

MODEL ROCKETRY NEWS

Vol. 15, No. 1
Nov./Dec. 1975

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NARAM-17

"The 17th Annual National Model Rocketry Championships"

For the past 17 years the National Association of Rocketry (N.A.R.) has hosted model rocketry's biggest yearly event, the official "United States Model Rocketry Championship Meet". This year more than 200 top model rocketeers, from all across the nation, traveled to Orlando, Florida to take part in the meet. For five activity filled days the participants competed in nine different events, each consisting of three age divisions plus workshops, seminars, technical discussions, film presentations and NAR business meetings.

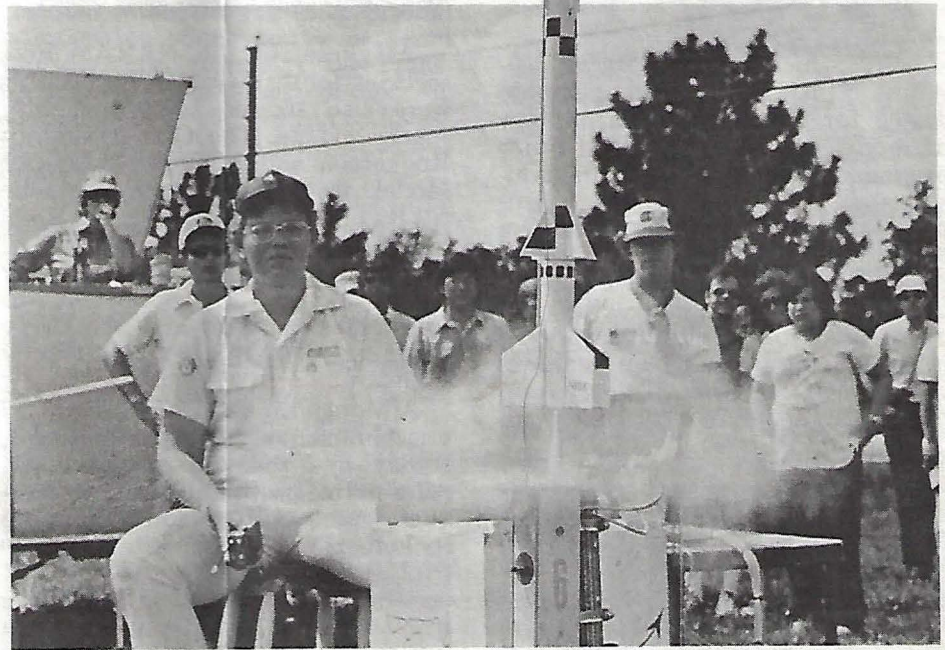


Photo Courtesy of Alan Williams, Model Rocketeer Mag., N.A.R.

Launch officer Larry Shenosky, of the Brevard County Florida NAR section, launches the new Estes Nike-X sport model.



Photo Courtesy of Vern Estes

NARAM contestants tour Kennedy Space Center and observe mock-up of Apollo/Soyuz crafts.

Official NAR Pink Book for officially sanctioned United States model rocketry competition. For further information on joining the NAR or for additional event data we suggest you contact NAR Headquarters, Dept. E-6, P.O. Box 725, New Providence, N.J. 07974. We at Estes Industries highly recommend membership in the NAR for the serious model rocketeer.



Photo Courtesy of Vern Estes

NARAM-17's very sophisticated launch complex which controlled all meet launchings.

NARAM-17 events included Robin Eggloff, PeeWee Payload, Class O Parachute Duration, Sparrow Boost Glider, Hawk Rocket Glider, Class 1 Streamer Duration, Plastic Model, Scale, and Research and Development. All events and their respective rules were taken from the

Sunday, August 3, signaled the beginning of the week's meet with the official contestant's briefing, commercial displays and a really exciting manufacturer's demonstration launch. The NARAM host sections gave Estes Industries a big hand with carrying out an excellent demo for spectators and participants. Our

new STAR TREK Starship Enterprise and Klingon Battle Cruiser plus the Nike-X, Renegade, Mars

(Continued on page 2)

Snooper II, Russian Vostok, Andromeda and our Maxi-Honest John were the featured kits in our demo along with other favorites like the Maxi-Pershing 1A and Cineroc/Omega. This year too, Vern was able to attend the entire week of NARAM activities. Of special interest to contestants was the unveiling of EPIC, Electronic Propulsion Impulse Computer, a super miniaturized static test stand which runs off your standard 12 volt car battery.



**EPIC
ELECTRONIC
PROPULSION
IMPULSE
COMPUTER**

Price
\$2495.00

The EPIC is a rugged, portable device for testing the total impulse of model rocket engines and other propellant devices. It is a professional, quality instrument which employs the latest digital and analog techniques for achieving accuracy, reliability, and simplicity of operation. It comes complete with data processing control unit, load cell, interconnecting cables, and calibration weight and level...everything needed for accurate electronic read-out of total impulse.



Photo Courtesy of Vern Estes

This is not a blow-out. Vern is simply testing EPIC using the cars 12 volt battery for power and it's tire for support.

Gleda Estes, Vern's wife, is the Vice President of the company manufacturing EPIC. For more information write American Technology Corp., 225 Main Street, Canon City, CO 81212. Hundreds of model rocket engines were tested by EPIC during the week for the enjoyment, interest, and education of NARAM rocketeers.



Photo Courtesy of Vern Estes

Vern at entrance to Kennedy Space Center.

As guests of the NARAM host sections (clubs), visiting contestants were also treated to several very special events. The Orange County Rocketeers and the Broward County Model Rocketry Association, the NAR host sections, led NARAM rocketeers on an exciting tour of Cape Canaveral and the Kennedy Space Center, plus a visit to Orlando's Sea World, and on a really super excursion through Walt Disney World.

Although the week of NARAM-17 was jam-packed with things to do, Friday and the end of the meet, culminating with the Awards Banquet, came all too soon. Winning rocketeers were presented with beautiful trophies and awards plus gift certificates from Estes Industries and attending manufacturers. Vern was there to personally congratulate the winners and to also wish "good

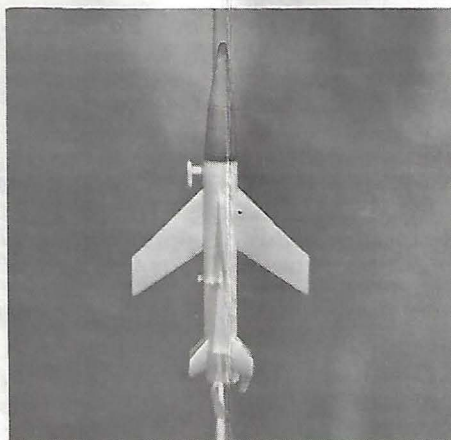


Photo Courtesy of Alan Williams, Model Rocketeer Mag., N.A.R.

A plastic Lacrosse kit takes to the air during the "Plastic model" flight competition.



Photo Courtesy of Alan Williams, Model Rocketeer Mag., N.A.R.

The extreme detail ability required of NAR-FAI scale modelers is demonstrated by Tom Hoelle's scale Genie Air To Air Missile.

luck in the future" to those who were not so lucky this time. We at Estes are pleased to have been involved with this years NARAM once again.

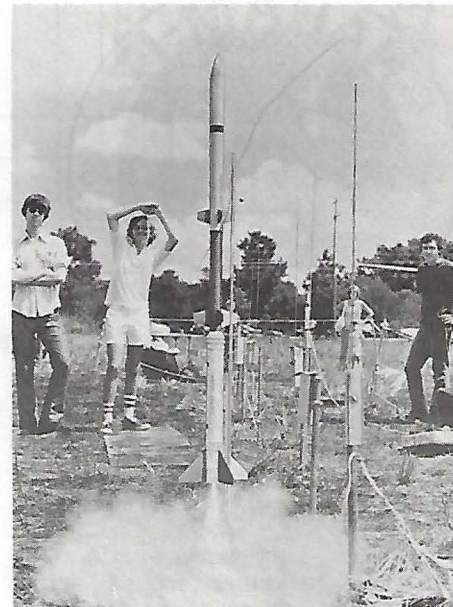


Photo Courtesy of Alan Williams, Model Rocketeer Mag., N.A.R.

The Langford-Biedron team's winning flight of their 1/7 scale Argo D-4 Javelinsounding rocket.

Needless to say, win or lose, NARAM contestants really enjoyed themselves and would take home many great memories of NARAM-17. Why not join the N.A.R. and perhaps we'll see you at next years meet.

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 just be 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!

SCIENCE FAIR CONTEST

Want to win a bonus award on your Science Fair project this school year? You have a chance if your project involves model rocketry.

The rules for the Estes 1976 Science Fair Contest are:

1. Your project must involve model rocketry.
2. Your project was entered in your school's Science Fair.
3. You send us a copy of your report (which should be self-explanatory) and photos of your project and your exhibit. Do not send the entire exhibit. All entries become the property of Estes Industries, and no entries will be returned. Each entry must be accompanied by a signed statement from your teacher that your entry shows your exhibit as it was actually entered in the Science Fair.
4. All entries must be for projects entered in school year 1975-'76 Science Fairs.

5. Judging will be arranged by Estes Industries. Duplicate prizes will be awarded in case of ties. The decisions of the judges are final.
6. All entries eligible for the contest must be received by May 30, 1976. Address all entries to Science Fair Contest, Estes Industries, Penrose, Colorado 81240.
7. Employees of Estes Industries and their immediate families are not eligible to enter this contest.

