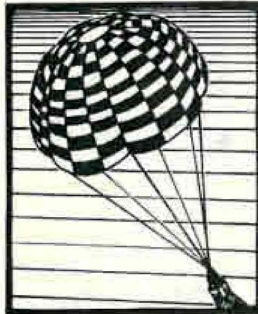
Fill the body tube as shown to seal the tube and protect the chute from hot gases.

To be sure ejection gases do their job and activate the recovery system, secure the engine in parachute and streamer models by wrapping tape around its nozzle end until it makes a very tight press fit in the tube.



Recovery Equipment

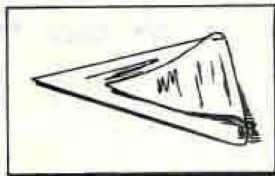
PARACHUTE KITS: Designed to give you the best in parachute recovery! Two color printed plastic parachutes give maximum visibility -- special pattern makes them extra easy to spot. Lightweight, durable, and easily folded, these 'chutes are only .00075" thick, allowing the most material to be packed into the least body space. Each kit is complete with 'chute material, tape strips, and shroud lines. Specify color combination and size when ordering. Shipping wt. 2 oz.



Cat. No.	Parachute Diameter	Color Combinations Available	Price	
			Each	3 for
641-PK-12	12 inches	Orange and White Red and White Red and Yellow Yellow and Black Orange and Black	\$.20	\$.50
641-PK-18	18 inches	Red and White Red and Yellow Orange and Black	\$.30	\$.75
641-PK-24	24 inches	Red and White Orange and Black	\$.45	\$1.00

PARACHUTE MATERIAL: High visibility red plastic in 10" x 10" sheets to make easy to spot parachutes for your models. Comes with 4 tape discs for attaching shroud lines of your choice. Net weight .07 oz. Shipping weight 1 oz.

Cat. No. 641-PM-1 \$.20 each 3 for \$.35



PARACHUTE MATERIAL: You get a big square yard of high 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. Shipping weight 5 oz.

Cat. No. 641-PM-2 \$.45 each

STREAMER MATERIAL: Bring light weight models back to earth with bright orange, flame resistant crepe paper streamers. In 7-1/2 foot lengths, enough for two to eight streamers. Available in 1" and 2" widths. Specify size when ordering. Shipping weight 1 oz.

1" WIDE: Cat. No. 641-5M-1 \$.15 each 3 for \$.30
2" WIDE: Cat. No. 641-5M-2 \$.20 each 3 for \$.30



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. 641-SLT-1

\$.25 each



SCREW EYES: Attach recovery systems to nose cones or nose blocks with these light weight metal screw eyes. Available in two sizes, 1 inch long (net wt. .04 oz.) and 3/4" long (net wt. .03 oz.). Shipping weight for 3 eyes 1 oz.

LARGE EYE: Cat. No. 641-SE-1

3 for \$.10

12 for \$.35

SMALL EYE: Cat. No. 641-SE-2

3 for \$.10

12 for \$.35



TAPE DISCS: Fasten shroud lines to plastic 'chutes with these 3/4" pressure sensitive tape discs. Shipping wt. for 12 discs, 1 oz.

Cat. No. 641-TD-1

4 for \$.10

12 for \$.15

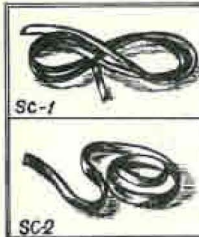
Roll of 1000 \$4.00



TAPE STRIPS: For top strength, low bulk and low weight, fasten shroud lines with these 1/4" x 3/4" tape strips. Come in sheets of 35 strips. Shipping weight 1 oz.

Cat. No. 641-TD-2

\$.30 Per sheet



SHOCK CORD: Convenient 18" lengths of model airplane contest rubber to absorb shock of recovery system deployment. Available in 1/8" widths for normal models and 1/4" widths for heavy rockets. Specify width when ordering. All shock cords are .03" thick. Shipping wt. 1 oz.

1/8" WIDE: Cat. No. 641-SC-1 \$.10 each 3 for \$.20

1/4" WIDE: Cat. No. 641-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. 641-SV-12

\$.10 each

3 for \$.20



RECOVERY WADDING: Protect parachutes and streamers from hot ejection gases, get greater recovery reliability with this lightweight flame-proof wadding. Each package contains approximately 3 oz., enough wadding for 15 to 60 flights, depending on size of the rocket. Shipping weight 6 oz.

Cat. No. 641-RP-1

\$.25 each



EVERYTHING You need...

FINISHING WAX: For the high-gloss finish so important for appearance and low drag. Apply with soft cloth, let dry, and polish with a soft, dry cloth. In 2 ounce jar. Shipping weight 5 oz.

Cat. No. 641-FW-2 \$.80 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. 641-WG-1 \$.40 each



BODY PUTTY: Make super-sleek models with body putty. Fill cracks, holes, grain marks in balsa parts, make smooth fin-body joints. In 21 cc. tube. Shipping weight 5 ounces.

Cat. No. 641-FM-1 \$.30 each

MASKING TAPE: Secure engines in models, mask for painting, etc. Extra strong 1/2" wide tape comes in 30' rolls. Flexible, seals tightly and strips off clean. Shipping weight 5 oz.

Cat. No. 641-MT-1 \$.30 each



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 nickled ferrules. Available in sets of three only. Shipping wt. 2 oz.

Cat. No. 641-PB-3 \$.30 Per set

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 2-1/2" x 2-1/4" sheets. Shipping wt. 1 oz.

Cat. No. 641-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. 641-SPM-2 \$.10
 6 SHEETS FINE: Cat. No. 641-SPF-2 \$.10
 6 SHEETS EXTRA FINE: Cat. No. 641-SPEF-2 \$.10
 18 SHEETS ASSORTED (6 each) Cat. No. 641-SPA-2 \$.25



For the Finishing Touch

HEAT RESISTANT PAINT: Protect exposed rocket parts from heat damage with easy to apply, brush-on, high heat aluminum paint. Protects to 1000°, gives a bright metallic finish. Recommended for swept fins and other parts exposed to hot exhaust gases. In 1-1/2 ounce bottles. Shipping weight 6 oz.

Cat. No. 641-AP-1 \$.35 each



FLUORESCENT SPRAY PAINT: Paint your rockets with the brightest colors available--make them easy to spot in the air and on the ground. This glowing, high visibility paint comes in handy 6 oz. spray cans, dries in minutes. For maximum brilliance, use glossy white enamel for an undercoat. Available in Cerise Red, Yellow Orange, Sunset Gold, Lemon Yellow, Red Orange, and Green. Specify colors when ordering. Shipping weight 16 oz. each.

Cat. No. 641-FP-1 \$.40 each

ENAMEL SPRAY PAINT: Get that "professional" appearance for your best models. Top quality enamel in handy 6 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. 641-EP-1 \$.20 each



BUTYRATE DOPE: The dope preferred by expert modelers for perfect finishes. Brushes on smoothly, easily, comes in convenient 1 oz. bottles. For mirror-smooth finish use Sanding Sealer #SS-1 as an undercoat. Available in Insignia Red, International Orange, Dark Green, Gloss Black, Insignia White, True Blue, Sky Blue, Aircraft Gray, Orange Yellow, Silver, Gold, and Clear. Specify colors when ordering. Shipping weight 4 oz. (Mailable)

Cat. No. 641-BRD-1 \$.20 each

SANDING SEALER: Use sanding sealer on all balsa parts for the smoothest possible paint or dope job--saves paint, too. Just sand the balsa, brush on sealer, let dry, and sand again. Repeat as needed to seal all the pores in the wood for a glass-like surface for painting. Get the best in aerodynamics and appearance. In 1 ounce bottles. Shipping weight 4 ounces.

