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Apollo 11 and Beyond

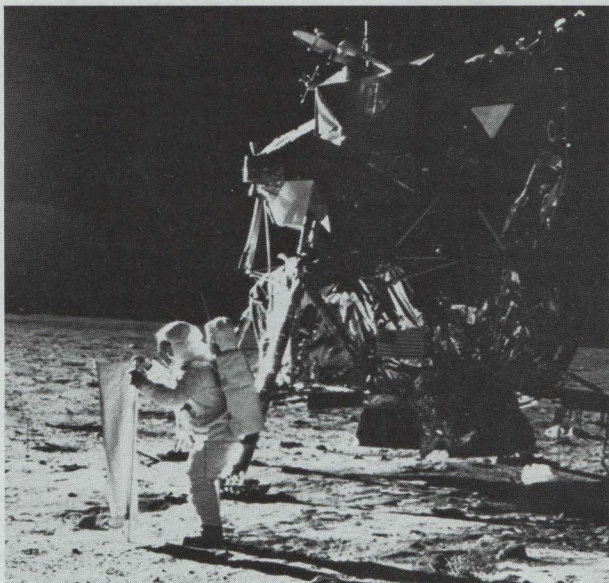
by Gregory P. Kennedy NAR # 12874 Assistant Curator, Astronautics, Smithsonian Institute

Ten years ago, during the flight of Apollo-11, men first walked on the moon. In the decade since, we have seen five more lunar landings, the first space stations, and the first international manned space flights. The second decade following Apollo-11 holds the promise of an operational space transportation system which will make flights into space an everyday occurrence.

Apollo-11 was launched on July 16, 1969, with astronauts, Neil Armstrong, Michael Collins, and Edwin ("Buzz") Aldrin aboard. At 9:32 AM, EDT, the 364-foot tall Saturn-V roared to life. Slowly, the thundering giant rose from its launch pad at the Kennedy Space Center in Florida. As it gained altitude its speed increased. The boost to orbit was flawless. The crew spent a brief time in orbit around the earth, then re-ignited the Saturn's third stage engine to propel themselves to their destination a quarter of a million miles away. Three days later they were orbiting the moon.

On July 20 Armstrong and Aldrin entered the lunar module Eagle, while Collins remained behind in the command module Columbia. The two spacecraft were separated, and Eagle began its descent to the lunar surface.

"Houston, Tranquility Base here. The Eagle has landed." With those words, Armstrong announced the successful landing at 4:17 PM.



"Buzz" Aldrin and Eagle during Man's first moon landing.
 — Photo Courtesy NASA.

Later that night Armstrong and Aldrin emerged from the frail-looking spindly-legged Eagle and spent 2-1/2 hours walking on the moon. They found the surface to be littered with rocks and craters. Everything was covered with a layer of fine, grey dust. A seismometer to measure moonquakes and a laser reflector were deployed. These two items would be used to obtain data after the astronauts' return to earth.

Like tourists everywhere, Armstrong and Aldrin took photographs and collected souvenirs. Their souvenirs were 56 pounds of lunar rocks and

soil. When their traverse on the moon's surface was over, they climbed back into Eagle for a well-deserved rest.

Lift-off from the moon, on July 21, was perfect. Within hours, Armstrong and Aldrin had rejoined Collins aboard Columbia. The service module's engine was ignited to place the spacecraft on a home-ward trajectory.

Following a three-day coast home, the Apollo-11 Command Module re-entered the earth's atmosphere and splashed down in the Pacific Ocean. Thus, one of humankind's most impressive technological feats—the first manned landing on the

moon—had reached a successful end. Five more lunar landings were made after Apollo-11.

Apollo-12 demonstrated precision landing techniques. Astronauts Conrad and Bean touched down within 1000 feet of the unmanned Surveyor-3 which had landed in the moon's Ocean of Storms in 1967.

The Apollo-13 landing had to be aborted after an oxygen tank in the Service Module exploded. The Lunar Module Aquarius was used as a lifeboat for astronauts Lovell, Swigert, and Haise as they nursed their crippled spacecraft back to Earth.