Utilize your model rocketry talents to make a prize-winning project for your local Science Fair. If you do it right, you might go on to regional, state, or even international competition. Such topics as aerial photography, telemetry by Transroc, aerodynamics of gliders, or simpler topics, etc. are fun to investigate and can make impressive exhibits for the judges.

Your project need not win a prize at your local fair to be eligible to

compete. We have observed, however, that many of the past prize winners in our earlier Science Fair Contests had won something in their local fairs.

Prizes to be awarded are:

- First Place - \$100 merchandise certificate
- Second Place - \$50 merchandise certificate
- Third Place - \$25 merchandise certificate
- Honorable Mentions - \$10 merchandise certificates

Every winner will receive an award certificate personally signed by Vern.

"We look forward to receiving your entry." GOOD LUCK!!!



"Design Of The Month Winners"

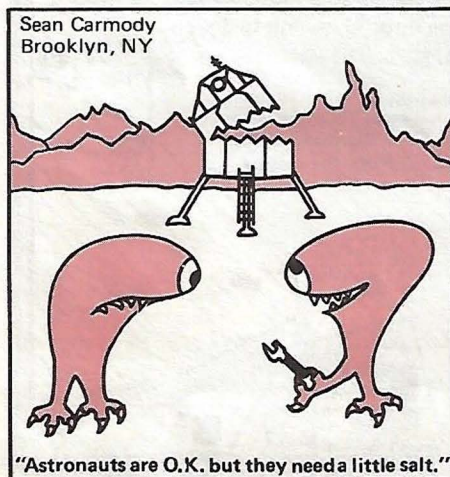
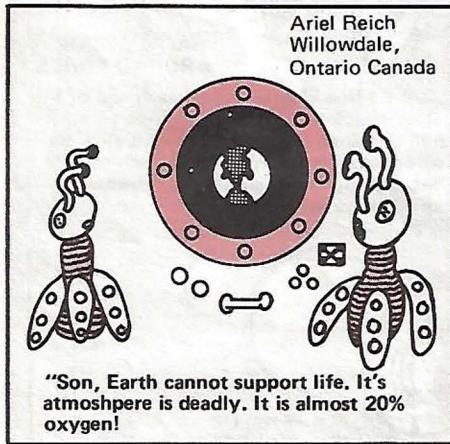
Congratulations to another fine group of Estes Rocketeers for their outstanding DOM entries. First place winners will receive \$50.00 merchandise certificates and honorable mentions will be awarded \$5.00 certificates. Keep those entries coming, maybe you'll be our next winner!

APRIL 1974 - **First Place:** Richard Bates, New Hampton, NH ("Goliath-D"). **Honorable Mention:** Mark Buchschacer, St. Louis, MO ("Two Stage Boost Glider"). Kevin Niess, Minot, ND ("The Steel Bird"). Gary Mehrl, Dubuque, IA ("Photographers Dream"). Jim Kenney, Amarillo, TX ("Jupiter IX"). Steve Argento, East Syracuse, NY ("White Lighting Transport"). Dean Lehr, Zwolle, LA ("Predator"). Stan Cooper, Ft. Wayne, IN ("Obelisk"). Steven Higgins, Naper, NE ("Castro"). Charles Numej Jr., Morgantown, WV ("Flex Wing II"). Michael Schuttler, Oneonta, NY ("Neptune II"). Mark Teeple, Jonesboro, TN ("Moon Transport"). Ronny Hoyt, Pottsville, TX ("Bumble Bee"). Charles Poeter, Ann Arbor, MI ("S*O*R*V*"). Luke Paxson, Creston, IA ("Yankee Clipper"). Rodger Hursh, Lake George, MI ("Terrier"). Mark Paxson, Creston, IA ("Staraine"). Daran Dammyer, New Bremen, OH ("Topflite"). Scott June, Lapeer, MI ("The Shuttle Jet"). Patrick Kelley, Purvis, MS ("Condor"). Michael Popp, Russell, KS ("Single Launch System Type A/M"). Tony Malburg, Hart, MI ("Marauder II"). John Head, Cement City, MI ("Killer"). Charles Miller, St. Elmo, IL ("Dizzy D").

MAY 1974 - **First Place:** Kay Sakamoto, Loomis, CA ("Tycho"). **Honorable Mention:** Greg Stewart, Salisbury, NY ("X-200"). Todd Neal, Fairport, NY ("Polaris"). Jim Weller, Hillsboro, OH ("Galazy 5"). Gerald McDaniel, Pueblo, CO ("Math Formula"). Leigh Harrington, Oneida, NY ("Stargazer"). Art Telkamp, Orange, CA ("Hawk"). Mark Ramsey, Charlotte, NC ("Blue Flame"). James Pyle, John Stark, Kendallville, IN ("Dagger II"). Taiden Brown, Newark, NJ ("Free Spirit").

JUNE 1974 - **First Place:** Winfred Hughes, APO New York, NY ("Galazy XI"). **Honorable Mention:** Cliff Tisdale, Bradenton, FL ("Alien Battleship"). Aubrey Hursh, Lake George MI ("Barricade"). Thomas Poff, Campbellsville, KY ("Starship Aquarius"). Joel Karsberg, Holden, MA ("Thunderhead"). Wally Kuhn, North Syracuse, NY ("Flying Saucers").

(Continued on page 7)



STAR TREK™ CONSTRUCTION TIP

Removing the vacuum-formed parts for the Starship Enterprise, #1275 and Klingon Battle Cruiser, #1274 can be made easier by using the following procedure.



© 1975 PARAMOUNT PICTURES CORP.

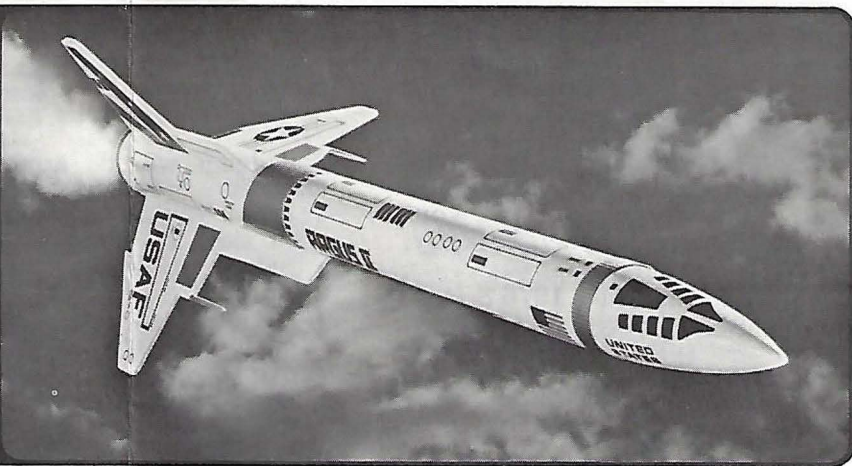
ARGUS II

SKILL LEVEL 2

FIRST PLACE WINNER
DESIGN OF THE MONTH

By BUFORD TAYLOR
Xenia, Ohio

ESTES INDUSTRIES ROCKET PLAN NO. 84



★ BUILD THE ARGUS II WITH ESTES HIGH PERFORMANCE PARTS AND ACCESSORIES.

PARTS LIST

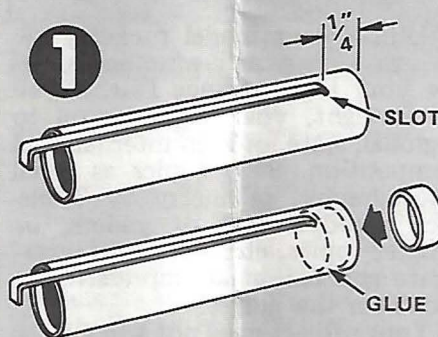
1	Body Tube	BT-55V
1	Nose Cone	BNC-55F
2	Launch Lugs	LL-2A
1	Screw Eye	SE-2
1	Shock Cord	SC-1
1	18" Parachute	PK-18
1	Balsa Fin Stock	BFS-40L
2	Toothpicks	
1	Engine Mount	EH-2055
1	Engine Hook	EH-2

ADDITIONAL MATERIALS

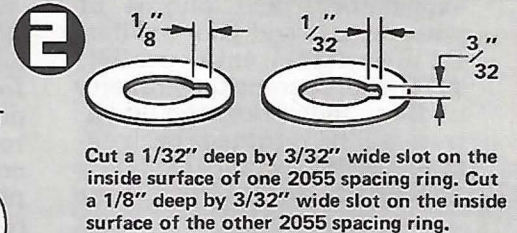
- Hobby Knife
- White Glue
- Ruler
- Sanding Material
- Sanding Sealer
- Enamel Paint (Spray)
- Sharp Pencil

RECOMMENDED ENGINES

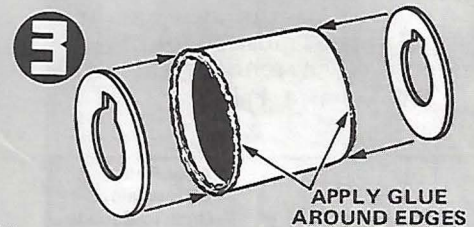
B4-2 B6-4 C6-5



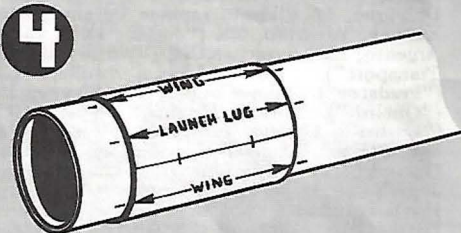
Mark the BT-20 engine tube 1/4" from one end. Punch a 1/8" wide slot on this mark and insert EH-2 engine hook. Spread glue 1/4" inside the end of the engine holder tube nearest the slot and insert the engine block. Push it in place until it touches engine hook and is flush with the end of the engine holder tube.