Cat. No. 641-SS-1 \$.20 each

THINNER: For diluting butyrate dope and 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. 641-BDT-1 \$.20 each

Decorate Your Rockets with Our DECALS



A)--STARS AND BARS: Sheet of 12 red, white, and blue Air Force emblems, each 1-1/4" wide. Fit on fins and body tubes, look great on gliders. Shipping weight 1 ounce.

Cat. No. 641-D-1 \$.15 each

B)--LARGE STARS AND BARS: Add a special touch to your large models. Sheet contains two large 2" insignia, two medium 1-3/4" insignia, and appropriate designations. Shipping weight 1 oz.

Cat. No. 641-D-2 \$.15 each

C)--3/8" LETTERS AND NUMBERS: Identify and decorate your birds the neat and easy way with these 3/8" high letter and number decals. Sheet contains 62 characters. Available in black or white. Specify color when ordering. Shipping weight 1 oz.

Cat. No. 641-D-3 \$.15 each

D)--1/4" LETTERS AND NUMBERS: Ideal for code markings and identification on smaller rockets. Sheet contains 65 1/4" high characters. Available in black or white. Specify color when ordering. Shipping weight 1 ounce.

Cat. No. 641-D-4 \$.15 each

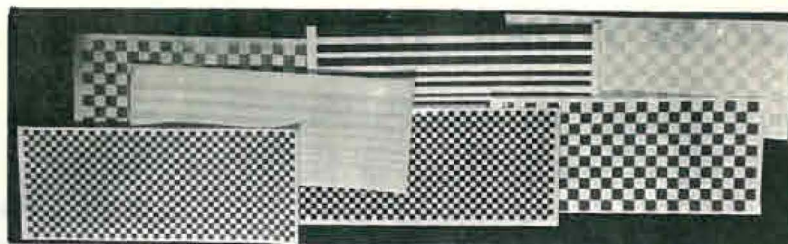


E)--GOLD MINE SPECIAL: Get this real gold mine of decorative decals for your model rockets. Lettering, vents, hatches, rivets, and more, all on one big 3-1/2" x 8-1/2" sheet. You'll have a ball decorating your birds with this sheet. Printed in brilliant red, white and black to add extra color, too. Shipping weight 1 ounce.

Cat. No. 641-D-5 \$.25 each

F)--KIT NAMES DECAL: Dress up your models with these special kit name decals. Identify and decorate--easy to apply. Comes in black or white. Specify color when ordering. Shipping wt. 1 ounce.

Cat. No. 641-D-6 \$.25 each



G)--1/5" CHECKERBOARDS: Glossy, colorful 1/5" square checks on clear background. Add color contrast to models for easy tracking. Extra large sheets, 9-1/2" x 4", available in red, black, gold, or white. Specify color and check size when ordering. Shipping weight 1 ounce.

Cat. No. 641-D-7 \$.25 each

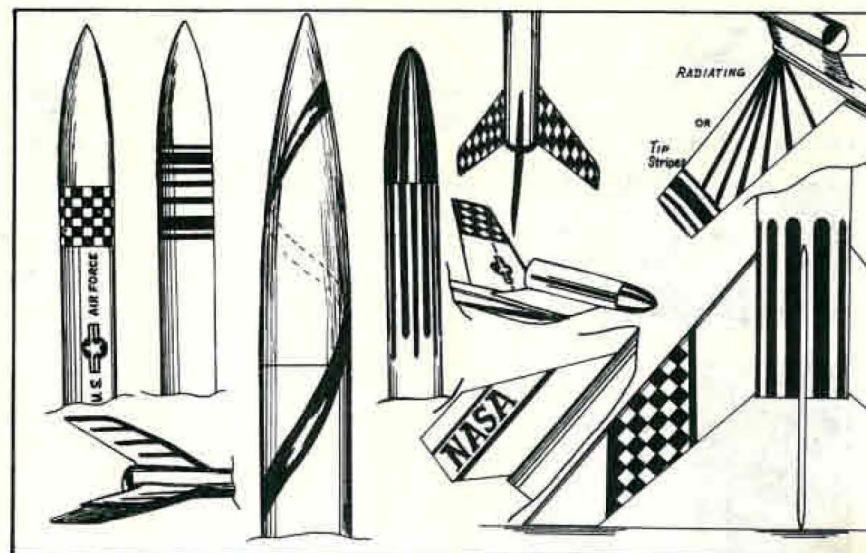
H)--3/8" CHECKERBOARDS: Big 3/8" square checks for your large models. Cut out special patterns for even more striking effects. Large 9-1/2" x 4" sheets, available in red, black, white, gold, or silver. Specify color and check size when ordering. Shipping weight 1 ounce.

Cat. No. 641-D-8 \$.25 each

I)--COLOR STRIPES: Put vertical stripes or horizontal rings on your models the easy way. Each sheet has ten stripes, 1/32" through 1/2" wide and 9-1/2" long. Available in red, black, or yellow. Specify color when ordering. Shipping weight 1 oz.

Cat. No. 641-D-9 \$.25 each

Tips on Decorating Your ROCKET



LITTLE ITEMS THAT GIVE

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. Safe, uses only non-combustible materials. Shipping wt. 1 oz.

Cat. No. 641-CE-1 \$.50 each



Press upward 'till the engine



can be removed.

ENGINE HOLDER: For quick and easy replacement of engines in models use engine holders. Attach as shown in drawing or run forward from the engine as a substitute for the engine block. Use with BT-20 and BT-30 only. Net wt. .05 oz. Shipping wt. 1 oz.

Cat. No. 641-EH-1 \$.15 each 3 for \$.30

FOAM PADDING: Protect payload specimens. Pad your payload capsules with this plastic foam. Each piece is 6" x 6" x 1/4". Cut to size, secure in place with white glue. Net weight .08 oz. Shipping weight 1 oz.

Cat. No. 641-PSP-1 \$.20 each 3 for \$.50



PAYLOAD: How high can your rocket lift an ounce of lead? This 1 oz. payload weight, 3/4" in diameter, is used in some altitude competition events. The current official record: 980 feet with a B engine. Think you can beat it? Shipping weight 2 oz.

Cat. No. 641-PL-1 \$.50 each 3 for \$1.00



NOSE CONE WEIGHT: Balance your rockets for perfect stability with these 11/16" diameter lead weights. Now with center hole for easy attachment and alignment. Stack them for more weight, cut them with scissors for less. Each weighs .12 oz. Shipping weight 1 oz.

Cat. No. 641-NCW-1 3 for \$.25



NOSE CONE WEIGHT: For delicate balancing, use these 7/16" diameter brass washers. Each has a 1/8" hole in the center, weighs .02 oz. Attach up to four weights to a nose cone by threading them on the screw eye. Shipping weight 1 oz.