Each of the four remaining Apollo flights added to our growing bank of knowledge about the moon. With each mission, man's abilities to work on the moon increased. Beginning with Apollo-15, an electric-powered car, the Lunar Roving Vehicle, was used to greatly expand the area which could be explored by the astronauts on the moon. Also beginning with Apollo-15, an array of scientific instruments was carried in the Service Module to conduct a detailed examination of the moon from orbit.

The last lunar landing, that of Apollo-17, was in December, 1972. The twelve Apollo astronauts who walked on the moon had brought back over 8 hundred pounds of the moon's rocks and soil to Earth. They had left scientific instruments behind which continued to return data about our nearest celestial neighbor for years afterwards. One of the greatest epochs in the history of exploration had reached its end.

However, the technology of the Apollo program and a great deal of its leftover hardware was destined to be used for our next step in the exploration of space: Skylab. Skylab was America's first space station. Fabricated from a Saturn-V third stage, the Skylab Orbital Workshop



"Enterprise" 1st Space Shuttle.
 — Photo Courtesy NASA.

(OWS) offered as much habitable volume as a small three-bedroom house on Earth. The planned scientific program was ambitious. Experiments included biomedical investigations, materials processing, solar observations, and remote sensing of the earth from space.

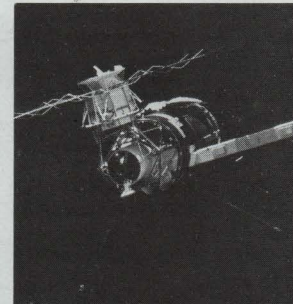
The workshop was launched by a Saturn-V on May 14, 1973. Shortly after launch, telemetry signals began to indicate that all was not well with the space station. The wrap-around micro-meteoroid shield had torn loose 63 seconds after launch, taking one of the two solar cell arrays (or "wings") with it. Worse still, the other wing was jammed by debris and would not deploy. Without the shield the body of the OWS was exposed to the sun's intense radiation, causing interior temperatures to soar.

The launch of the first crew was delayed until May 25 while procedures were developed to save the crippled giant. One of the first tasks facing astronauts Conrad, Weitz, and Kerwin after boarding Skylab was to unfurl a make-shift parasol to shield the OWS from the sun. After the parasol was deployed, temperatures inside the work-

shop began to drop. The next major concern was to free the jammed solar wing. On June 7, Conrad and Weitz succeeded in deploying the wing during an hours-long spacewalk. Skylab, through the courage and ingenuity of the astronauts and ground support personnel, had been brought back from the brink of disaster.

The first crew spent a total of 28 days in space. Two more visits to Skylab were made. The second crew spent 56 days living in the 85-ton space station, while the third and final crew spent 85 days in orbit above the earth.

During the Summer of 1975, the United States and the Soviet Union conducted the first international manned space flight. Three American astronauts in an Apollo spacecraft, docked with two Russian cosmonauts in a Soyuz. This was the last American manned space flight using expendable spacecraft and boosters.



Skylab in Orbit as seen from Apollo.
 — Photo Courtesy NASA.

During the first half of 1980, the Space Shuttle will make its first flight in space. Unlike previous manned spacecraft, the Shuttle Orbiter has wings and will glide in for a landing like an airplane. It will be reusable, which will greatly reduce the cost of spaceflights. After the Space Shuttle has undergone several flight tests, it will become the basis for an operational Space Transportation System, and flights into space will become routine occurrences.

APACHE-ARROW

WINNER APRIL 1979
DESIGN OF THE MONTH CONTEST
By: MILES CONKLIN, Highland, MI

SKILL LEVEL 2

PARTS LIST

A	2	Body Tube (BT-5)	3070
B	1	Nose Cone (BNC-5W)	8003
C	1	Fin Stock (BFS-20)	3164
D	2	Launch Lugs (LL-2A)	2321
E	1	Screw Eye (SE-3)	2281
F	1	Shock Cord (SC-3)	85744
G	2	Stage Coupler (JT-5C)	3050
H	1	Parachute (PK-8)	2261

ADDITIONAL MATERIALS

White glue, sanding sealer, spray paint, sandpaper, hobby knife, ruler, sharp pencil.