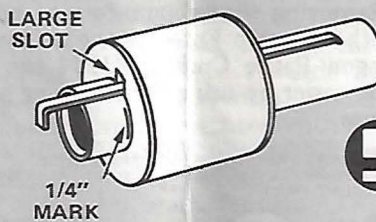
Cut a 1/32" deep by 3/32" wide slot on the inside surface of one 2055 spacing ring. Cut a 1/8" deep by 3/32" wide slot on the inside surface of the other 2055 spacing ring.



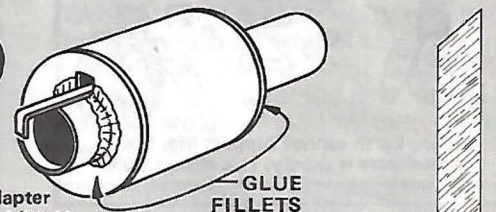
Apply a line of glue around each end of the stage coupler. Place a spacing ring on each end as shown and wipe off excess glue. Be sure that slots are in line with each other. Set this and the engine holder assembly aside to dry completely.



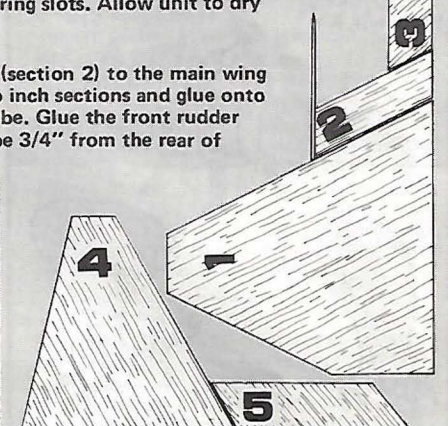
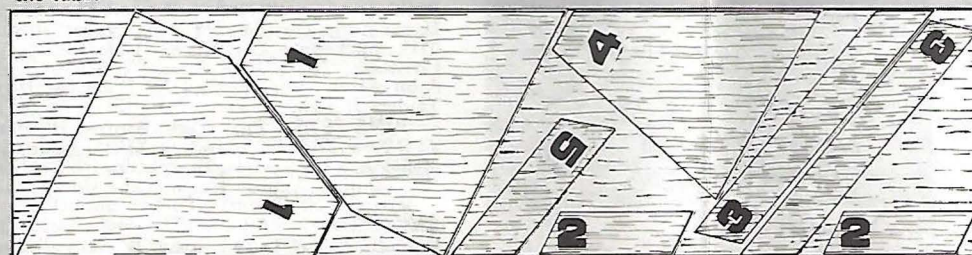
Cut out the body tube marking guide. Wrap it around the rear of the body tube and mark the tube at each arrow point. Remove the guide and draw a straight line the entire length of the tube connecting each matching front and rear mark.



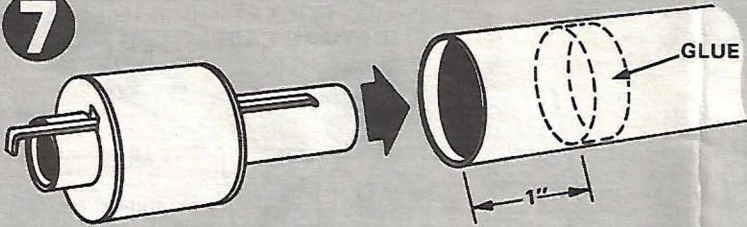
Mark the engine holder tube 1/4" from the end (end opposite engine block) as shown. Slide the engine holder assembly into the adapter assembly so the spacing ring with the larger 1/8" X 3/32" slot is on the 1/4" mark. Apply a fillet of glue around each ring-body tube joint, being careful not to get glue in the spacing ring slots. Allow unit to dry completely.



Using the fin patterns, trace and cut out fins from BFS-40L as shown. Glue the antenna mount (section 2) to the main wing (section 1) and the front wing (section 3) to the antenna mount as shown. Cut each toothpick into two inch sections and glue onto section 2 as shown. Glue wing assemblies onto appropriate lines on body tube 1/4" from rear of the tube. Glue the front rudder (section 5) to the main rudder (section 4). Glue the rudder assembly onto appropriate line on body tube 3/4" from the rear of the tube.

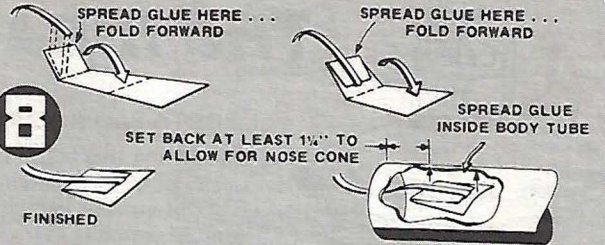


7



Spread a layer of glue 1" inside one end of the BT-55 body tube. Slide the engine mount assembly into the body tube until the end of the engine tube is flush with the BT-55. Do not pause during this operation or the glue may stick with the mount in the wrong place.

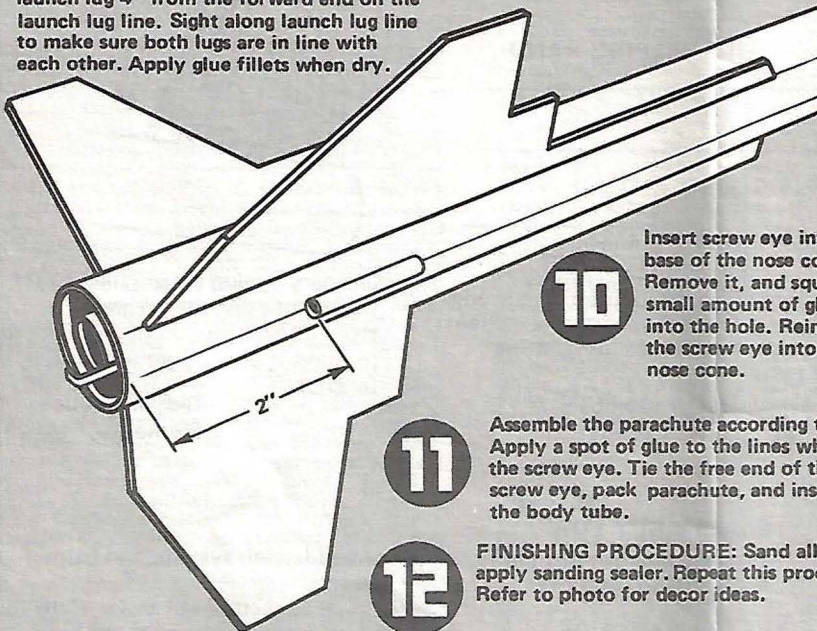
8



Cut out shock cord mount and trace onto post card type paper. Assemble as shown. When gluing mount into body tube, press it down until glue sets.

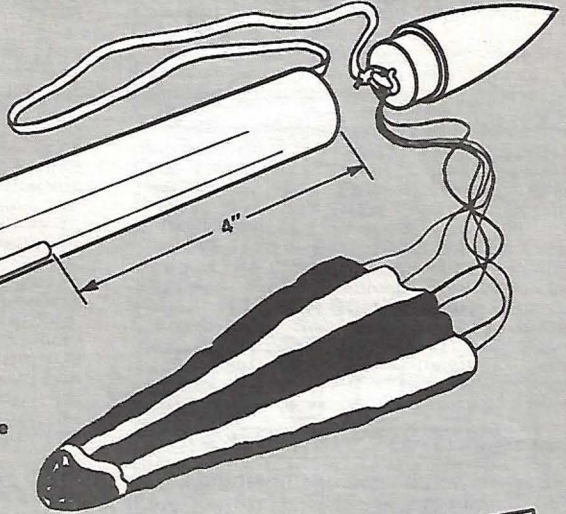
9

Glue one launch lug (LL-2A) 2" from the rear of tube and one launch lug 4" from the forward end on the launch lug line. Sight along launch lug line to make sure both lugs are in line with each other. Apply glue fillets when dry.



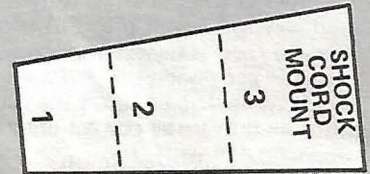
10

Insert screw eye into the base of the nose cone. Remove it, and squirt a small amount of glue into the hole. Reinsert the screw eye into the nose cone.



