

SEA DART

FLYING MODEL ROCKET

SKILL LEVEL 2

1-Beginner 2-Intermediate 3-Craftsman
4-Advanced 5-Expert

- British Surface-To-Air Missile
- Parachute Recovery
- Molded Plastic Parts
- Die-Cut Balsa Fins
- Quick Release Engine Mount

Flights
Over
800
Feet!

JL
5

Length: 16.5 in. (42 cm)

Dia.: 1.325 in. (33.6 mm)

Weight: 1.7 oz. (48.6 g)

Engine Types: A8-3 (First Flight),
B4-4, B6-4, B8-5, C6-5

This is a hobby kit requiring assembly.
Recommended for ages 10 to adult.
Engines, launch system, glue and finishing
supplies are not included. Adult supervision
is suggested for those under 12 years of age
when flying model rockets.



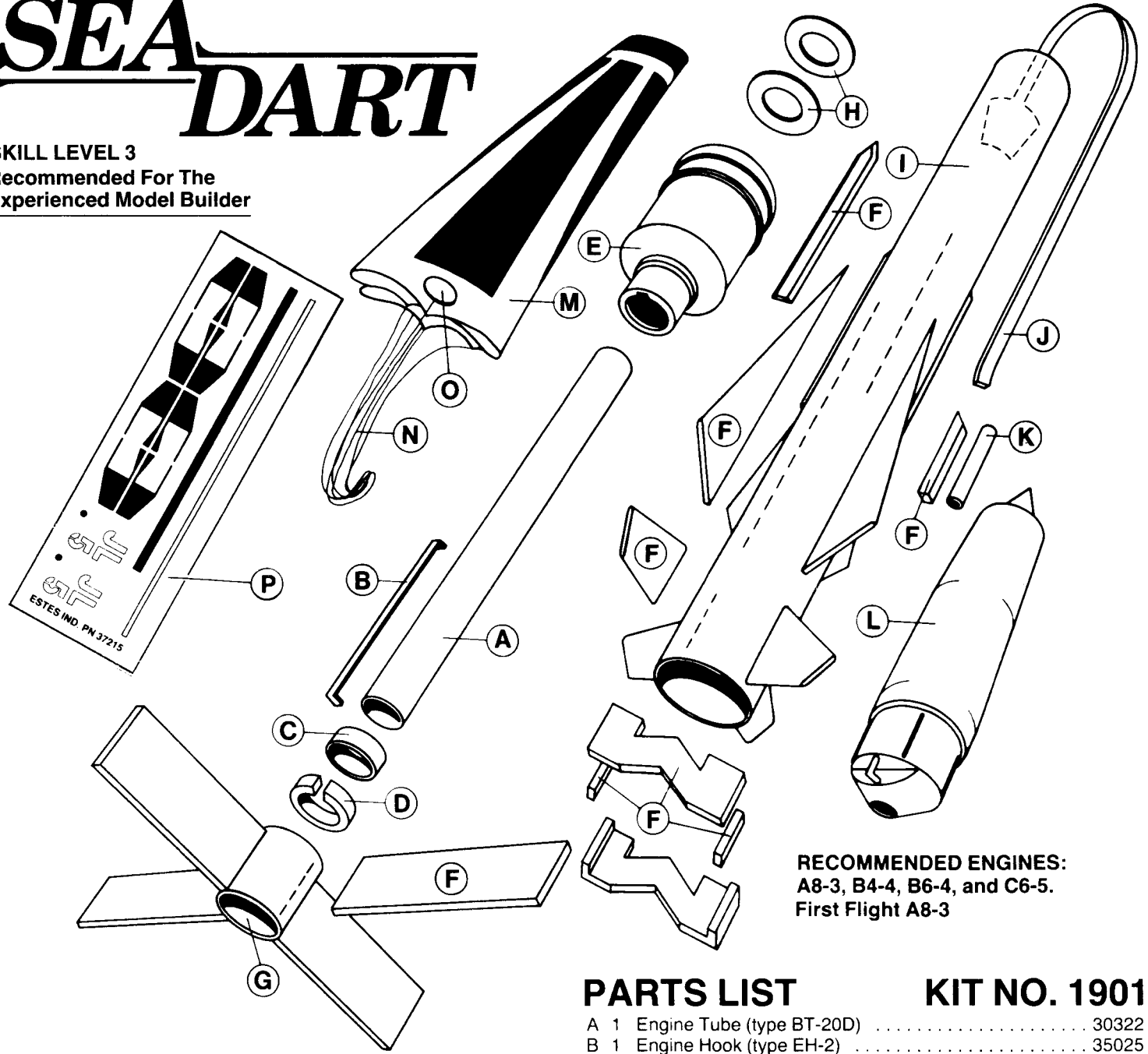
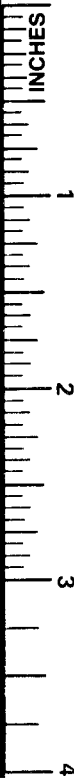
A DAMON COMPANY