Cat. No. 641-NCW-2 10 for \$.15



LAUNCHING LUGS: Cut lengths of soda straws. If you don't want to get a life-time supply at the grocery store for 25¢, you can buy these. Inside diameter 5/32", fit 1/8" rod. Shipping wt. 1 oz.

1-1/4" long: Cat. No. 641-LL-1A 5 for \$.10
2-3/8" long: Cat. No. 641-LL-1B 4 for \$.10
5" long: Cat. No. 641-LL-1C 3 for \$.10



BIG RESULTS IN ROCKETRY



Apply over launching lug as well.

GAUZE REINFORCING: For super strong fin joints, reinforce with this 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. 641-GR-2 \$.15 each 3 for \$.30

PAPER REINFORCING: Double fin strength with this easy to use self-adhesive treated paper. Cut reinforcing to shape, strip off protective backing, and press on balsa. Doubles fin strength when applied to both sides of the balsa sheet, provides a smooth white surface for painting. Comes in 3" x 9" sheets. Shipping weight 1 oz.

Cat. No. 641-PRM-1 \$.10 each 3 for \$.20



TAPE HINGES: Easy to use elevon hinges for your boost-gliders. Treated paper, 4-1/2" x 3/4", adhesive coated on one side. Simply strip off protective backing, apply to wing. Shipping weight 1 oz.

Cat. No. 641-TH-1 2 for \$.10



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

Cat. No. 641-ET-1 3 for \$.10



NYLON SCREWS: Extra light, high strength screws for glide adjustment on boost-gliders. 1/2" long, 1/16" thread diameter. Read TR-4 for information on gliders and their design. Shipping weight 1 oz.

Cat. No. 641-A5-1 \$.10 each



STYROFOAM BALLS: Build a Sputnik-Too or odd ball bird of your own design with feather-weight 3" diameter styrofoam balls. Use white glue for best results in attaching legs, antennas, stabilizers, etc. Net weight .2 ounces. Shipping weight 5 oz.

Cat. No. 641-SB-3 \$.25 each



DOWELS: Extra strong, light weight 1/8" x 18" seasoned maple dowels. Build a Sputnik-Too or design your own odd ball. Shipping weight 5 oz.

Cat. No. 641-WD-1 4 for \$.20



ASSORTMENTS

"Launch Pad" Special

For Simple & Durable Rockets. Perfect starter assortment for the novice to explore the building techniques of model rocketry. Make sturdy, serviceable models for many hours of fun. Study aerodynamics, stability, and recovery techniques the enjoyable way with this special assortment. Not available with quantity discount orders.

**\$7.56
Value!**



**Only
\$5.00**



BODY TUBES		RECOVERY EQUIPMENT	
5	Body Tubes #BT-40	2	Parachutes #PK-12A
NOSE CONES		1	Parachute Material #PM-2
1	Balsa Nose Cone #BNC-40D	1	Streamer Material #SM-1
1	Balsa Nose Cone #BNC-40N	1	Sheet Tape Strips #TD-2
1	Plastic Nose Cone #PNC-40F	1	Roll Shroud Lines #SLT-1
1	Plastic Nose Cone #PNC-40G	3	Shock Cords #SC-1
1	Plastic Nose Cone #PNC-40H	3	Screw Eyes #SE-1
FIN MATERIAL		MISCELLANEOUS	
1	Plastic Fin Unit #PF-40A	5	Engine Blocks #EB-40A
1	Plastic Fin Unit #PF-40B	3	Launching Lugs #LL-1C
3	Balsa Fin Stock #BFS-50	1	Design Booklet #P-1
		1	Fin Pattern Sheet #PP-2



Shipping Weight 1 lb. 8 oz.

Cat. No. 641-E5-50 \$5.00 each

"Countdown" Special

FOR HIGH PERFORMANCE BIRDS. Countdown on real rocket-building enjoyment with this high performance assortment. Build a basic fleet of high flying rockets--single and multi-stage. Great for your science project experiments, payload studies, etc. Not available with quantity discount orders.

**\$10.68
value!**



**Only
\$7.50**

BODY TUBES		FIN MATERIAL	
2	Body Tubes #BT-20	3	Balsa Fin Stock #BFS-20
2	Body Tubes #BT-50	3	Balsa Fin Stock #BFS-30
RECOVERY EQUIPMENT		NOSE CONES	
2	Parachutes #PK-12A	1	Balsa Nose Cone #BNC-20A
1	Parachute #PK-18A	1	Balsa Nose Cone #BNC-20B
1	Parachute Material #PM-2	1	Balsa Nose Cone #BNC-20N
1	Streamer Material #SM-1	1	Balsa Nose Cone #BNC-50J
1	Sheet Tape Strips #TD-2	2	Balsa Nose Cones #BNC-50K
1	Roll Shroud Lines #SLT-1	1	Payload Section #PS-20A
3	Shock Cords #SC-1	1	Nose Cone Stock #NCS-1
6	Screw Eyes #SE-1	1	Nose Cone Dowel #NCD-1
3	Snap Swivels #SV-12	MISCELLANEOUS	
ENGINE BLOCKS, MOUNTS, ETC.--		1	Balsa Adapter #TA-2050A
1	Balsa Nose Block #NB-20	1	Paper Adapter Set #TA-1
1	Balsa Nose Block #NB-50	3	Nose Cone Weights #NCW-1
3	Engine Blocks #EB-20A	1	Design Booklet #P-1
2	Engine Mounts #EH-2050	1	Fin Pattern Sheet #PP-2
1	Stage Coupler #JT-50C		

Shipping weight 1 lb. 8 oz.