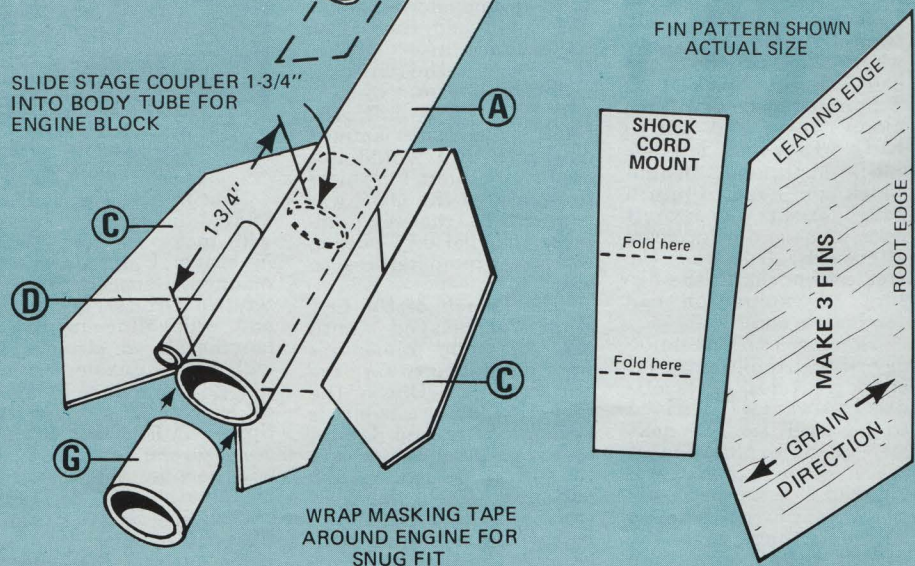
RECOMMENDED ENGINES

A3-4T (First Flight) A10-3T

PAINTING

Nose cone - Black
Body Tubes - Yellow
Multi-colored stripes around body tube above fins.

SLIDE STAGE COUPLER 1-3/4" INTO BODY TUBE FOR ENGINE BLOCK



WRAP MASKING TAPE AROUND ENGINE FOR SNUG FIT

the VIEW from up there

by Bob Cannon

Ever wondered what things looked like from above? If you were in a helicopter, airplane, or handy skyscraper, no problem! If not, you were left with your imagination to try to see a "bird's eye view" of the world.

Now there is a simple, inexpensive way to see the world the way an eagle sees it. The new Estes Astro-Cam 110 is an aerial camera which takes excellent color photos from about 107 meters (350 feet) or more in the air. The wide angle lens (33°) is in focus from 3.66 meters (12 feet) to infinity.

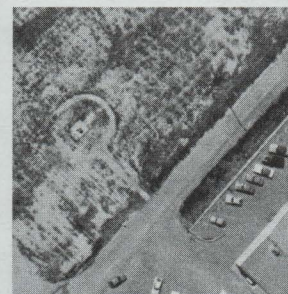
Seeing the world from above is fun, but it makes things look different. Familiar objects don't look the same any more. You must seek reference points to help you identify what you see. Since the Astro-Cam 110 takes pictures with the use of a mirror, everything on the color print is backward unless you ask that the prints be reversed when you take or send in the roll of film for development and printing.

ground). Oblique photos show more surface area and are often more beautiful, but vertical photos are easier to use in aerial photo interpretation.

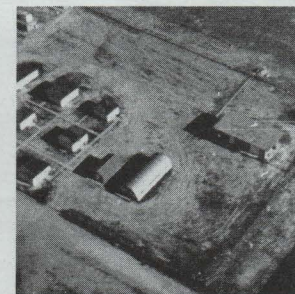
The amount of information which can be derived from an aerial photograph is enormous. The obvious information includes telling just what is photographed (houses, your house, your block, your barn, a local school, etc.). In addition, the time of day can often be determined by the length of shadows. This is harder with a photo of an unfamiliar area for which you do not immediately know which direction is north. Don't forget to allow for direction reversal left to right if your print was not reversed when the film was developed and printed.)

are no row crops or other signs of agriculture, the area is probably not cultivated. Since there is evidence of plowing, the area has been cultivated. In fact, the "rows" were produced by plowing the previous summer to control weeds. The straight and curved "path" is a "road" of yellow bricks to the launch pad. The launch pad is visible in the middle of the curve.

What time of day was this photo taken? Probably near noon as evidenced by the very short shadows. If you knew that the launch pad was east of the building, you could determine from shadows near the cars and the building that the photo was taken shortly before noon (sun east of overhead).