ESTES INDUSTRIES
PENROSE, CO 81240 USA

#1901

SEA DART

SKILL LEVEL 3
Recommended For The
Experienced Model Builder



RECOMMENDED ENGINES:
A8-3, B4-4, B6-4, and C6-5.
First Flight A8-3

BEFORE YOU START

Read each step and study the accompanying drawings before doing any of the work called for in that step. Make sure you have all parts and materials. Check off each step as you complete it. Always test-fit parts together before applying glue. It will sometimes be necessary to sand edges of rings, tubes, etc. to obtain proper fit. If you are in doubt about the relative size or location of some parts, refer back to this exploded view drawing for clarification. Adequate glue joints are very important for a flying model rocket. Follow the instructions carefully in this regard.

TOOLS AND MATERIALS

In addition to the parts included in this kit you will need: Scissors, pencil, ruler, fine or extra-fine grit sandpaper, sanding sealer, a medium-size modeling paint brush, modeling knife with sharp blade, razor saw, masking tape, gloss white, gloss black and gloss red enamel spray paint, and household white glue or resin glue (Elmer's, Titebond, or similar) and tube type plastic cement. Other types of glue are not recommended.

For easy and positive alignment of the fins on your model, we recommend the use of Estes' Fin Alignment Guide, Part No. 2231.

PARTS LIST

KIT NO. 1901

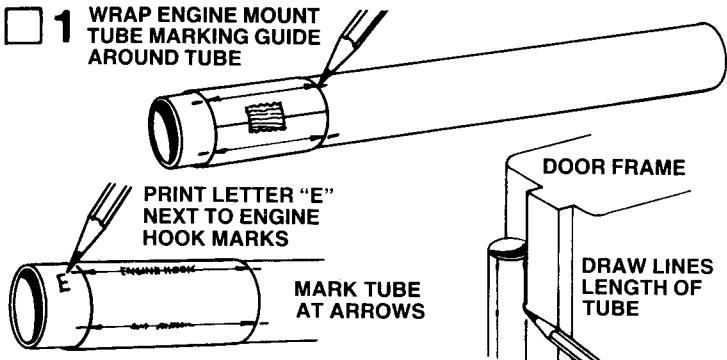
A	1	Engine Tube (type BT-20D)	30322
B	1	Engine Hook (type EH-2)	35025
C	1	Retaining Ring (type HR-20)	30168
D	1	Split Adapter Ring (type AR-2050S)	80425
E	1	Molded Booster Body (type 1901)	71039
F	1	Balsa Die-Cut Sheet (type BF-1901)	32601
G	1	Booster Body Tube (type BT-50AE)	30354
H	1	Centering Ring Set (type RA-2055)	30126
I	1	Upper Stage Body Tube (type BT-55IJ)	30384
J	1	Shock Cord (type SC-1)	85730
K	1	Launch Lug (type LL-2A)	38175
L	1	Nose Cone (type PNC-55D)	71038
M	1	Parachute (type PK-12A)	85564
N	1	Shroud Line (type SLT-72)	38237
O	1	Tape Discs (type TD-3F)	38406
P	1	Decal (type KD-1901)	37215