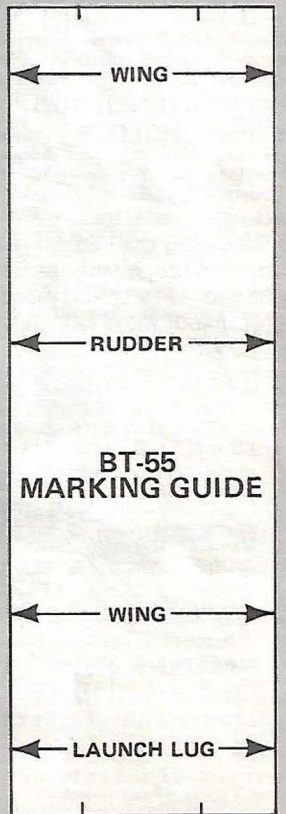
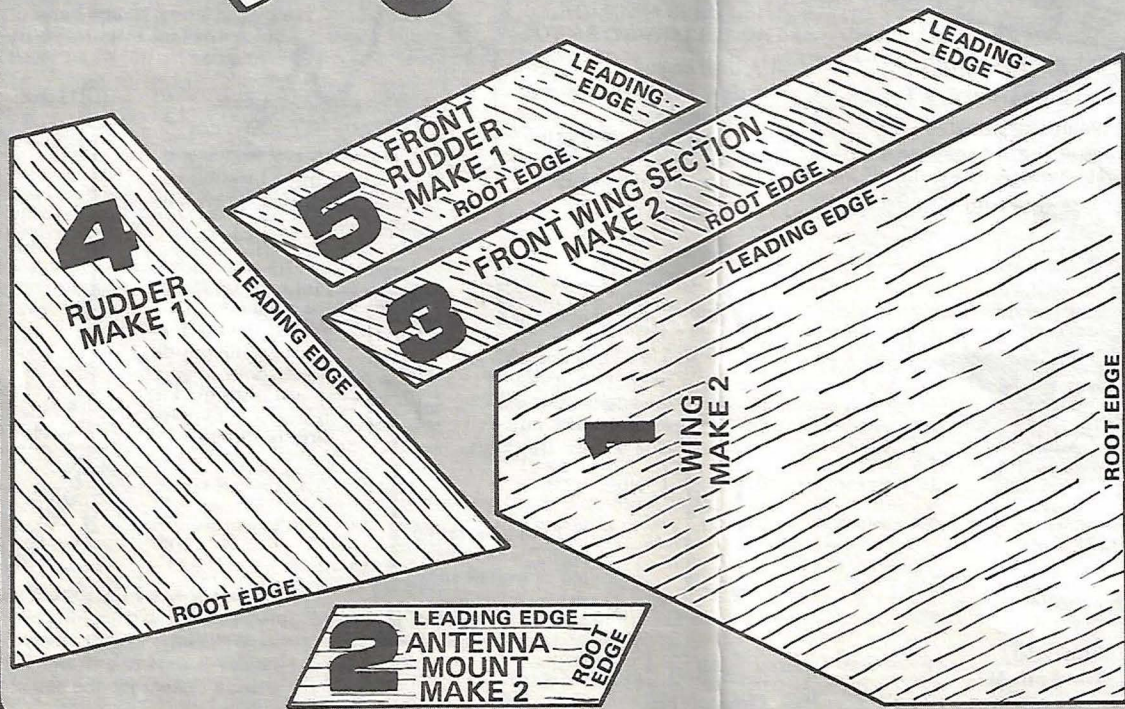
11

Assemble the parachute according to its instructions. Apply a spot of glue to the lines where they loop around the screw eye. Tie the free end of the shock cord to the screw eye, pack parachute, and insert the nose cone into the body tube.

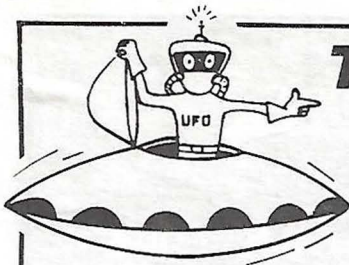


12

FINISHING PROCEDURE: Sand all balsa surfaces smooth, then apply sanding sealer. Repeat this procedure until balsa is very smooth. Refer to photo for decor ideas.

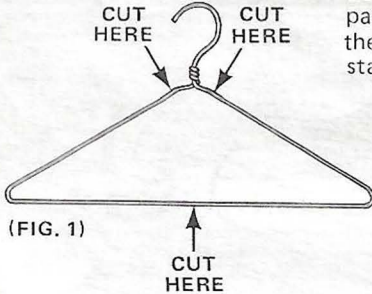


THE IDEA BOX



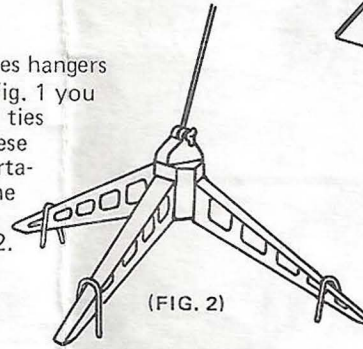
PORTA-PAD ANCHOR

By cutting two metal clothes hangers at the points indicated in Fig. 1 you will obtain four launch pad ties (one of which is extra.) These ties can be put over the Porta-pad leg and inserted into the ground for extra pad stability, as shown in Fig. 2.



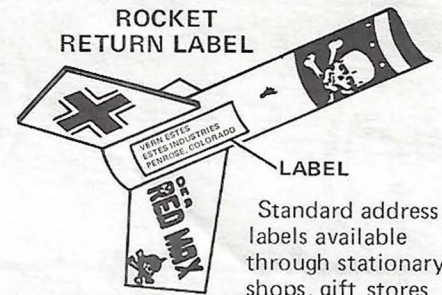
(FIG. 1)

Charles McCarver
Gadsden, AL



(FIG. 2)

ROCKET RETURN LABEL

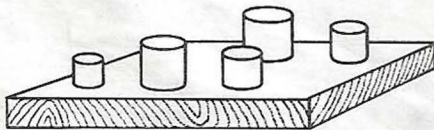


LABEL

Standard address labels available through stationary shops, gift stores, or "gift and gimmick" catalogs make great I.D. labels for the sure return of your rockets.

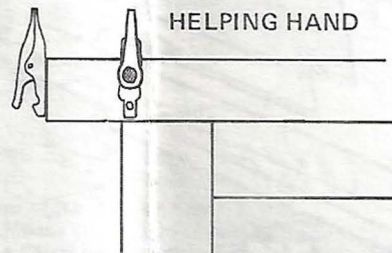
George Pasek
Calgary, Alberta, Canada

BODY TUBE HOLDER



Ever have the wind or something knock over your rocket while the fins were drying? A good way to prevent this is to take a piece of board (best if heavy wood) and glue nose blocks of each body tube size around the board. When you go to set the rocket down just slide it over the correct nose block to support it.

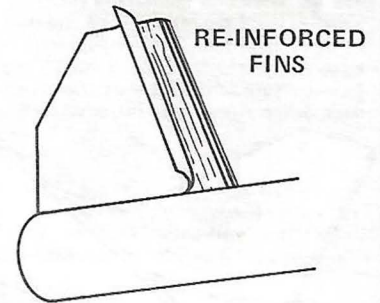
Wayne Smith
Hilliard, OH



HELPING HAND

A small micro clip mounted on the edge of your work bench makes an excellent gluing clamp or holder for painting small parts.

Gary Hedberg
Harris, MN

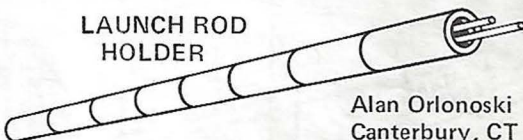


RE-INFORCED FINS

Ordinary typing paper glued to the side of fins gives them great strength and gets rid of balsa grain to make it easy to get a beautiful finish.

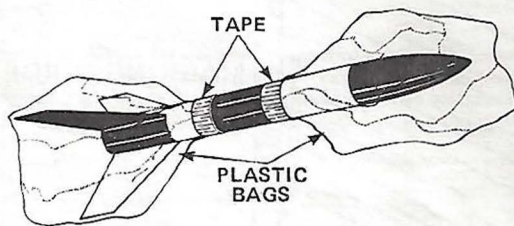
Billy McMullen
Plymouth, MA

LAUNCH ROD HOLDER



Alan Orlonoski
Canterbury, CT

Take eight used engines and clean the nozzles and burned propellant out. Then glue them together end to end. Let dry and paint. Makes a handy carrier for one or more launch rods. Use masking tape to cap the ends.



FINISHING TIP

Use the plastic bag your kit comes in to protect another part of the model when painting.

Jim Fato
Trenton, NJ

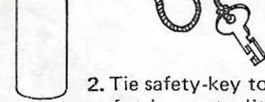
SAFETY KEY FOB

"Prevents launch rod injury, signals armed launch system, and helps avoid loss of safety key."

THE FOB IS MADE OF THE FOLLOWING PARTS:

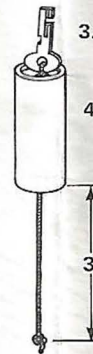
- A used engine
- Safety key from existing ignition system
- 12 inches of strong string
- White glue
- Fluorescent red or orange spray paint

1. Sand outside of engine lightly to remove lettering; scrape burned out propellant from inside of engine.



2. Tie safety-key to one end of string; put a little bit of glue on the knot to prevent unravelling.

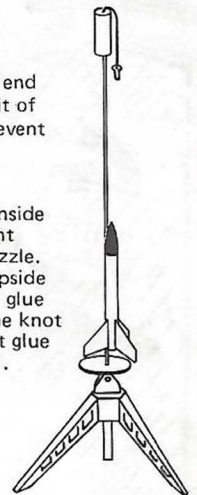
3. Thread string through nozzle, pull until key rests against engine.
4. Tie a large knot 3" from the bottom of the engine. Cut off excess string. Put glue all over this knot.



6. Paint engine casing with fluorescent red or orange spray paint. A white enamel under coat is recommended.



5. Pull knot up inside the engine tight against the nozzle. Turn engine upside down, pour in glue just until the knot is covered. Let glue dry thoroughly.