Vertical Aerial Photo of "Cape Estes", The Launch Pad For Tours At Estes Industries.



Oblique Photo of A Storage Area at Estes Industries.



Oblique Photo Looking West From Penrose, Colorado. (Note mountains on horizon.)

Pictures which are taken by aerial cameras are usually classified as either oblique (taken at an angle, camera not perpendicular to ground) or vertical (taken straight downward, camera perpendicular to

From the above photo can you tell if the area shown is a housing development, an industrial area, or at least partly "in the country"? The lack of homes indicates that it is not immediately in a residential area. The parking lot with several cars indicates that the area is at least partly commercial, industrial, or a shopping center. The area with sparse weeds and grass indicates that at least part of the area is open. Since there

This photo was taken on the same roll of film as the prior photos. The photos were all taken the same day. East is to the right in this photo. (Was the picture taken before (earlier in the day) or after (later in day) the previous photo? (Earlier, longer shadows to left (west) of building.)

Many "indirect" facts can be determined by careful consideration of an aerial photo. If you have an aerial photo of a prairie dog colony and know the average number of prairie dogs in a family, and the

average number of entrances per burrow, you can make a good estimate of the number of prairie dogs in the colony or per acre of the colony. Counting the number and size of red ant colonies can allow you to compare relative seed productivity of two fields of grass. Variations in plant health can let you spot poorly watered or fertilized or poor soil areas of fields of crops or lawns. Many more such studies are possible. Not only are they fun and meaningful, they could make great Science Fair projects. Actual examination on the ground of the area in the photo is helpful in verifying the accuracy of the interpretation of the photo.

Using the C6-5 engines to launch the AstroCam 110 usually produces oblique photos. Use of the C6-7 engine generally yields vertical or nearly vertical photos. Photos with the C6-5 engine are usually taken at about 130 meters (426 feet) or higher. Pictures taken with the C6-7 engine are usually taken at 107 meters (351 feet) or higher (two seconds longer for aerial camera to descend before picture taken). Occasionally, the camera may take a nice "sky shot" because it failed to tip over at apogee.

Exact determination of height from which the aerial photograph was taken is possible by analysis of the photograph if the picture was taken vertically and the size of one object near the center of the picture is known.

It is easier to make all measurements for photo interpretation in metric units (millimeters and meters).

Using the photo of "Cape Estes", determine the height from which this photo was taken.

Make all measurements from the negative. Since you don't have this negative, the measurements are provided in this example.

Formula for determining height of camera at instant photograph was taken

$$H = \frac{OF}{I}$$

H=Height of camera above surface
O=Object size
I=Image size on negative
F=Focal length of lens
O=3.023 meters (9 feet 11 inches) or 3023. millimeters
I=0.5 millimeters
F=30.0 millimeters (a constant)
H=(3023. mm) (30.0 mm) / 0.5 mm

$$H = \frac{90790. \text{ mm}}{0.5 \text{ mm}}$$

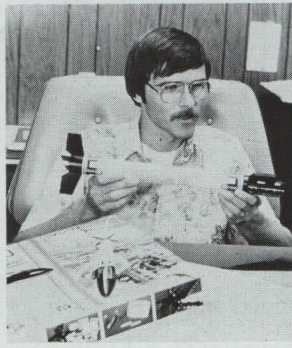
H=181380. mm or 181.38 m

The height of the camera at the instant the picture was taken was 181.38 m (594.9 feet).

Once you know the height from which the picture was taken, the formula can be modified to give the size of other objects near the center of the photo.

$$O = \frac{HI}{F}$$

Since the height (H) is known, only the size of the image (I) of the object under study need be determined and the formula solved to determine the size of the object. The focal length (F) is always 30.0 mm.



Mike Dorffler, Estes Engineer for the AstroCam 110.

The aerial photographs in this article were all taken by Mike Dorffler with an AstroCam 110 made from a kit taken off the assembly line on the first day the kit was packed. He took these photos on one roll of film the same day.

Stump Your Teacher Quiz

Question for your teacher:

Do model rockets have to have fins?