Cat. No. 641-E5-75 \$7.50 each

"Lift-Off" Special

For building an all-purpose rocket fleet

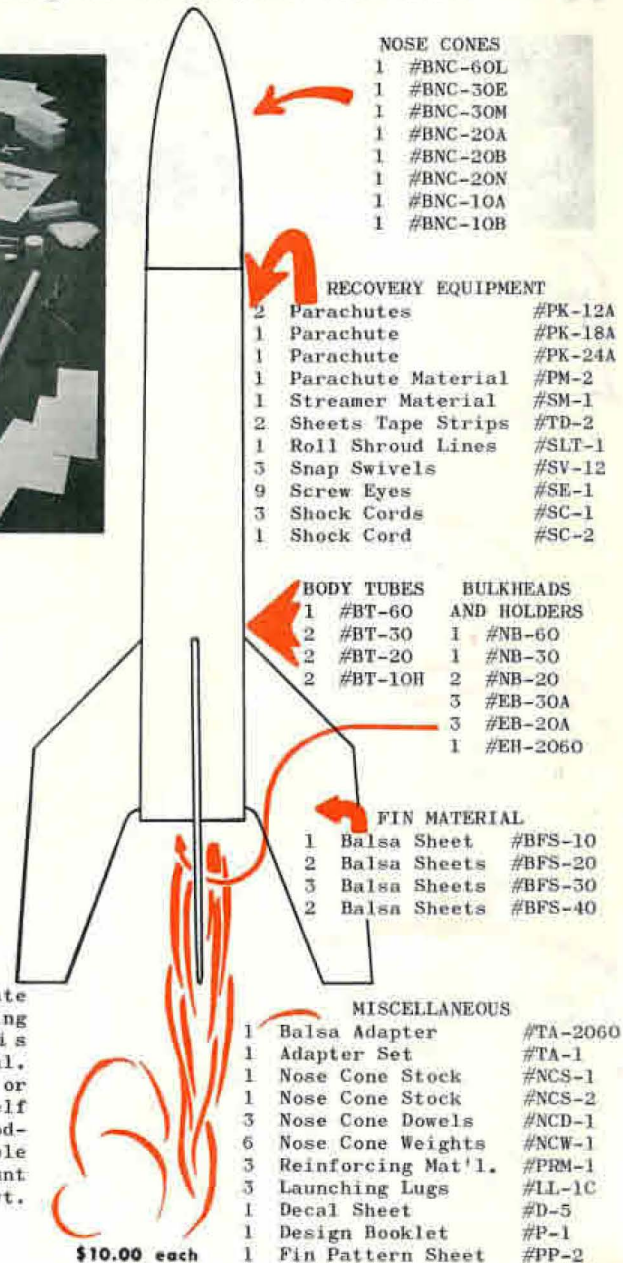


**\$13.40
VALUE**

**Special
Price
\$10.00**

Liftoff and accelerate to more rocket building enjoyment with this value-packed special. Great for gifts--or get one for yourself and build advanced models. Not available with quantity discount orders. Shipping wt. 1 lb. 12 oz.

Cat. No. 641-E5-100



NOSE CONES

- 1 #BNC-60L
- 1 #BNC-30E
- 1 #BNC-30M
- 1 #BNC-20A
- 1 #BNC-20B
- 1 #BNC-20N
- 1 #BNC-10A
- 1 #BNC-10B

RECOVERY EQUIPMENT

- 2 Parachutes #PK-12A
- 1 Parachute #PK-18A
- 1 Parachute #PK-24A
- 1 Parachute Material #PM-2
- 1 Streamer Material #SM-1
- 2 Sheets Tape Strips #TD-2
- 1 Roll Shroud Lines #SLT-1
- 3 Snap Swivels #SV-12
- 9 Screw Eyes #SE-1
- 3 Shock Cords #SC-1
- 1 Shock Cord #SC-2

BODY TUBES BULKHEADS AND HOLDERS

- 1 #BT-60
- 2 #BT-30
- 2 #BT-20
- 2 #BT-10H
- 1 #NB-60
- 1 #NB-30
- 2 #NB-20
- 3 #EB-30A
- 3 #EB-20A
- 1 #EH-2060

FIN MATERIAL

- 1 Balsa Sheet #BFS-10
- 2 Balsa Sheets #BFS-20
- 3 Balsa Sheets #BFS-30
- 2 Balsa Sheets #BFS-40

MISCELLANEOUS

- 1 Balsa Adapter #TA-2060
- 1 Adapter Set #TA-1
- 1 Nose Cone Stock #NCS-1
- 1 Nose Cone Stock #NCS-2
- 3 Nose Cone Dowels #NCD-1
- 6 Nose Cone Weights #NCW-1
- 3 Reinforcing Mat'l. #PRM-1
- 3 Launching Lugs #LL-1C
- 1 Decal Sheet #D-5
- 1 Design Booklet #P-1
- 1 Fin Pattern Sheet #PP-2

\$10.00 each

"ORBIT"

\$20.18 Value

Special **Only \$15.00**

For Clubs or Ambitious Individual
Rocketeers - Experiments Unlimited.



BODY TUBES

- 1 #BT-60
- 1 #BT-50
- 5 #BT-30
- 2 #BT-20
- 2 #BT-10H

You or your club members will "orbit" this boxful of rocket goodies many times before you're through with it. Many rockets, projects and experiments will have been completed before the last useful piece is gone. Your imagination will have a real chance to run free with this value-packed assortment. Not available with quantity discount orders. Shipping weight 2 pounds.

Cat. No. 641-E5-150

\$15.00 each

NOSE CONES

- 1 #BNC-60L
- 1 #BNC-50K
- 1 #BNC-30D
- 1 #BNC-30E
- 1 #BNC-30M
- 1 #BNC-20A
- 1 #BNC-20B
- 1 #BNC-20N
- 1 #BNC-10A
- 1 #BNC-10B

ADAPTERS

- 1 Balsa #TA-2050A
- 1 Balsa #TA-2060
- 1 Balsa #TA-5060
- 1 Paper #TA-1

FIN MATERIAL

- 3 Balsa Sheets #BFS-10
- 3 Balsa Sheets #BFS-20
- 3 Balsa Sheets #BFS-30
- 3 Balsa Sheets #BFS-40

NOSE BLOCKS, ENGINE BLOCKS, HOLDERS, ETC.

- 1 Nose Block #NB-60
- 1 Nose Block #NB-50
- 3 Nose Blocks #NB-30
- 2 Nose Blocks #NB-20
- 3 Engine Blocks #EB-30A
- 3 Engine Blocks #EB-20A
- 1 Engine Mount #EH-2050
- 1 Engine Mount #EH-2060
- 1 Stage Coupler #JT-50C
- 1 Stage Coupler #JT-60C

MISCELLANEOUS

- 1 Payload Section #PS-20A
- 1 Nose Cone Stock #NCS-1
- 1 Nose Cone Stock #NCS-2
- 3 Nose Cone Dowels #NCD-1
- 6 Nose Cone Weights #NCW-1
- 1 Reinforcing Mat'l. #PRM-1
- 1 Reinforcing Mat'l. #GR-2
- 3 Launching Lugs #LL-1C
- 1 Decal Sheet #D-5
- 1 Decal Sheet #D-6
- 1 Design Booklet #P-1
- 1 Fin Pattern Sheet #PP-2