7. The safety-key FOB should be placed over the launching rod tip at all times except when the key is used to arm the ignition system for the actual launch.

Jerry and Carolyn Golda
Omaha, NE

(IDOM Winners continued from page 3)

Rodney Holmgren, Roseau, MN ("Vargon"). Ronny Hoyt, Pottsboro, TX ("Sonar III"). Steven VanderZanden, Hart, MI ("Neptune 4"). Terry Bruning, Orem, UT ("Enforcer-Intersteller Police Cruiser"). George McKinney, Orlando, FL ("Octo Bird"). Mark Joplin, Elma, WA ("Starbanner"). Scott Pemberton, Cumberland, RI ("Mini Brute Scorpion"). Kerry Crouse, Littlestown, PA. Dave Cronk, Clinton, IA ("Chuter II"). Science Club of Westbrook School, Valdosta, GA ("SC-1").

JULY 1974 - First Place: Mike Conrad, Joplin, MO ("USS Sagittarius"). Honorable Mention: Wally Kuhn, North Syracuse, NY ("Learjet"). Glenn Knight, Baltic, CT ("Ducee Coupe 409"). Greg Anderson, Horsham, PA ("Starshine"). Jeff Koenig, Carnegie, PA ("Martinian Alien Planetary Cruiser"). John Bush, Ballwin, MO ("Star Fighter"). Gary Everett, Jackson, OH ("Nucleus"). Jeff Koenig, Carnegie, PA ("Sky Clipper"). John Schaaf, Branch, WI ("Nike Ajax"). Kenneth Olson, Santa Maria, CA ("Blue Streak"). Eric Johnson, Jackson, AL ("USS Challenger"). Bill Clark, North Canton, OH ("SS Dud"). Darrel Kronemann, Fergus Falls, MN ("Arcturus II"). Ken Houdek, Skokie, IL ("ID"). Rick Tyo, Salem, OH ("Gyrojet").

AUGUST 1974 - First Place: David Miller, Skokie, IL ("Flip Flop"). Honorable Mention: Alan Bland, West Chester, PA ("Javelin"). Don Guenther, Ballwin, MO ("Saturn IB Semi Scale"). Dennis Phillips, Saskatoon, Saskatchewan, Canada ("Scissor Wing B/G"). Steven VanderZanden, Hart, MI ("Soaring Falcon"). Mitchell Aigner, Madison, WI ("The ??? Boost Glider"). Charles Rogers, Garden Grove, CA ("Aerodart II"). David Harshman, Nashville, TN ("M.A.X."). Steve Ingalls, Columbia, MO ("Triple Trouble"). Mark Carlisle, Jacksonville, NC ("Project 7"). Bill Egr, Schuyler, NE ("Pluto's Pal"). Dave Languis, Columbus, OH. Robert Walsmith, Indianapolis, IN ("Helicopter Recovery"). William Reim, Pennel, PA ("4 Station Control Panel"). Eugene Doom, Muskegon, MI ("X-4").

SEPTEMBER 1974 - First Place: Brad Vatsaas, Minneapolis, MN ("Silhouette"). Honorable Mention: Renato Sejas, Miami, FL ("Arrow Rocket"). Michael Steveson, Westminster, CO ("Astron Grasshopper"). Mark Kemp, Henderson, NV ("Double Barrel"). Chris Agee, Rantoul, KS ("Silver Scout"). Dan Lubbers, Zealand, MI ("Black Bat"). Charles Canniff Jr., Mattaposett, MA ("Egg Lifter"). Steve Takechi, Sacramento, CA ("Mini 3"). Steve Myers, Raytown, MO ("PTF - Passengers Touring Flight"). Mark Waters, Breesport, NY ("Arcturus III"). Mike Thompson, Great Falls, MT ("Phobos"). Craig Hilton, Los Angeles, CA ("Deep Space Probe"). Glenn Knight, Baltic, CT ("OCH 475").

OCTOBER 1974 - First Place: Buford Taylor, Xenia, OH ("Romulus"). Honorable Mention: Frank Scavo, Syracuse, NY ("Wireless Electronic Launcher"). Earl Sanford, Corning, NY ("Pluto Two"). John Schowengerdt, Wilmington, DE ("Super Sonic Cycle"). Ed Wahl, Oxford, IA ("Vela"). Philip Dandrematteo, Niagra Falls, NY ("Conquestor"). Philip Graves, Charlottesville, VA ("Mini Transport"). Matthew Ferrari, San Leandro, CA ("Skylark I"). Greg Dove, Lithonia, GA ("Sky Chief"). Mark Fresemak, Alamo, CA ("E214 Valkerie"). Bill Groff, Iberia, MO ("The Esquire").

NOVEMBER 1974 - First Place: Dennis Ballash, Mayfield Village, OH ("Helio-Roc"). Honorable Mention: William Henry, Lucerne Valley, CA ("Matador SX 15"). Steven Dong, Alameda, CA ("Saturn V Sky Lab Launch Vehicle Conversion"). John Linck, Ravenna, MI, Jeff Buecker, Santa Barbara, CA ("Spider"). Chris McCormack, Napa, CA ("Galaxy Seven"). Victor Ross, Aliquippa, PA. Mike Glass, Oklahoma City, OK ("N.E.V. - Nasa Exploration Vehicle"). Peter Vella, South San Francisco, CA ("Stingray"). Tom David, Franklin, PA ("Merlin"). Walter Page, De Soto, MO ("Probe 3"). Tom Hrusceky, Binghamton, NY ("X-2"). Rick Steed, Granger, UT ("Nike Hercules"). James Kopa, Scotia, NY ("Gamma X"). Eric Unruh, Newton, KS ("Powl Ball"). John Ruck, Elgin, IL ("Sorden"). Eddie Rich, Shirley, NY ("Lil Mike I").

DECEMBER 1974 - First Place: Steve Okum, Killaloe, Ontario, Canada ("Pisces"). Honorable Mention: Tim Bartlett, Tokyo, Japan ("Persuader"). Dennis Miller, Millersburg, IN ("Bumblebee"). Buford Taylor, Xenia, OH ("Argus I"). Hank Ipema, Palos Heights, IL ("Perigee I"). Matt Zamorski, Linden, NJ ("Blazer"). Terry Glenn Renfrow, Hartford, KY ("Transtar 1000"). Jeff France, De Soto, TX ("Hebbanlode I"). Mike Hellmund, Apo New York, NY ("Cirrus Hi"). Vincent Egarian, Yonkers, NY ("The Coke-Bird"). Anthony Williams, Jasper, AL ("NARC"). Mitchell Morgan, Exton, PA ("Satellite XL 70"). Todd Carpenter, Farmington, MI ("Zodiac"). Bret Simpkins, Albuquerque, NM ("Hatchback"). John Cipriano, Malibu, CA ("Defiance"). David Bouchonnet, Santee, CA ("Freedom Fighter").

JANUARY 1975 - First Place Tie: Mark Reaney, Monticello, MN ("Observer II"). Richard Pomeroy, Kalamazoo, MI ("Twin Lifter"). Honorable Mention: Ray Beerman, Montgomery, AL ("Phenomenon"). Craig Miller, Henderson, NV ("The Who"). John Brewer, St. Louis, MO ("USS Orion"). John Tkacs, North Braddock, PA ("Starship Olympia"). Michael Whitney, Lansing, MI ("Earth Scanner - I"). Randall M. Victory II, Garland, TX ("Phobos"). Brad Larsen, St. Germain, WI ("Shark"). David Crouse, Seneca, IL ("Payplugger"). David Joe File, Beloit, KS ("The Original"). Douglas Mayne, American Fork, UT ("Polaris"). Jackie France, De Soto, TX ("Little Boy Blue"). Rick Suorsa, Slippery Rock, PA ("Arrow"). Gregg Handova, 29 Palms, CA. Chris Owen, DeKalb, IL ("Flyin Dagger"). Edwin Riggsbee, Oak Ridge, TN ("The Rip"). Thomas Lebrky, Newark, NJ ("Thunderbird II"). Michael Buonpane, Brooklyn, NY ("Researcher-2").

FEBRUARY 1975 - First Place Tie: Doug Pollack, Denver, CO ("Ionaut I"). Tiffin Miller, Riviera, AZ ("Radiant"). Honorable Mention: James Ely, Kenyon, RI ("America II"). Gary Boast, Portage, PA ("Hydra II"). Patrick Dixon, Irving, TX ("PeeWee D"). Mark Teeple, Jonesboro, TN. Robby Clause, Grand Junction, IA ("X-The Unknown"). Lewis M. Jackson, Madison Heights, VA ("Aurora"). Mike Hough, Harrodsburg, KY ("Nike-Ajax"). Patrick Lourigan, Chester, SC ("Tear Drop"). Tom Prager, Bay City, MI ("Via. Satellite"). Steven Hayes, Lancaster, OH ("Montgolfier Balloon"). Stan Finch, Austin, TX ("Stratos II"). Dave Jaeger, Boulder, CO. Rich Meredith, APO San Francisco, CA ("Weightlifter"). James E. Brown, Mary Esther, FL ("Mousetronaut II"). F. J. Spirek, St. Petersburg, FL ("T-Bird"). Randy Struzik, Orland Park, IL ("Star Finder"). John Schuetz, Allentown, PA ("Lunar Probe"). Buford Taylor, Xenia, OH ("Vixen").