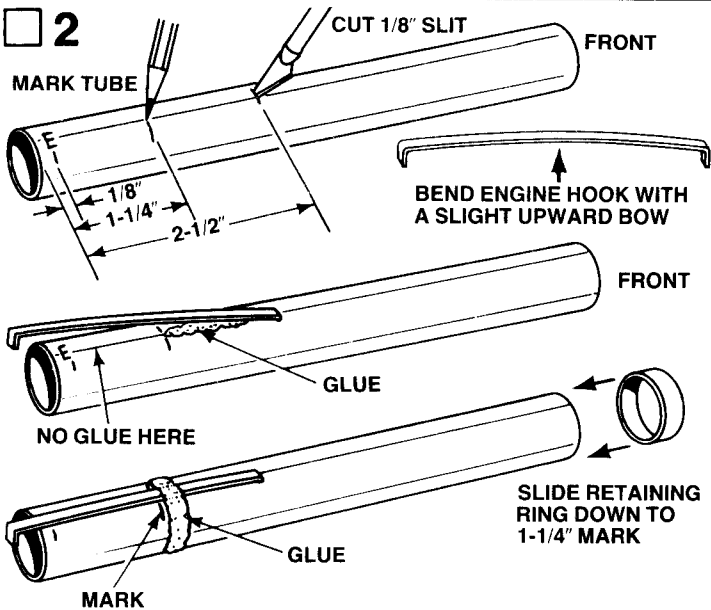
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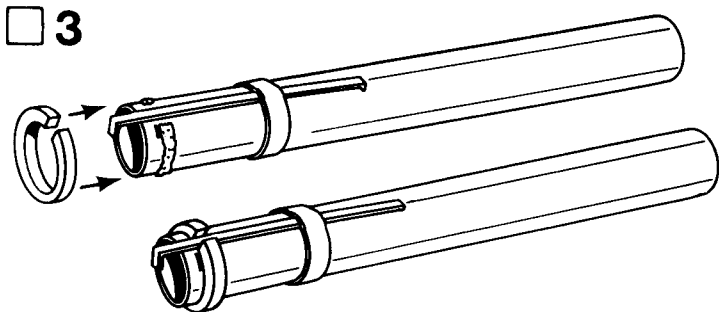
ASSEMBLY OF BOOSTER SECTION



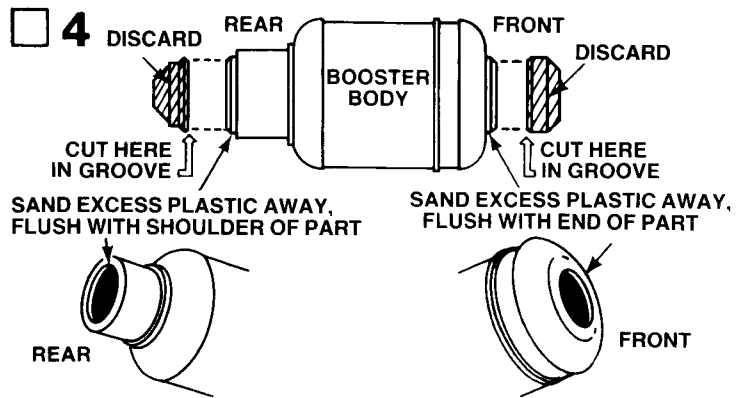
Cut out engine tube marking guide from the pattern sheet on separate instruction sheet and wrap it around the engine tube (part A) and secure it with masking tape. Mark the engine tube at each of the arrow points. Print the letter "E" next to the engine hook marks to identify engine hook location. Remove the marking guide and draw straight lines connecting each pair of marks. A door frame inside edge can be used as a guide as shown. Extend the lines the length of the tube.