RECOVERY EQUIPMENT

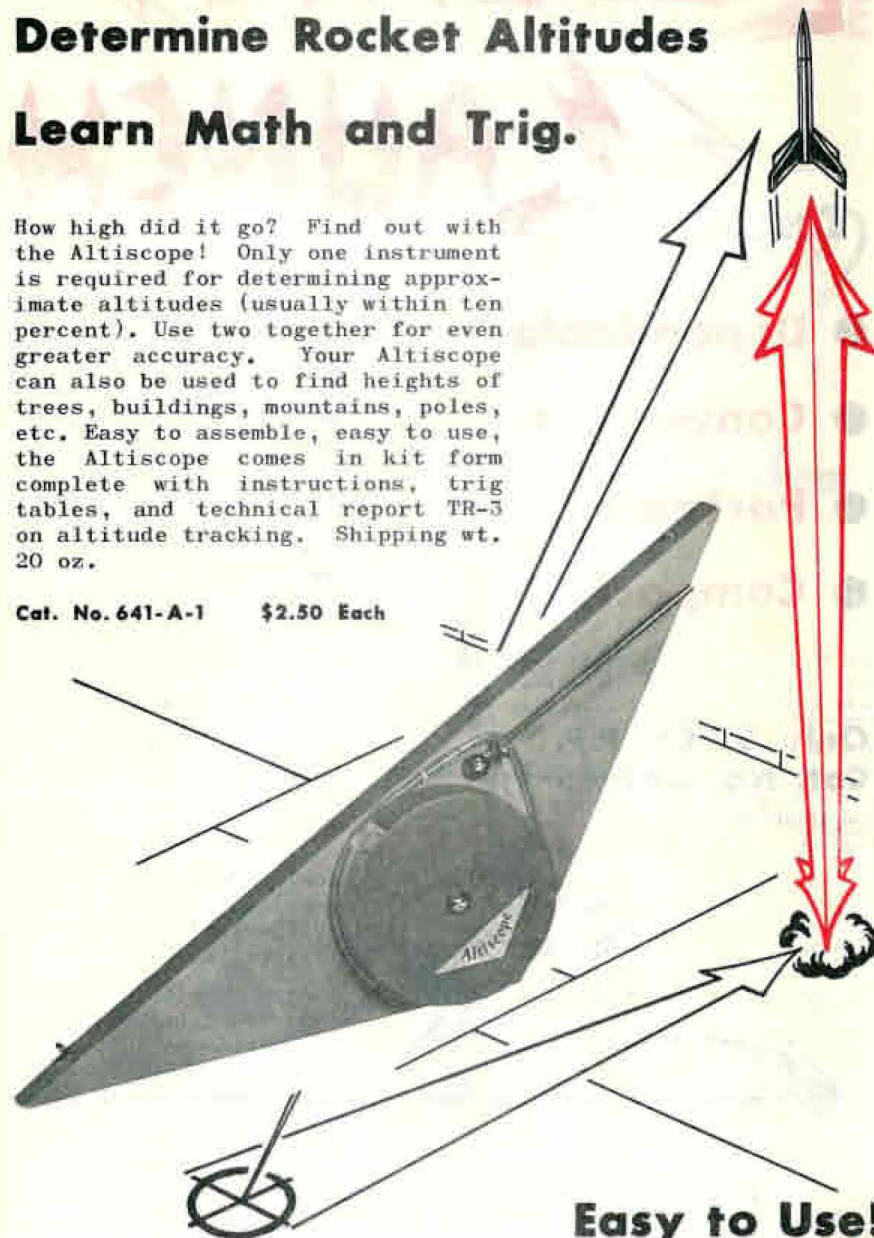
- 1 Parachute Material #PM-2
- 3 Parachutes #PK-12A
- 2 Parachutes #PK-18A
- 1 Parachute #PK-24A
- 3 Streamer Material #SM-1
- 2 Sheets Tape Strips #TD-2
- 1 Roll Shroud Lines #SLT-1
- 6 Shock Cords #SC-1
- 3 Shock Cords #SC-2
- 12 Screw Eyes #SE-1
- 3 Snap Swivels #SV-12

Altiscope

Determine Rocket Altitudes
Learn Math and Trig.

How high did it go? Find out with the Altiscope! Only one instrument is required for determining approximate altitudes (usually within ten percent). Use two together for even greater accuracy. Your Altiscope can also be used to find heights of trees, buildings, mountains, poles, etc. Easy to assemble, easy to use, the Altiscope comes in kit form complete with instructions, trig tables, and technical report TR-3 on altitude tracking. Shipping wt. 20 oz.

Cat. No. 641-A-1 \$2.50 Each



Easy to Use!

ELECTRO LAUNCH

- **Dependable**
- **Convenient**
- **Portable**
- **Compact**

Only \$3.00 P.P.
Cat. No. 641-FS-1
(without batteries)



Fly your rockets the "professional" way with this completely self-contained launching system. Engineered for simplicity, safety, dependability, and convenience, the Electro-Launch is a basic piece of equipment for model rocketeers. Collapsible 36" long two-piece launching rod guides light weight models into the air for accurate flights. Use it for rockets weighing up to 6 oz., or anchor the base to the ground for heavier models. Spring return safety switch permits safe loading of rockets on launcher. Uses 4 size D photoflash batteries (#PFB-1). For heavy duty use the addition of a battery pack (#BP-1) is recommended to give longer battery life and sure starts in cold weather.

Complete with all parts and instructions, but no batteries. Shipping weight 30 ounces.

Complete Electro-Launch kit also available with 4 batteries. Special price \$4.00.

OR--Get the same kit as above, but complete with batteries: **Cat. No. 641-FS-1B \$4.00 P.P.**

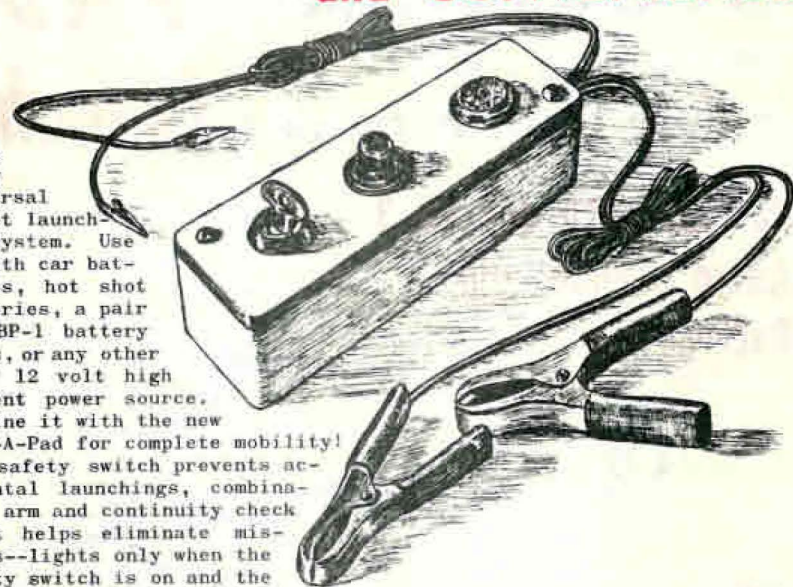
ASTRO-LAUNCH

**ULTIMATE in UTILITY
and CONVENIENCE**

Now a truly universal rocket launching system. Use it with car batteries, hot shot batteries, a pair of #BP-1 battery packs, or any other 6 or 12 volt high current power source. Combine it with the new Tilt-A-Pad for complete mobility! Key safety switch prevents accidental launchings, combination arm and continuity check light helps eliminate misfires--lights only when the safety switch is on and the micro-clips make a good connection to the igniter. Extra large battery clips attach firmly to almost any battery. Unit comes completely assembled with 25 feet of lead wire. Available for 6 or 12 volt power supplies. Specify voltage when ordering. Shipping weight 1 pound 6 ounces.

Cat. No. 641-F5-3

\$6.50 each



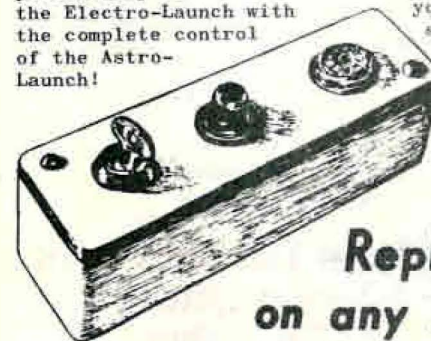
Combine the compactness and portability of the Electro-Launch with the complete control of the Astro-Launch!

Astro-Launch Panel

This compact panel attaches easily to your Electro-Launch in place of the standard switch. You get the same continuity check, key control, etc., as in the Astro-Launch, but without wires and clips. Available for use with either 6 or 12 volts. Specify voltage when ordering. Panel comes pre-assembled, ready to connect and use. Shipping weight 8 ounces.