MARCH 1975 - First Place: Greg K. Schaefer, Columbiaville, MI ("Comanche III"). Honorable Mention: Bob Sealy, Cookeville, TN ("Quickie"). Joe Brancato, Rome, NY ("The Blue Devil"). Rodney Mark Kramer, Rockford, IL ("Underground Launch Pad"). Lee Dziuk, Shafer, MN ("Minutemen"). Clancy Carroll, Milwaukee, WI ("Evel Knievel Sky-Cycle X-2"). Jon Fuenning, Lincoln, NE. Tony Malbour, Hart, MI ("Cloud Buster II"). Brian Engel, Rome, NY ("Starloader"). Ricky Stanton, Baton Rouge, LA ("Voyager I"). David Lux, Spring Valley, CA ("Mini Omega"). John Johnson, Tahlequah, OK ("Centurian"). Randy Jirak, Marion, KS ("Thunderlight Starship"). Darren Jones, Petaluma, CA ("Dual SST Space Shuttle"). Larry Larkins, Hotchkiss, CO ("Saber"). Tom Arielly, Neversink, NY ("Tyrant III"). Jim Ewins, Springfield, VA ("Titan 3-E"). Ryan Moore, Cane Hill, AR ("Space Needle"). Bill Tatter, Homewood, IL ("U.S. Poseidon"). Jim Renne, Atherton, CA ("Antares"). Cary Utterberg, Buffalo, MN ("Vulcan"). Mark Joplin, Elma, WA ("Centaurian"). Andy Foremiak, Tonawanda, NY ("The Nose"). K. Scott Kent, Bogart, GA ("Meander"). Bill Esunis, Bartlett, IL ("Starship Nebula"). James W. Jones, Novato, CA ("Nike-Hercules").

APRIL 1975 - First Place Tie: Dave Klein, Windsor Ontario, Canada ("Chaparral"). Buford Taylor, Xenia, OH ("Selene"). Honorable Mentions: Richard Bruckner, Schuyler,

NE ("Warrior"). Allen Hwang, Jacksonville, FL ("Firebird"). Joseph Koch, Coplay, PA ("Odyssey"). Grady Sharpe, Rocky Mount, NC ("Evel Knievel Skycycle"). Mark Cochran, Normal, IL ("USS Odyssey 8027"). Jon Steward, Oregon, OH ("Vesta 4"). Kevin Cline, Lewistown, PA ("Gargoye II"). Thomas Dembowski, Portland, CT ("Fireball XL-5"). Rick Boyette, St. Petersburg, FL ("Tupolev"). Edwin Riggsbee, Oak Ridge, TN ("TRI-X-D"). Paul Proto, E. Haven, CT ("Burst Glider"). Bill Esunis, Bartlett, IL ("USS Destination"). John Van Gelderen, Darien, IL. Timothy Ray Lewis, Hopkins, MN ("Cosmic - Ray"). Robert Lewis Koger, APO San Francisco, CA ("Spitfire"). Joseph A. Boylan, Washington, OH ("Journeyman"). Bruce Mac Lead, South Portland, ME ("Skyscraper"). Joe Gasbarro, Red Creek, NY ("Javelin"). Randal Kerr, Richford, NY ("Arrow-1").

MAY 1975 - First Place: Tom Steinhoff, Upper Saddle River, NJ ("Wolverine 11"). Honorable Mention: Bill Engar, Salt Lake, UT ("The Exeter"). David Leininger II, Randolph AFB, TX ("All-American Flyer"). Dale Lutes, Monessen, PA ("The Galaxy"). Richard Rosko, Coal Valley, IL ("Tristor"). Bob Kupetsky, Deer Park, NY ("Delta Monarch"). Brian Cieslak, Milwaukee, WI ("Pegasus"). Norman Kolb, Benson, IL ("Crescent").

JUNE 1975 - First Place: Richard Carns, Newport, PA ("Space Station II"). Honorable Mention: Mark Sandberg, Pipestone, MN ("Spirit of '76"). Brian Tonks, Victor, ID ("Kyro Kite Recovery System"). Ronny Hoyt, Pottsboro, TX ("Javelin II"). Jay Moles, Hagerstown, IN ("The Phoenix"). Bruce Harmon, Berwyn, PA ("Hypersonic Transporter"). Nicholas Acker, Paramus, NJ ("Star-shooter").

JULY 1975 - First Place: Steve Gardner, Joplin, MO ("Outer Limits Observatory"). Honorable Mention: Joel Enders, Columbia, PA ("Starfire"). Tony Moreno, Denver, CO ("Arco VI"). Ronny Hoyt, Pottsboro, TX. Stephen McGaw, Hanover, NH ("Mini Max"). Richard Koen, Pueblo, CO ("Venus Explorer"). Mark Moore, Pine Bluff, AR ("Astroplane"). Charles Gallemmo, Mooers, NY ("Mirage"). Ken Carraway, Bassfield, MS. Scott Mueller, San Pablo, CA ("X-3"). Steve Takechi, Sacramento, CA ("Mini 3"). Alan Eaton, Dumas, MS ("Peacekeeper"). Joe Hansel, Frostproof, FL ("Siamese Twins"). Mike Markowski, Palm Coast, FL ("Hunter"). Scott Lacey, Delton, FL ("Sorro"). Jeffrey Kozak, Roslyn, NY ("Tri-Podx"). Michael Butler, Newport News, VA ("Fire-Fly"). Bruce Harmon, Berwyn, PA ("Spider"). Jim Nicholson, Columbus, OH ("The Evil Eye"). Matthew Ferrari, San Leandro, CA ("Stargazer"). Bill Tatter, Homewood, IL ("Toy Cannon"). Steven Bronzo, Morristown, NJ ("Nova"). Brian Phillips, Nova, OH ("White Lightning").

AUGUST 1975 - First Place Three-Way Tie: John Aragon, Kaneohe, HI ("Astron SST"). Jon Mooney, Georgetown, OH ("S.H.A.R.C. Shuttle Launcher"). Kent Joosten, Pella, IA ("Soyuz"). Honorable Mention: Joseph Laskowski, Beacon Falls, CT ("Viking"). Chris Miller, Mobile, AL ("Mister Black Jack"). Tommy Mills, Jackson, MS ("Tau Cygni IV"). Roger Gilbert, Long Beach, NY ("Two Stage Rocket"). Dennis O'Meara, Andover, MA ("Project - Titan"). Yuji Matsuyama, Tuckahoe, NY ("USSR T-2"). Hank Pernicka, Glen Ellyn, IL ("The Big and Little"). Chuck Williams, Richardson, TX ("Falcon"). B. Costello, Middletown, NJ ("Dart"). Fred Hickman, Orlando, FL ("Black Widow"). Peter Kreuthmeier, Murrysville, PA ("Corvus LL"). Mark Moore, Pine Bluff, AR ("Tomcat"). Wayne Sommars, Godfrey, IL ("Eggbeater"). Mike Hardy, Victoria, TX ("Jaws"). Kermit Little, Birmingham, AL ("Vertex"). Jim Reynolds, Gadsden, AL ("Vista"). John Latzanze, Swedeland, PA ("Bicen I"). Tom Davidson, Winter Haven, FL. David Chew, Richmond, CA ("Mini Eagle"). Greg Davis, Des Moines, IA ("Whatzamacallit"). David Evens, Tustin, CA. Michael Gray, APO New York, NY ("Vampire"). Charles Zallow, Warren, OH ("Comet"). Jim Salmon Ann Arbor, MI ("Tomahawk"). Timothy Stone, Long Beach, CA ("Commander"). Greg Gardia, Whittier, CA ("Lunar Patrol SL 4"). Duncan Weber, State College, PA.

Technical Note TN-1

MODEL ROCKET ENGINES

NOTE: Although Technical Note, TN-1, "MODEL ROCKET ENGINES" was first published back in 1972, we have continued to receive many requests and questions regarding the design and performance of our engines. As many new rocketeers have joined the hobby since then, we have decided to reprint a major portion of this report in this MRN. We hope you will enjoy it.

ENGINE TYPES AND CLASSIFICATION

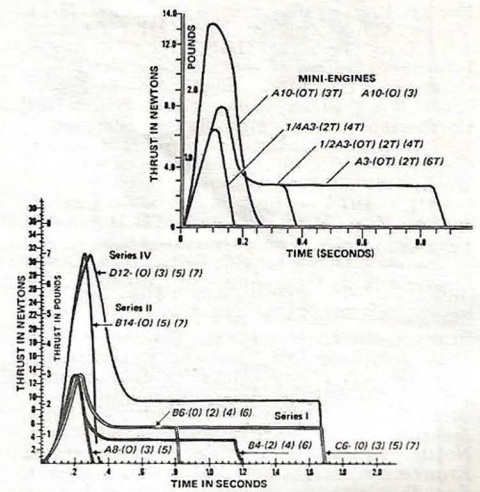
All engines sold by Estes Industries are stamped with a code designation which, when understood, will give the rocketeer important and useful data on the engine's performance capabilities. Here's how to read this coding: (refer to engine illustration).

ENGINE CODING FOR QUICK-N-EASY IDENTIFICATION

- Label color indicates recommended use of the engine.
 - GREEN Single Stage Rockets
 - PURPLE & BLUE-Top stage and multi-stage rockets
 - RED-Booster and intermediate stages of multi-stage models
- Code designation stamped on the engine gives useful and important information on its performance capabilities.
 - This portion indicates total impulse or total power produced by the engine.
 - This portion shows the engine's average thrust in newtons and helps you choose the right engine for your rocket's flight.
 - This number gives you the delay in seconds between burnout and ejection charge. Lets you choose the engine with the delay time you want for any flight.