Answer:

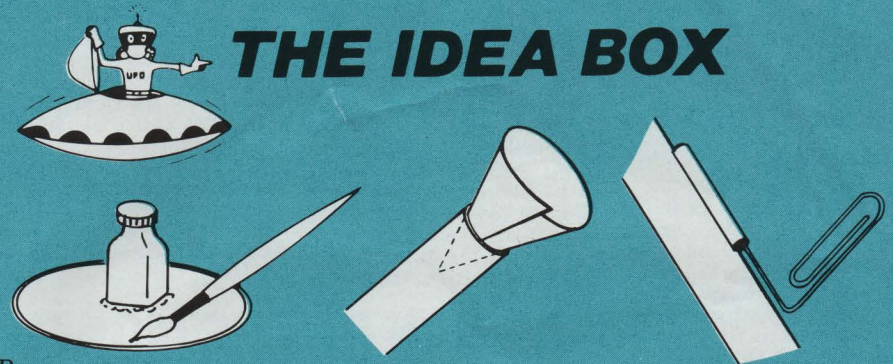
No. Model rockets do require some sort of aerodynamic guidance. This guidance is usually secured by causing the Center of Pressure (point at which all of the aerodynamic forces operating on the rocket appear to be centered) to be well back of the Center of Gravity (point at which all of the weight of the rocket appears to be concentrated) of the model rocket. This situation is usually secured through the use of fins, but other techniques such as conical body shapes are possible.

Question for your teacher:

What is the maximum thrust developed during launch by the Space Shuttle?

Answer:

Current designs call for each of the three orbiter engines to produce 420,000 pounds (2.1 million Newtons) of thrust and each of the strap-on boosters to produce 2,600,000 million pounds (11.6 million Newtons) of thrust. The total thrust produced at lift-off will be 6,610,000 pounds (29.5 million Newtons). The anticipated lift-off weight of the Space Shuttle with boosters and a typical payload is 4,400,000 pounds.



By:

Tim Brake, Albion, IL

Joel Heinitz, Iowa City, IA

To avoid spilled paint when painting your models, glue the bottom of the paint bottle to a coffee can lid. This prevents spills as well as catching drops off the brush.

When painting a model where the nose and body are different colors, a paper cone prevents paint from getting inside of the tube when painting.

Need to pick up a model with wet paint? Bend a paper clip as shown and slip bent end under launch lug and you can lift the model without touching the paint.

MRN and Free Goodies.. For You!!

Model Rocket News is now published four times a year-Winter, Spring, Summer, and Fall. We will, whenever possible, mail your MRN to you with our seasonal mailings in addition to including it with return mail-orders as long as our supplies last as an exclusive service for our mail-order customers.

To receive our seasonal mailings you must be an active Estes mail-order customer which requires you to have placed an order for Estes merchandise within the past four months.

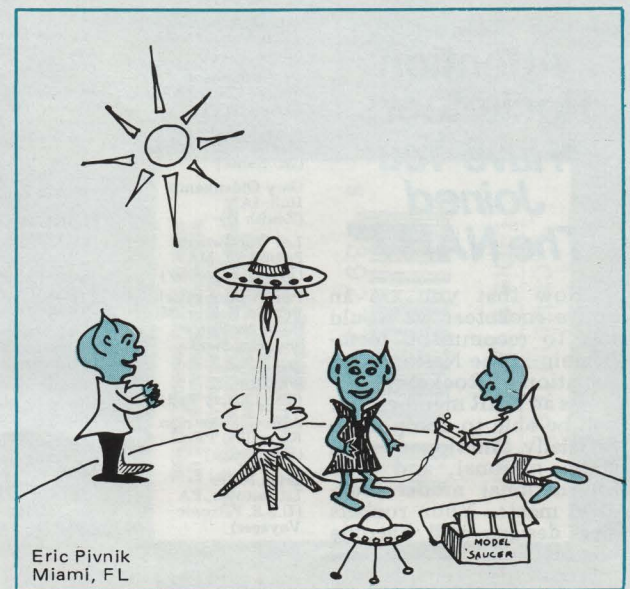
Additional Bonuses. . . All orders received on even numbered months, (February, April, June, etc.), will be returned with a "free" plan to help increase your Estes fleet. These new plans feature a variety

of designs from single-stage sport models to far-out exotic rockets you will be proud to display. All "free" plans can be constructed from the Estes hi-performance parts and accessories listed in our catalog.