Cat. No. 641-F55-2

\$4.50 each



**Replaces spring switch
on any ELECTRO LAUNCH**

NOW!

LAUNCH from ANY terrain ... AND adjust launch angle

Perfect with our FS-3 Astro Launch and Battery Pack!



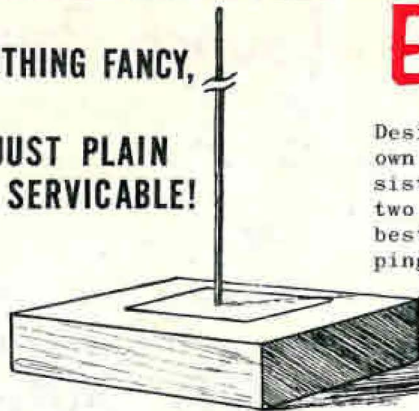
Unbeatable for flexibility! Tilt-A-Pad adjusts to fit any terrain, adjusts to compensate for wind direction and speed, giving you the very best in launch control and convenience. Use it with almost any electrical firing system. Comes in easy to assemble kit form with complete instructions. Shipping weight 2 pounds.

Cat. No. 641-RL-3

\$2.00 each

NOTHING FANCY,

JUST PLAIN SERVICABLE!



Econo-Launch

Designed for easy use with your own electric firing system. Consists of pre-drilled base, 36" two piece launching rod, and asbestos deflector material. Shipping weight 2 pounds.

Cat. No. 641-RL-2

\$1.25

Use Your Own Electrical Ignition System or the ASTRO LAUNCH

Tilt-A-PAD launcher

Fully adjustable legs!

Two-Piece Rod

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 1/2" red plastic jewel, mounts in 7/16" hole. Takes either 6 or 12 volt bulbs, bulb not included. Shipping weight 4 oz.

Cat. No. 641-LH-1

\$.45 each



6 VOLT BULB: Fits holder #LH-1. Shipping wt. 1 oz.

Cat. No. 641-AL-6

\$.20 each



12 VOLT BULB: Fits holder #LH-1. Shipping wt. 1 oz.

Cat. No. 641-AL-12

\$.20 each

KEY SAFETY SWITCH: A must for every control panel. Prevents accidental launching of rockets. SPST, turns on with key, must be turned off to remove key. Mounts in 1/2" hole. One key included with switch. Shipping weight 4 oz.

Cat. No. 641-KSW-1

\$2.05 each

EXTRA KEY: Cat. No. 641-KSW-1K

\$.25 each



PUSH BUTTON SWITCH: Heavy duty construction momentary type, SPST, normally open. Excellent for use as a firing switch. Mounts in 1/2" hole. Shipping weight 4 oz.

Cat. No. 641-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 3/8" hole. Shipping weight 5 oz.

Cat. No. 641-SWR-1

\$1.35 each

DIAL PLATE: Numbered 12 position plate for use with rotary switch #SWR-1. Mounts on panel with same nut used to hold switch. Etched aluminum on black background. Shipping weight 1 oz.

Cat. No. 641-DP-1

\$.25 each

SPRING SWITCH: Same switch as used on the standard Electro-Launch. Consists of masonite base piece, two terminal lugs, two self-tapping screws, and a contact strip. Can be used as a firing switch, phone switch, or for other utility applications. Shipping weight 1 oz.

Cat. No. 641-FSS-1

\$.35 each

LAUNCHING Equipment

MICRO-CLIPS: Equip your launcher with the best. Use these spring-loaded, solid copper clips to attach lead wires to igniters. Easy to clean, highly conductive, with flat contact surfaces for the best connection. Only 1.1 inches long, attach to leads with or without solder. Shipping weight 1 oz.



Second insulator outlined to show construction.



Cat. No. 641-MC-1

2 for \$.25

BATTERY CLIPS: Heavy duty clips connect to battery terminals up to 1" in dia. Replacement part for the Astro-Launch, clips are 3" long, available with red or black insulators. Specify color when ordering. Shipping weight 5 oz.

Cat. No. 641-BC-1

\$.40 each

2 for \$.75

TERMINAL LUGS: Tiny 1/2" long solderless lugs make electrical connections a snap. Simply insert the bare wire into the end of the lug and crimp in place with pliers. Has 1/8" hole for mounting on terminal. Shipping weight 1 oz.

Cat. No. 641-TL-1

\$.05 each

3 for \$.10



LEAD WIRE: Flexible, durable size 18 two conductor insulated wire for use with firing systems. Ideal as a lead from firing panel to launcher, or zip the conductors apart for wiring inside the panel. In handy 12 foot lengths. Shipping weight 5 oz.

Cat. No. 641-LW-1

\$.70 each

Same quality lead wire as above, in 250 foot spools. Shipping weight 6 lb.

Cat. No. 641-LW-1B

\$7.50 each



NICHROME WIRE: Electrical heating wire for professional model rocket ignition. #30 recommended for use with car batteries, #32 for use with other power supplies. Shipping wt. 1 oz.

#30, 7 INCH LENGTHS: Cat. No. 641-NW-30 3 for \$.15

#30, 15 FOOT ROLL: Cat. No. 641-NW-30-A \$.50 each

#32, 7 INCH LENGTHS: Cat. No. 641-NW-32 3 for \$.15

#32, 15 FOOT ROLL: Cat. No. 641-NW-32-A \$.50 each



BATTERIES: Extra strong size D photoflash batteries pack the power needed for rocket launching. These are the type specified for the Electro-Launch, delivering up to 16 amperes of current on a complete short when fresh. Shipping weight 4 oz. each.

Cat. No. 641-PFB-1

\$.30 each



... and MORE Launching Gear

BATTERY PACK: Handy power supply. Use it as a booster for your Electro-Launch, use two with your Astro-Launch, or use battery packs for any other range power application. Gives longer battery life and faster, more reliable ignition when used with the Electro-Launch. Hook two packs together and get 12 volt power for operating multiple launchers, phones, etc. Durable and convenient, comes in kit form with complete instructions, requires four size D cells (not included). Shipping weight 1 pound.

Cat. No. 641-BP-1

\$1.35 each



ASBESTOS DEFLECTOR: Protect wooden launchers with this asbestos deflector material. Just glue to the launcher over the area to be protected. Comes in four inch square sheets. Shipping weight 1 oz.

Cat. No. 641-AD-1

\$.20 each



BLAST DEFLECTOR PLATE: Durable pressed steel plate deflects engine blast out and away from launcher. Two inches wide, five inches long. Ideal for any launcher that receives extensive use. Shipping weight 5 oz.

Cat. No. 641-BD-1

\$.60 each



TWO PIECE ROD: Handy collapsible two piece rod for easily portable launchers. Pieces slip together to make a rod 36" long. Base rod has a diameter of 1/8". Shipping weight 6 oz.