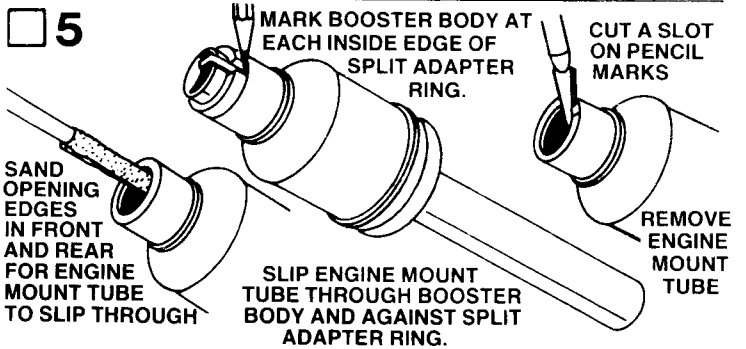
Mark the engine tube at 1/8", 1-1/4", and 2-1/2" from the end of the tube with the letter "E" as shown: Cut a 1/8" long slit at the 2-1/2" mark. Gently bend the engine hook (part B) so that it bows upward very slightly in the middle. (Study the drawing:—Don't bend the wrong way.) Apply a bead of glue between the slit and the 1-1/4" mark. Insert one end of the engine hook into the slit and press the hook into the glue. Align the hook so it runs straight along the tube. Apply a bead of glue around the tube just forward of the 1-1/4" mark. Slip the retaining ring (part C) onto the front of the tube and slide it down to the 1-1/4" mark. Wipe away excess glue.



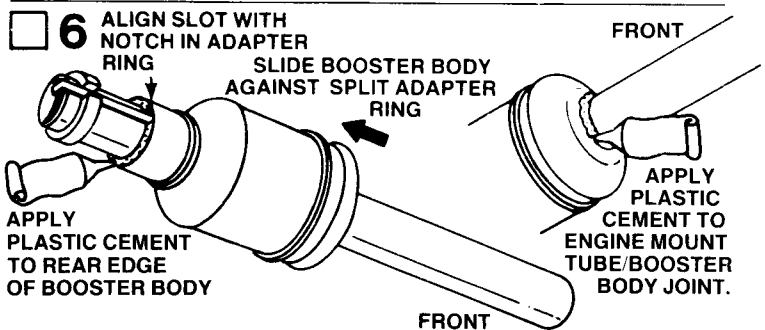
Apply a bead of glue around the rear of the tube just forward of the 1/8" mark. Do not get glue on the engine hook. Slide the split adapter ring (part D) over the rear of the tube and push forward until the rear of the ring is even with the mark. Make sure the engine hook is centered in the split portion of the ring. Hold the ring in place until the glue sets.



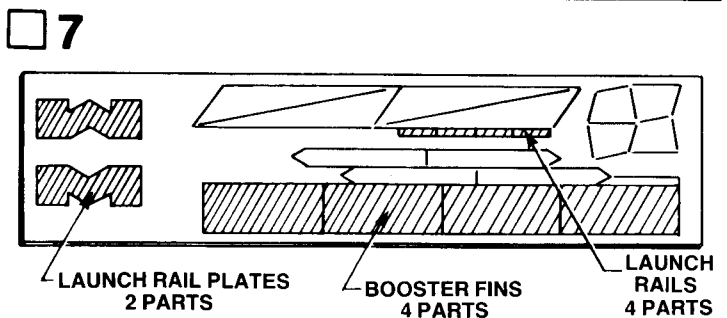
Cut the ends from the molded booster body (part E) as shown and discard. Use a modeling razor saw, or a fine woods coping saw to cut through the separation grooves as shown. Make repeated light cuts around the groove work slowly to avoid tearing or marring the plastic part. Using an emery board or sanding block, sand excess plastic lip away at the front and rear of the part.

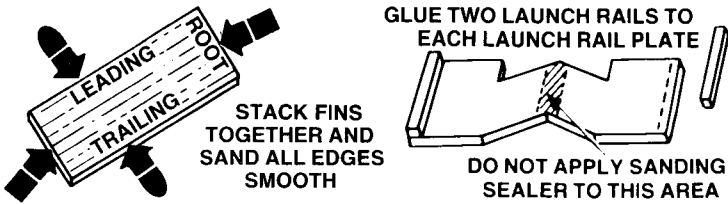


Wrap a piece of sandpaper around a wood dowel or pencil and sand out the openings at the front and rear of the booster body until the engine mount tube slips through booster body. Slide engine mount tube through booster body and up against split adapter ring. Hold the two parts together and mark, along inside edges of split adapter ring, on booster body with a pencil. Remove engine mount tube and cut, on the marks, a slot in the plastic edge of the booster body.