All orders received on odd numbered months will be returned with a free

iron-on decal for your t-shirt, windbreaker, or range jacket. These iron-ons feature a variety of super-neat designs. You iron it on right at home to any surface containing 50% or more polyester.

Remember. . . these items are available only with return mail-orders!!!



Eric Pivnik
Miami, FL

Help Us Publish The Model Rocket News

Got any good ideas for MODEL ROCKET NEWS articles, technical information, cartoons, anecdotes, club news of unusual interest, etc? Then why not submit them to us for possible publication? Our constant aim is to make MRN a better, more interesting magazine, and you might be just the type of contributor we need.

If you send us photos, please make sure that you pack them between cardboard sheets so that they won't get creased in the mail. All contributions become the property of Estes Industries and cannot be returned. Address all material to: MRN Editor Estes Industries, Penrose, Colorado 81240.

Should your article or photos be used in MRN, we'll reward your efforts and talent with an Estes merchandise certificate, the amount of which will be determined by the MRN editorial staff.

Hope to hear from you soon!

Attention Rocketeers: "Have You Joined The NAR?"

Now that you are an active rocketeer we would like to recommend membership in the National Association of Rocketry.

As an NAR member you will be able to compete in officially sanctioned local, state, national, and even international model rocketry meets. Your rockets and designs will become eligible to set national and international records and most important, you will

be kept informed of happenings in model rocketry around the world. Flight insurance is available now too!

Also as a NAR member you will receive a monthly copy of Model Rocketeer, a magazine published as a service by the NAR for its members. It contains news of upcoming model rocketry and space events, man-

ufacturers news, modroc tips, designs and plans, news of the NAR, its members, and other people in the aerospace field. Also, it contains editorials, humor, and rocketry history.

For more information and a membership application write: NAR Headquarters, Dept. E-8, P.O. Box 725, New Providence, NJ 07974.

DESIGN OF THE MONTH WINNERS

WINNERS

Michael Hardman
Cary, NC
(Quasar)

Ken McClure
Upland, CA
(Cobra)

Dave Henry
Euclid, OH
(Tri-Finned Spacing Formula)

Kevin Bates
Troutdale, OR
(Rotor Rocket)

HONORABLE MENTIONS

Kirk Negaard
Hawthorne, CA
(Launch Control System)

Troy Davis
Princeton, MN
(Destroyer)

Scott Spangenberg
Erie, PA
(Cloud Buster)

Bob Meierjürgen
Little Valley, NY
(Romulan II)

Benjie Johnson
Spruce Grove, AB,
Canada (Rat)

Mark Lesko
Mayfield Heights, OH
(No Name)

Gary Oldenkamp
Hull, IA
(Zenith II)

Lee Woodworth
Pembroke, MA
(Flying Farce-Sar)

Paul Antonowitsch
Benton Harbor, MI
(U.S. Air Force Shooting Star)

Dan Lower
Wheaton, IL
(The Liberty Bell)

Alan C. Streetman
Knoxville, TN
(Dominator)

Brian Miller
Littlestown, PA
(U.S.S. Patronic Voyager)

Don Bruechert
Manitowoc, WI
(Solar Cell Launch Controller)

Tim Rood & Jeff
White
Ames, IA
(Arcturus IV)

Mike Aron
Needham, MA
(Manual Launcher)

Ray Munselle
Cedar Hill, TX
(Boost Glider)

WINNERS

Walter Lapovich
Torrance, CA
(Sandpiper)

Partick J. Percival
Bay Village, OH
(Planetary Assault Support Craft)

Dennis Gilbert
East Brunswick, NJ
(Star Tripper)

Dean Kavalkovich
Monroeville, PA
(Cyclone II)

Andrew Davidson
Oakland, ME
(Polaris LF-1)

Steve Lindsley
Tyndall AFB, FL
(Centurion II Launch Control)

Kevin Harms
Carrollton, IL
(Master Launcher III)

HONORABLE MENTIONS

Rusty Roach
Frisco, TX
(Voodoo)

Tony Clark
Arlington, TX
(Launcher System)

John Grosvenor
Roanoke, VA
(Rocket Stand)

Douglas Weerstra
Tlacotala Oaxaca
Mexico
(Mariner VIII)