Cat. No. 641-RLR-1

\$.35 each 3 for \$.70



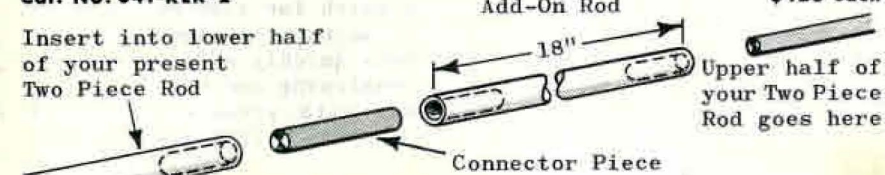
Each half is 18 inches long

ADD-ON ROD: Now pick your launch rod length -- 36, 54, or 72 inches. Use a longer rod for heavy models or rockets of marginal stability. Each add-on rod set contains one 1/8" diameter, 18" long rod drilled on both ends and a 3/32" diameter connector piece to fit the 1/8" rod. Solder, epoxy glue, or contact cement is required for a good joint between rods. Shipping wt. 6 oz.

Cat. No. 641-RLR-2

\$.20 each

Insert into lower half of your present Two Piece Rod



Upper half of your Two Piece Rod goes here

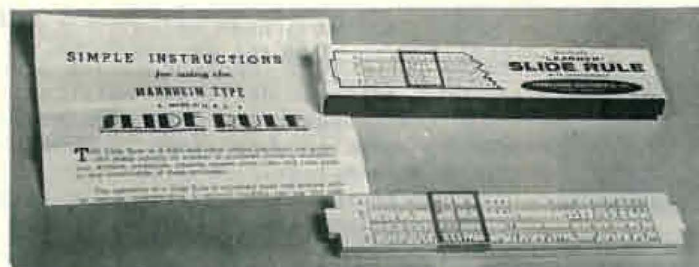
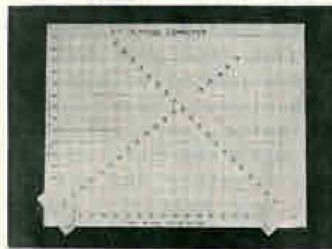
Connector Piece

COMPUTING EQUIPMENT

2-D COMPUTER: Build your own easy-to-use altitude computer. Get this set of charts and instructions--everything you need except tape, thumbtacks and glue--assemble the 2-D computer in a few minutes. Designed for use with one or two Altiscopes, easily used with other tracking systems. Shipping weight 2 oz.

Cat. No. 641-AC-1

\$.25 each



5" POCKET SLIDE RULE: Ideal companion to the Altiscope. Find altitudes, solve problems in multiplication, division, proportions, reciprocals, etc. A, B, C, D, CI, and K scales accurately calibrated on white face of hardwood rule. Great for beginners. With easy-to-follow instructions. Shipping weight 4 oz.

Cat. No. 641-SR-1

\$.40 each



10" TRIG SLIDE RULE: Perfect slip-stick for your rocket math. Durable plastic 10" rule has all nine basic scales: A, B, C, D, CI, K, S, T, and L. Do complex problems quickly and easily. Use it for math and science classes, designing and building rockets, and finding altitudes. Comes with protective carrying case and complete instructions. Shipping weight 9 oz.

Cat. No. 641-SR-2

\$ 2.10 each

BOOKS & 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, Sky Bird, Orange Bullet, and 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. 641-P-1

\$.50 each

3 for \$1.00



Note: HB-1, HB-2, and HB-3 may not be included in discount orders.

Space Volunteers

by Terence 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. 641-HB-1

\$ 3.20 each



Rockets and your Future

by Stanley Beitler

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. 641-HB-2

\$ 3.75 each



Guide to Rockets, Missiles and Satellites

by Homer E. Newell

Written by the Director of the Office of Space Sciences, NASA, this book tells all about the big birds, Aeolus to Zuni, and over 160 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. 641-HB-3

\$ 3.50 each



TECHNICAL REPORTS



STABILITY REPORT: 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 wt. 1 oz.

Cat. No. 641-TR-1 \$.25 each 3 for \$.50

MULTI-STAGE REPORT: New, revised version tells all about the latest discoveries in multi-stage technique. Complete, easy-to-understand and well illustrated. A necessity for designing, building and flying multi-stage birds. Shipping weight 1 oz.

Cat. No. 641-TR-2 \$.25 each 3 for \$.50



TRACKING REPORT: 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. 641-TR-3 \$.25 each 3 for \$.50

BOOST-GLIDE REPORT: 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. 641-TR-4 \$.25 each 3 for \$.50



WIND TUNNEL REPORT: Full plans and information for building a wind tunnel to study rocket stability. Covers motor and hand-powered 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. 641-TR-5 \$.25 each 3 for \$.50

CLUSTER REPORT: 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. 641-TR-6 \$.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 oz.

THE BEST FROM VOLUMES 1 AND 2



16 pages packed with the best in ideas, plans and information from Volumes 1 and 2. Contains current revised plans for the Bug-A-Bye and Dirty Bird III payload rockets, plus the Cloud Buster and Technical Report TR-3. Included are stories on the Crickenauts 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. 641-MRN-1 \$.50 each

VOLUME 3, NO. 1: Features science fair projects, plans for Buchanan Buster, Part II of TR-3, Idea Box, parachute cutting info.

Cat. No. 641-V3-N1 \$.25 each

VOLUME 3, NO. 2: Includes information on Estes Industries, plans for Big Bertha, demonstration rocket.

Cat. No. 641-V3-N2 \$.25 each

VOLUME 3, NO. 3: Carries basic info on fins, Idea Box, Safety Report, plans for Moonik-I and Sputnik-Too, Technical Report TR-4.

Cat. No. 641-V3-N3 \$.25 each

VOLUME 3, NO. 4: Contains information on science fair projects and booster recovery, Idea Box, plans for Sky Hook and Cobra, Technical Report TR-6.

Cat. No. 641-V3-N4 \$.25 each

VOLUME 4, NO. 1: Features 'chute recovery, plans for Loadlifter 1-A and MMSV-II (2 stage altitude rocket), TR-2, Idea Box and crossword puzzle.

Cat. No. 641-V4-N1 \$.25 each

MRN COLLECTION: Get the complete collection of available MRN back issues for one reduced price. Includes "The Best from Volumes 1 and 2", Vol.3, No.1; No.2; No.3; and No.4 plus Vol.4, No.1. Shipping weight is 11 oz.

Cat. No. 641-MRN-6 \$1.25 each

Rocket Flight Data Sheet

A truly universal data sheet for model rocketeers, each sheet has spaces for complete data on four flights of a model rocket. Includes the following sections: Preflight, Countdown Checklist, Launch, Weather, Flight Data. Each sheet measures 8-1/2 x 11 inches, printed on both sides. Shipping weight 2 oz.