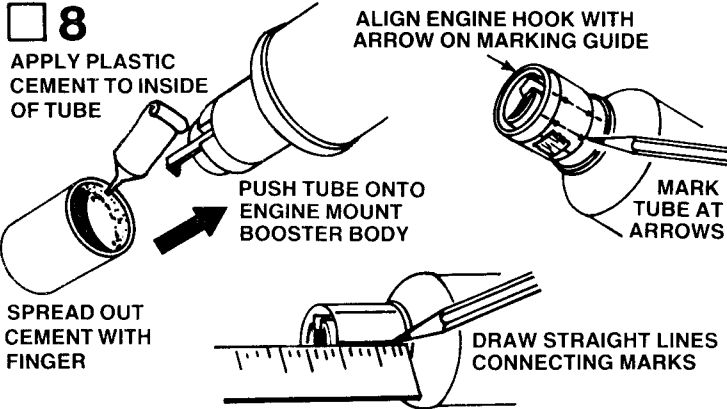


Apply a bead of plastic cement to the rear edge of the booster body. Push booster body down engine mount tube and against split adapter ring. Carefully align slot in edge of booster body with notch in split adapter ring. Wipe off excess cement from joint and hold in place until cement sets. Apply a bead of cement to front of booster body/engine mount joint as a reinforcement, and wipe away excess cement with your finger.

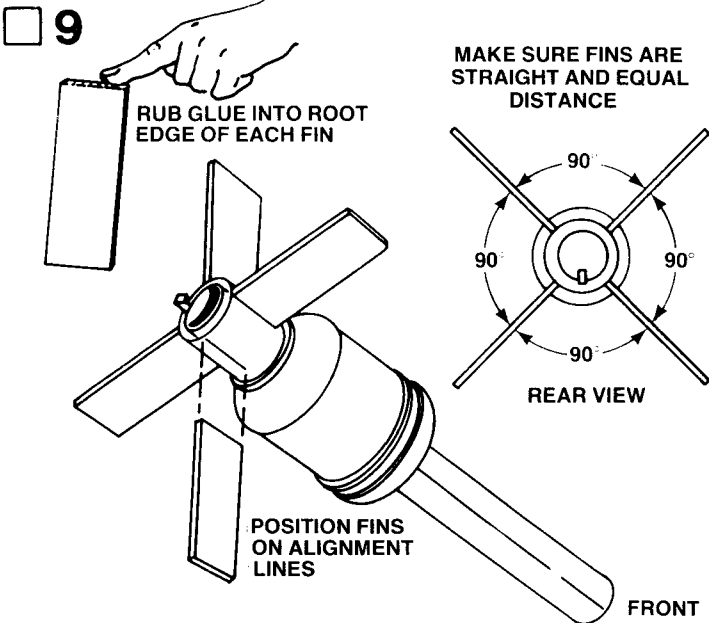




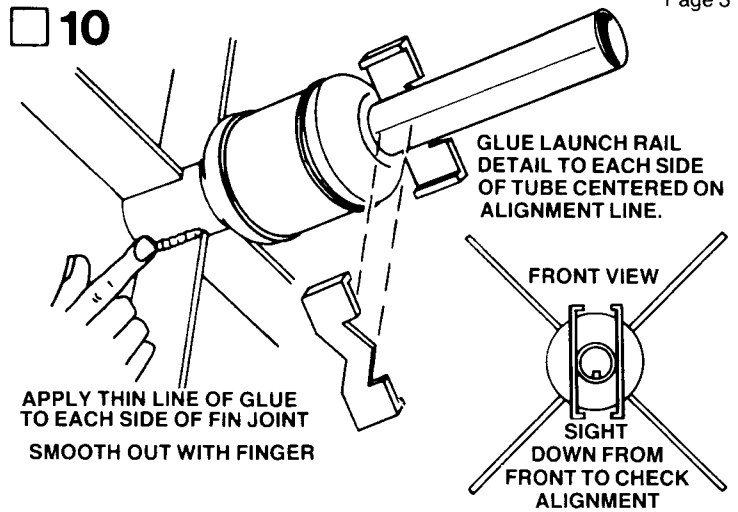
Fine sand the balsa die-cut sheet (part F), then carefully remove the booster fins, launch rail plates, and launch rails from the sheet. Free the edges with a sharp knife. Stack like parts together and sand all edges smooth. Sand the leading and trailing edges of booster fins round. Glue two launch rail parts to the ends of each launch rail plate. Sand edges smooth and square. Apply a coat of sanding sealer to all balsa parts and edges except where noted and root edges of fins. When sealer is dry, lightly sand all the sealed surfaces. Repeat sanding and sealing process until balsa grain is filled and smooth. Resand root edges, lightly, to remove any trace of sealer.