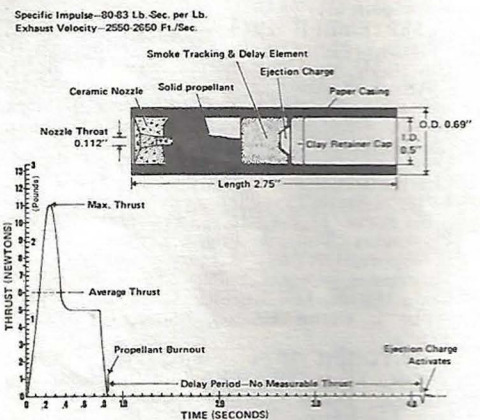
Igniters and complete instructions are included with Estes engines.

COMPARATIVE TIME/THRUST CURVES OF ALL ESTES ENGINES

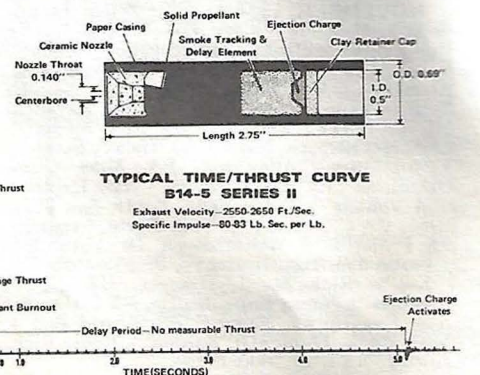


short thrust duration. The total thrust duration of a Series II engine is about 0.35 sec. This makes the thrust characteristics of the engine somewhat like a sledge hammer blow — thrust rises to about 7 pounds in a fraction of a second, then drops off again, as shown in the Series II engine performance graph. The average thrust of the Series II engine is about 3.0 pounds.

TYPICAL TIME/THRUST CURVE OF B6-4 SERIES I



The result is that the Series II engine is ideal for high acceleration studies, as a booster on heavy multi-stage rockets, and for drag racing. Delay charge and ejection charge operation are the same in all series of engines.



TOTAL IMPULSE CLASSIFICATION

Code	Pound-Seconds	Newton-Seconds
¼A	0.00-0.14	0.00-0.625
½A	0.14-0.28	0.625-1.25
A	0.28-0.56	1.25-2.50
B	0.56-1.12	2.50-5.00
C	1.12-2.24	5.00-10.00
D	2.24-5.00	10.00-20.00

HOW HIGH WILL YOUR MODEL GO? The chart below shows the approximate altitudes that can be achieved with single stage rockets.

Engine Size	Altitude Range (depending on rocket size and weight)	Approximate Altitude in a typical 1 oz. model
1/4A3-2	50' to 250'	100'
1/2A6-2	100' to 400'	190'
A8-3	200' to 650'	450'
B6-4	300' to 1000'	750'
C6-5	350' to 1500'	1000'

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

The Series I and Mini-engines (T Series) engines are 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 propellant grain which serves two purposes. First, it provides for easy ignition. Second, as you will note from thrust curves, this special design produces a high initial thrust which accelerates the rocket to a suitable flying speed quickly. This is because the slight center bore provides a relatively large burning area, resulting in faster consumption of the fuel.

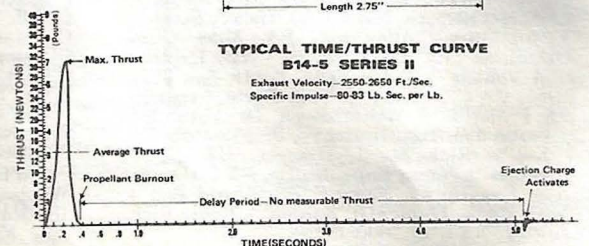
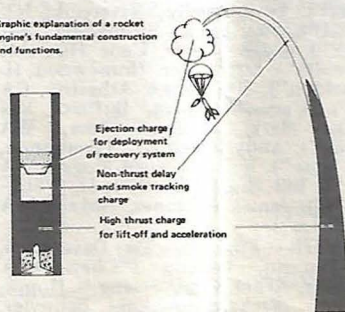
After this initial high thrust, a transition to an end burning grain is made, and the thrust drops to a sustaining level (except on low total impulse engines which burn out by this time). Data from wind tunnel tests shows that dual thrust level to be the most effective design for rocket engines which are used to propel lightweight model rockets at subsonic 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 performance graphs in your Estes Catalog and cutaway drawings in this article.

The Series II engine is a solid propellant type with a full center burning grain. This provides a greater propellant burning area, resulting in a higher thrust level than the Series I engines, but with a relatively

Graphic explanation of a rocket engine's fundamental construction and functions.

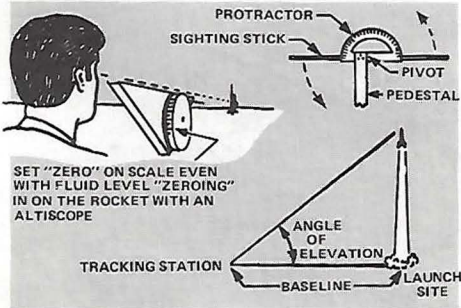


ALTITUDE TRACKING

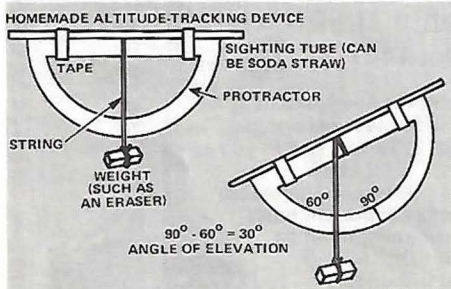
"How High Did It Fly"

Every rocketeer wants to know how high his models fly. Many methods of determining a model's peak altitude have been tried, but only one method has proven itself. This method is known as triangulation.

The simplest form of triangulation uses only one very simple tracking device. With it, the rocketeer measures the angle of elevation between the rocket on the launch pad and the line of sight to the rocket at its peak altitude (apogee). When this angle and the distance from tracker to launcher (baseline) are known, it is very easy to determine the altitude.



The Estes Altiscope (Cat. No. 1415) is one of the best all-around basic tracking devices. However, the rocketeer can also easily make his own tracker. One type of tracker can be made from an inexpensive plastic protractor, mounted securely on a post set in the ground, with a sighting stick pivoted at the "center". The tracking device must be set so that it reads 0° when aimed at the rocket on the launcher and 90° when aimed straight up. If the tracker is not "zeroed in" on the launcher, it will give incorrect information.

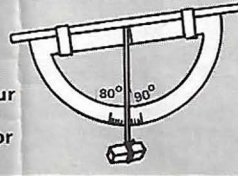


Another type of homemade tracker or "sextant" can be made from a protractor, soda straw, string, tape and eraser. When using this device the angle of elevation is found by subtracting the reading taken (angle marked) of the rocket at apogee from 90°.

An Altiscope may be easily and quickly adjusted to correct for a

difference between the elevation of the observer and the elevation of the launch pad. When using a homemade altitude-measuring device, a sighting must be made on the tip of the rocket on the launch pad and then the angular error noted (difference between the 90° or 0° mark and the angle marked by the string). This is an error for which you will have to allow when measuring the range of elevation reached on each flight.

In this example - - 90° - 86° = 4° error, therefore subtract four degrees from angular distances measured for each flight.



When the operator at the tracking station is ready, the rocket is launched. He follows the rocket with his tracker as it rises. When it reaches its peak altitude he stops or locks the tracker. The indicated angle is then read from the protractor scale.

The tangent of this angle is found by checking the tangent table.

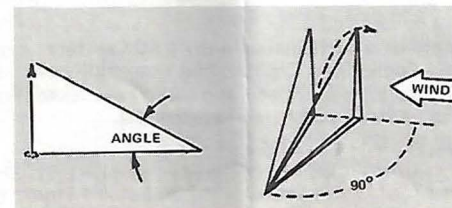
TABLE OF TANGENTS

Angle	Tan	Angle	Tan	Angle	Tan	Angle	Tan	Angle	Tan
1°	.02	17	.31	33	.65	49	1.15	65	2.14
2	.03	18	.32	34	.67	50	1.19	66	2.25
3	.05	19	.34	35	.70	51	1.23	67	2.36
4	.07	20	.36	36	.73	52	1.28	68	2.48
5	.09	21	.38	37	.75	53	1.33	69	2.61
6	.11	22	.40	38	.78	54	1.38	70	2.75
7	.12	23	.42	39	.81	55	1.43	71	2.90
8	.14	24	.45	40	.84	56	1.48	72	3.08
9	.16	25	.47	41	.87	57	1.54	73	3.27
10	.18	26	.49	42	.90	58	1.60	74	3.49
11	.19	27	.51	43	.93	59	1.66	75	3.73
12	.21	28	.53	44	.97	60	1.73	76	4.01
13	.23	29	.55	45	1.00	61	1.80	77	4.33
14	.25	30	.58	46	1.04	62	1.88	78	4.70
15	.27	31	.60	47	1.07	63	1.96	79	5.14
16	.29	32	.62	48	1.11	64	2.05	80	5.67

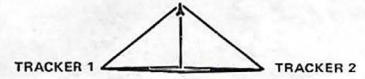
Multiply the tangent by the distance from tracker to launcher (baseline distance) to find the altitude.