John Gillio
San Jose, CA
(Saturn III)

Allan Hogue
Katy, TX
(Sky Ripper)

Milton J. Marasch
Plainview, MN
(Ark II)

Robby Doane
Lake Jackson, TX
(Centurian II)

Thomas Lemmons
Laverne, OK
(Yellow Jacket)

Dan Isidinger
St. Cloud, MN
(X-7)

Kerry Marsico
Palatine, IL
(Galaxy)

David Nuutinen
Thunder Bay "F"
ON Canada
(Candusa)

David Zitzkat
New Britain, CT
(Crusader)

Jim Denning
Hudson, CO
(Gemini I)

Scott Kerr
Grand Rapids, MN
(Darth Vader)

Richard K. Pautz
APO, NY
(Starburst)

Matthew P. Christian
Sacramento, CA
(Gamma Ray)

John Carlson
Cordova, AK
(Achilles' Arrow)

WINNERS

Monty Michael
Land O' Lakes, FL
(Mako)

David L. Sidebottom
Topeka, KS
(Launcher System)

Scott Huie
Troy, NY
(Parachute Ejection System)

HONORABLE MENTIONS

Devin Jones
Werserville, OH
(Nike Needle)

Kevin Schlier
Stroudsburg, PA
(WF-125 Banshee)

Art D'Ambrosio
Canton, MI
(O-Zone)

Ricky Wofford
Leesburg, FL
(Titan Imperial)

Scot Tolsen
Prospect Heights, IL
(Two-Stage Launch Pad)

Josh Woltz
Mercersburg, PA
(USC Starseeker II)

Tim Knight
Baton Rouge, LA
(Destroyer Rocket)

Robert Inscow
Newton, NC
(Space Probe)

Floyd E. White, Jr.
Jefferson, MD
(Star Warrior)

Clark Gerhart
Telford, PA
(Mach I Fighter)

Ron Eberts
Williamson, NY
(Night Hawk)

Thomas Payne, Jr.
Tappan, NY
(HoloFax)

Joel Frazin
Carmichael, CA
(Voyager 3)

October 1978

WINNERS

Mike Books
Aztec, MN
(Launcher System)

Doug Pisik
Deerfield, IL
(Launcher System)

Guy Letourneau
Andover, MA
(Cygnus X-1)

HONORABLE MENTIONS

Kenneth D. Griffin
Memphis, TN
(Apollo Avenger I)

Aaron Yeo
Littleton, CO
(Fury)

Karl Kugler
Germantown, WI
(No Name)

Iain Delaney
Oakville, ON,
Canada

(Battlestar:
Galactica
Colonial Viper)

David Todd Dean
Broken Box, NE
(ZX-1)

Doug W. Pasnik
Minneapolis, MN
(Space Trooper)

Dick Huey
Leland, MI
(Capricorn)

John McGurk
Cranford, NJ
(Protius III)

Imagine the strangest creature you can from another planet, solar system, or galaxy. Make a sketch, and send it to us with the additional information requested in the rules below. Your alien creation could win you a \$50.00 merchandise certificate for first place or one of twenty-five \$10.00 merchandise certificates for runners-up. We would like to see the weirdest, freakiest, most far-out creepy creature you can think of. Really let your imagination go as this should be a really fun contest. Winning entries will be reproduced for all to see in a future issue of the MRN.

RULES:

1. You may enter as many times as you like.
2. Employees of Estes Industries or members of their immediate families are not eligible.
3. All entries become the property of Estes Industries and cannot be returned.
4. In addition to a sketch of

your creature, tell us his name, where he comes from and any other characteristics you can imagine such as diet, size, life style, intelligence, breathing substance, physical makeup, etc. Why does he look the way he does? This additional information need not be lengthy, just interesting.

5. Entries will be judged for creativity, uniqueness, completeness, weirdness, strangeness, and anything else we can think of! It really should be fun!!!
6. Deadline for receipt of entries is midnight April 15, 1980.
7. Decision of the judges is final.
8. Be sure to include your name, age, address, city, state, and zip code with each entry. Also, be sure to include your Skill Level.
9. Mail entries to:
Estes Industries
MRN Creature Contest
Penrose, Colorado 81240



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DEPT. 372

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This order form replaces all previous order forms. Please be sure that you use the correct and full catalog number for each item you order. All prices are subject to change without notice. **WHEN SENDING ORDER BE SURE TO GIVE ZIP CODE IN YOUR ADDRESS.**

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Full payment must accompany all orders. Please send all remittances by either check or money order, both 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 to assure delivery. 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. For your protection, we do not ship orders C.O.D. Proper attention to these details will result in speedier service for you.