Cat. No. 641-DS-1 5 for \$.20



<h1>INDEX</h1>		L	R	
A		Dial Plate 51	ROCKET ENGINES 28-33	
		ADAPTERS 23	Rockets and 55	
Add-On Rod 53	Dope, Butyrate 39	"Launch Pad" Special 44	Your Future 50	
Adjustable Launcher 50	Dowels, Maple 43	LAUNCHERS 48-50	ROD LAUNCHERS 50	
Altiscope 47	Dowels, Nose Cone 21	Launching Lugs 42	Rod, Two Piece 53	
Altitude Computer 54	Drifter Kit 7	Launching Rods 53	Rotary Switch 51	
Altitude Tracking Report 56	E		Rubber Shock Cord 37	
Aluminum Paint 39	Econo-Launch 50	S		
Apogee II Kit 13	Elastic Thread 45	Safety Switch 51		
Asbestos Deflector 53	Electrical Supplies 51-53	Sanding Sealer 59		
ASSORTMENTS 44-46	Electro-Launch 48	Sandpaper 38		
Astro-Launch 49	Emery Boards 34	Saw 34		
B		M		
Balancing Weights 42	Engine Blocks 22	Maple Dowels 43	Scale Model Kit 8	
Balls, Styrofoam 43	Engine, Cut-Away 42	Mark Kit 9	Scout Kit 9	
Balsa Adapters 23	Engine Holder 42	Masking Tape 36	Screw Eyes 37	
Balsa Blocks 23	Engine Mounts 24	MATH SUPPLIES 54	Screws, Nylon 43	
Balsa Fin Stock 26	ENGINES, INFORMATION 28-33	Mercury Capsule 27	Selector Switch 51	
Balsa Nose Cones 20	Engines, Prices 50	Micro-Clips 52	Shock Cord 37	
Batteries 52	Engines, Selection Chart 30	MISCELLANEOUS SUPPLIES 42-43	Shroud Lines 37	
Battery Clips 52	F		Sky Hook Kit 15	
Battery Pack 53	Falcon Kit 11	MODEL ROCKET NEWS 37	Slide Rules 54	
BEGINNERS SPECIALS 4	Farside Kit 12	Momentary Switch 51	Snap Swivels 37	
Blades, Knife 34	Fin Pattern Sheet 26	Motors 28-33	Space Man Kit 15	
Blast Deflectors 53	Fin Reinforcing 43	Mounis, Engine 24	Space Plane Kit 10	
Blocks, Engine 22	FIN STOCK 26	Multi-Stage Kits 13	Space Volunteers 55	
Blocks, Nose 22	FINISHING MATERIALS 38	Multi-Stage Report 56	SPECIALS, Assortments 44-46	
Body Putty 38	Fins, Plastic 26	N		
BODY TUBES 18	Fire Proofing 39	Nichrome Wire 52	Special, Range Kit 29	
BOOKS 55	Firing Switch 51	NOSE BLOCKS 22	Spin Pins 26	
Boost-Glider Kits 10-11	FIRING SYSTEMS 48-49	Nose Cone Dowels 21	Spring Switch 51	
Boost-Glider Report 56	Foam Padding 42	Nose Cone Stock 21	Stability Report 56	
Brush Cleaner 39	G		Stage Couplers 24	
Brushes, Paint 38	Gauze Reinforcing 43	Nose Cone Weights 42	Streak Kit 14	
Bulkheads, Engine 22	Get the Most from Model Rocketry 6	NOSE CONES 20	Streamers 36	
Butyrate Dope 39	Getting Started in Model Rocketry 4	Nylon Screw 43	Styrofoam Balls 43	
C		O		
Capsule, Payload 'Chutes 36	Gliders 10-11	"Orbit" Special 46	T	
Clips, Electrical 56	Glue 38	Padding, Foam 42	Tape Discs 37	
Cluster Report 56	Gouge 34	Paint Brushes 38	Tape Hinges 43	
Cluster Rocket Kits 16-17	Guide to Rockets, Missiles and Satellites 55	Paint 39	Tape, Masking 38	
Cobra Kit 17	H		Tape Strips 37	
Computer, Altitude Cones, Nose 54	Hinge, Elevon 45	Panel, Firing 49	TECHNICAL REPORTS 56	
Construction Information 19, 41	Holder, Engine 42	Paper Adapters 25	Terminal Lugs 52	
Cord, Shroud Line 37	I		Thinner 39	
Corporal Kit 8	Ignition Material 52	Paper Reinforcing Material 43	Thread, Elastic 43	
"Countdown" Special 44	IGNITION SYSTEMS 48-49	PARACHUTES 36	Thread, Shroud Line 37	
Couplers 24	K		Thrust-Time Curves 33	
Cut-Away Engine 42	Key Switch 51	Patterns, Fin 26	Tilt-A-Pad 50	
D		Kit Names, Decals 40	Tips for Flying 29	
Data Sheet 57	Kits, Launcher 48-50	PAYLOAD SECTIONS 27	Tool Box 25	
DECALS 40	Kits, Rocket 8-17	Payload Padding 42	TOOLS 34	
Deflectors 53	Knife Blades 34	Payload Weight 42	Trackers 47	
Demonstration Engine 42	Knives 34	Phantom Engine 42	Tracking Report 56	
Design Booklet 55		Phantom Kit 14	TR's 56	
		Pilot Lights 51	TUBE ADAPTERS 23	
		Plan Booklet 55	Tubes, Body 18	
		Plastic Pins 26	Tweezers 34	
		Plastic Nose Cones 20	Two-D Computer 54	
		Power Supply 55	Two-Piece Rod 53	
		Push Button Switch 51	W	
		Putty, Body 38	WAC Corporal Kit 8	
		R		
		Range Box 25	Wadding, Recovery 37	
		Range Kit Special 25	Wax 38	
		Ranger Kit 16	Weight, Nose Cone 42	
		Razor Saw 34	Weight, Payload 42	
		RECOVERY EQUIPMENT 36	Whetstone 34	
		Recovery, Info. 35	White Glue 38	
		Recovery Wadding 37	Wind Tunnel Plans 56	
		Reinforcing, Gauze 43	Wire, Lead 52	
		Reinforcing, Paper 43	Wire, Nichrome 52	
		ROCKET ENGINE SELECTION CHART 30		

Ordering Information

EFFECTIVE DATE: This catalog takes effect as of November 20, 1965, and replaces all previous catalogs. Please be sure that you use the correct and full catalog number for each item you order. All prices subject to change without notice.

AIR MAIL SERVICE: For orders on which you desire extra fast service, Air Mail postage may be included. Shipping weights are given on all items. Send 8¢ for each ounce or fraction of an ounce weight of merchandise you order. Be sure to use the SHIPPING WEIGHTS in figuring. Any excess postage included with your order will be refunded.

PAYMENT ON ORDERS: Full payment must accompany all orders. Please send all remittances by either check or money order, for your protection and our convenience. If you do send currency, be sure your envelope has sufficient postage, is properly sealed, and is addressed correctly, so we will receive your order. Coins should be attached to a separate sheet of paper, not to the order blank. Use a single strip of masking tape to hold the coins in place. Avoid the mailing of coins, as they are easily lost in the mail. We cannot assume responsibility for the loss of coins, currency, or orders in the mail. Remember to include sufficient funds with your order. Due to postal regulations, we do not ship orders COD. Proper attention to these details will result in speedier service for you.

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QUANTITY PURCHASES: Quantity discounts are available to all individuals, clubs, and other organizations who wish to buy rocket engines and rocket supplies in bulk. For discounts and shipping terms see the table below.

AMOUNT OF PURCHASE BEFORE DISCOUNT	% OF DISCOUNT	SHIPPING TERMS	TERMS
Up to \$25.00	none	Prepaid	Cash with order
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\$50.00 to \$100.00	30%	F.O.B. Penrose	Cash with order
\$100.00 and up	40%	F.O.B. Penrose	Cash with order

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