For example, if the angular distance was 30° at apogee, and the baseline was 200 feet long, the rocket reached a height of 116 feet (0.58 x 200 ft.).

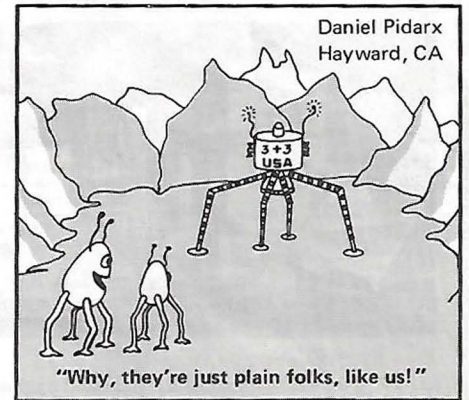
A single tracker will give best results on calm days. Wind interferes with accuracy since models tend to tilt over into the wind as they fly. The result is that the rocket will not be straight over the launch site at peak altitude, but instead will be some distance over in the direction of the wind. To keep error due to wind drift to a minimum, locate the tracker at a 90° angle to the wind direction as shown.



In determining where to locate a tracking station, estimate the altitude your model will reach. The tracking station should be approximately this distance from the launcher (usually 500 to 1,000 feet). Measure the distance from launcher to tracker carefully to insure accurate altitude calculations.



More elaborate tracking systems and more elaborate mathematics can be used to gain greater accuracy when the rocket doesn't fly straight up. However, a simple tracking system will do the job very well when good models are flown on calm days. When in doubt about how high a model will go, checking tables of predicted performance (TR-10), guessing from past experience, or using the Estes Predicted Altitude Computer, (shown above) (Cat. No. 9015) are the best methods of predicting the height your rocket will reach. More complete information on basic altitude tracking and tracking systems is contained in Estes Industries Technical Report TR-3, "Altitude Tracking" (Cat. No. 84723).



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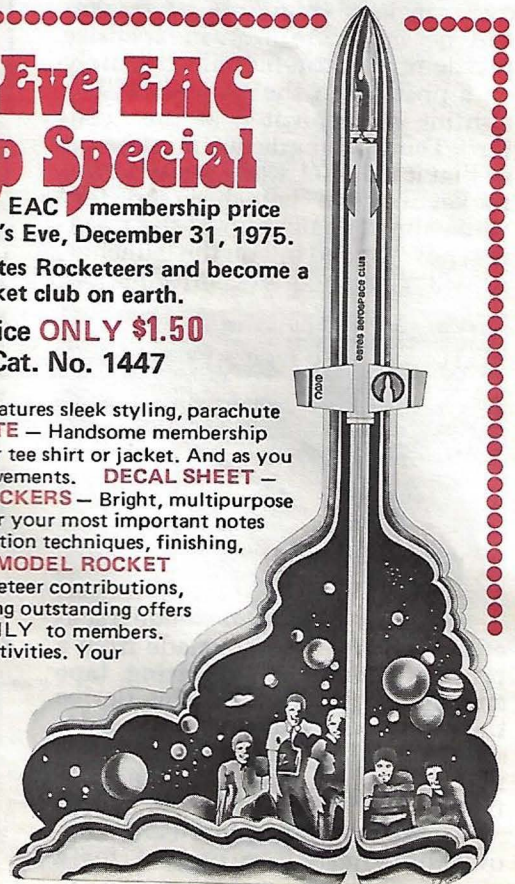
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Had you been a member since last January you could have participated in the EAC Creature Contest, Alien Spaceship Contest and Outa-This-World Comic Strip Contest. Plus you could have purchased the exciting EAC Fire-Cat Kit available only to EAC rocketeers and could have taken advantage of dozen's of special offers like free engines with the purchase of special kits.

DON'T MISS OUT ANY LONGER!
JOIN TODAY AT OUR SPECIAL NEW YEAR'S EVE PRICE



Dear Estes Rocketeer:

Due to the increasing costs of our materials, especially balsa and paper products, plus rising transportation and labor charges, we regretfully announce that the new retail prices listed in this MRN are effective for all orders received after September 1, 1975.

Your understanding and support will be greatly appreciated as we look forward to serving you in the future.

Thank you,
ESTES INDUSTRIES

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- Colorful mission decor with big, highly detailed three-color decals
- Die-cut parts with quick-release engine mount

Regular \$5.95

Orbital Transport

Skill Level 4

- Space Shuttle Concept
- Transport Ship plus gliding re-entry vehicle
- Futuristic three-color decals
- Exceptionally spectacular flights

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Be sure to list both kits of your choice on Order Form.

INTERCEPTOR

Skill Level 3

- Exotic deep space design
- Impressive 18" parachute recovery
- Two big four-color decal sheets
- Detailed plastic canopy/nose cone plus realistic wing pods and tail cone
- All die-cut balsa parts and quick-release engine mount
- Excellent performance for sensational flights

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Save as much as \$4.95 on this TERRIFIC CHRISTMAS OFFER!
Any two for ONLY \$8.95 Cat. No. 1463

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NOW while supplies last

The Astron Falcon or
Mini-Brute Aero-Hi

ONLY \$1.00 EACH

Aero-Hi

Skill Level 1

- Scale like sounding rocket vehicle
 - Realistic decor
 - High performance design
 - Fin strap-on and payload coupler decals
- Regular \$1.75 Cat. No. 0817
Now only \$1.00

FALCON

Skill Level 3

- Great performing Boost Glider
- Glide times up to 1-1/2 minutes and longer
- All balsa wing and pylon construction

Regular \$1.75

Now only \$1.00 Cat. No. 1213

HURRY! Offer expires when supplies are exhausted!! Less than 2,000 kits of each left!!!

BONUS KIT OFFERS

(Limit one kit per order.
Offer expires Feb. 1, 1976.)

Your choice only 50¢
with \$6.00 order.

Mark II

Skill Level 1

- Ideal sport model
- Midbody ejection/separation system
- Great performance
- Streamer recovery

Regular \$1.75

Sky Hook

Skill Level 1

- Easy-to-assemble
- 12" parachute
- Terrific performance
- Sleek design

Regular \$1.95

My order is over \$6.00.
I have enclosed an additional 50¢.

Please send me: (Check one)
 Mark II (#1202)
or
 Sky Hook (#1208)

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with \$9.00 order.

SAROS

Skill Level 2

- Scale-like sounding rocket vehicle
- Payload carrier
- Three-color decals and metallic press-on
- Plastic nose cone, adapter section, and fin unit
- 12" parachute recovery

Regular \$4.95

AEROBEE 300

Skill Level 3

- 1/15th scale sounding rocket
- Authentic decals
- Terrific performance
- Balsa detailing
- 12" parachute recovery

Regular \$2.95

My order is over \$9.00.
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Please send me: (Check one)
 Saros (#1254)
or
 Aerobee 300 (#1217)

Your choice only \$1.00
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SHRIKE

Skill Level 3

- Two-stage payload vehicle
- See-through cargo section
- Pop-and-go staging
- Excellent performance
- Super four-color decals

Regular \$6.95

SANDHAWK

Skill Level 2

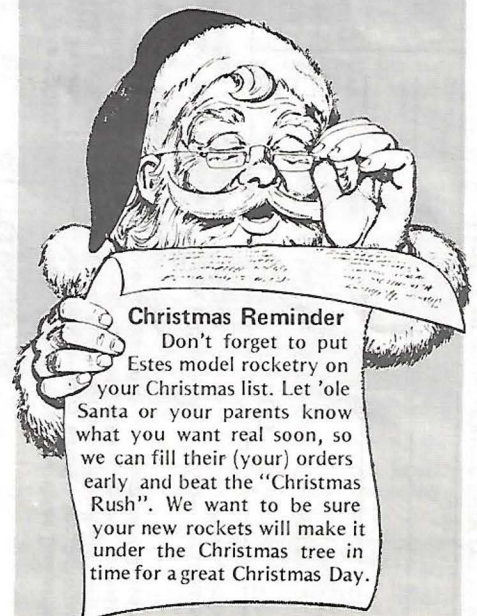
- "D" engine powered
- Scale sounding rocket vehicle
- Highly detailed plastic payload and fins
- Quick-release engine mount

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 Shrike (#1246)
or
 Sandhawk (#1251)

ATTENTION:
ALL SPECIAL OFFERS expire Feb. 1, 1976 unless otherwise indicated or when supplies are exhausted. Offers good only with MRN Order Form, Page 12. Substitutions will be made when necessary. Engines, launch system, and glue are not included with any kit. Expiration dates refer to order post mark.



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Don't forget to put Estes model rocketry on your Christmas list. Let 'ole Santa and your parents know what you want real soon, so we can fill their (your) orders early and beat the "Christmas Rush". We want to be sure your new rockets will make it under the Christmas tree in time for a great Christmas Day.

Note: Bonus kit offers good only with MRN order form. Limit one "kit" per order. Substitutions will be made when necessary. Offers Expire 2-1-76.

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PENROSE, COLO. 81240

UPS is available in my area.

DATE: _____

Age _____

I purchase most of my model rocketry supplies
 direct from Estes at a local retail store both.

Is this your first order? Yes No I am an EAC member.
Was you last order more than one year ago? Yes No

For Office Use Only

Quan.	Cat. No.	Product Description	Unit Price	Total
1	<input type="checkbox"/> #1447	EAC Membership Kit \$2.50		
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3				
4				
5				
6				
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