IMPORTANT

We believe that we have the safest program offered in the field of rocketry today. However, it is still important that the utmost care be exercised in the use of our products. We **DO NOT** assume any responsibility for accidents. No warranty is either made or implied as to reliability or performance. We assume no liability beyond the cost of replacement of a product, if any, which malfunctions or is found defective.

Estes model rocketry products are recommended for ages 10 to adult. Adult supervision is suggested for those under 12 years of age when flying model rockets.

Your order may, for various reasons, have to be shipped in more than one package. If all of your order does not come at the same time, please be patient, give the Post Office, U.P.S., or freight company a few days to mix things up and sort them out again.

NOTE: All foreign orders require additional postage. Please write for more information on postage and mailing restrictions.

PRIORITY MAIL (Air Mail) SERVICE

While Estes Industries specializes in fast service, sometimes extra speed is necessary. The Post Office offers a service called Priority Mail which gives packages and parcels the fastest handling and transportation possible. **PRIORITY MAIL CANNOT INCLUDE MODEL ROCKET ENGINES, AS**

ORDERS CONTAINING ENGINES CAN ONLY BE SHIPPED BY PARCEL POST AT THIS TIME.

For other items on which you desire extra rapid delivery, additional postage may be included for Priority Mail. Shipping weights are given on all items. Total up the shipping weights on the items you are ordering, then find the amount to allow for extra postage on the chart below. When your order is processed you will be charged only for the difference between regular parcel post and priority mail - any excess will be refunded.

WEIGHT (UP TO BUT NOT OVER)	10 oz. to				
	1 lb.	2 lbs.	3 lbs.	4 lbs.	
Allow →	\$.80	\$1.13	\$1.51	\$1.93	
5 lbs.	6 lbs.	7 lbs.	8 lbs.	9 lbs.	10 lbs.
\$2.48	\$3.13	\$3.73	\$4.33	\$4.93	\$5.53

For orders 9 ounces or less, send 9¢ per ounce.



"Estes is an equal opportunity employer."

↑
TEAR HERE AND INSERT IN ENVELOPE

Thank you for ordering

↑
TEAR HERE AND INSERT IN ENVELOPE

HAVE YOU ORDERED EVERYTHING YOU NEED? IS YOUR MONEY ORDER OR CHECK ENCLOSED? DID YOU CHECK YOUR MAILING ADDRESS AND ZIP? DON'T FORGET TO SEND A FRIEND AN ESTES CATALOG!

—HELP US TO SERVE YOU BETTER—

Your comments will assist us in providing you with better service and even more exciting products.

- What types of scale models would you like to see Estes produce? _____
- Do you prefer Large or Small size models?
- Do you think Estes kits are generally Easy, Average or Difficult to assemble considering their recommended skill level?
- Are Estes kit instructions easy to follow? Yes No
- Would you prefer more plastic parts for simpler assembly and better detail? Yes No
- What Skill Level of kits do you prefer to build?
 1 2 3 4 5
- My three favorite types of model rockets are (Mark 3 boxes):
 Single Stage Interplanetary Voyager
 Sport Flier Multi-Stager
 Mini-Brute Payload
 "D" Powered Boost Glider
 Scale Model Maxi-Brute
- I became interested in model rocketry because of:
 a friend film gift
 school magazine ad hobby shop
 rocket club saw a launch department store
 article comic book
 TV
 other _____
- My favorite type of scale model is:
 Military Scale NASA Scale Sounding Scale
- What product other than model rockets would you like to see Estes produce:
 Electric RC Cars/ Kits Pre-Assembled
 Powered Boats/ Kits Pre-Assembled
 RC Airplanes/ Kits Pre-Assembled
 U-Control Airplanes/ Kits Pre-Assembled
 Train Kits/Gauge:
 N HO S O-27 O
- Age _____ Grade _____
- Male Female

— THANK YOU FOR YOUR ASSISTANCE —