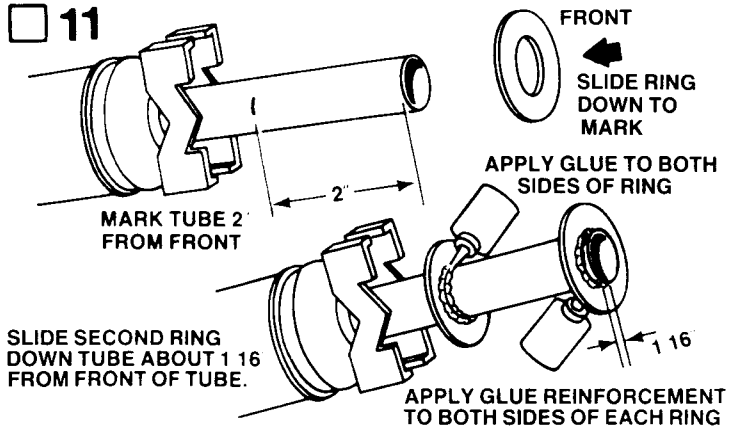
Apply plastic cement to inside of booster body tube (part G). Spread out cement inside body tube with a finger and push tube onto adapter ring and booster body with one smooth motion all the way up until tube is properly seated against the booster body. Cut out the booster body tube marking guide from the pattern sheet and wrap it around the booster body tube. Align engine hook with engine hook arrow on marking guide. Mark the tube at each arrow point. Remove the marking guide and connect each pair of marks with the use of a ruler. Extend lines the length of the tube.



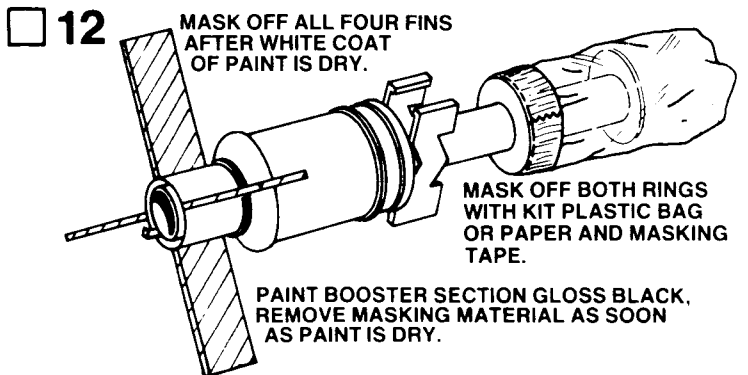
Rub glue into the root edge of each fin and allow to dry. Apply glue to the fins again and position fins on the alignment lines in positions shown. Adjust the fins so they project straight away from body tube and are 90° to one another. DO NOT set the rocket booster on its fins while glue is wet.



Apply a thin line of glue to the inside, center of one of the launch rail details. Position the launch rail detail centered on the alignment line and with the rear edge of the detail against the booster body. Apply second rail detail on other side of tube, sight down tube to check alignment. When glue on the fin joints has dried, apply a glue reinforcement to each side of fin joint. Smooth out the glue with your finger and wipe away any excess glue. **IMPORTANT**—Support booster on table edge with the model level until glue dries.

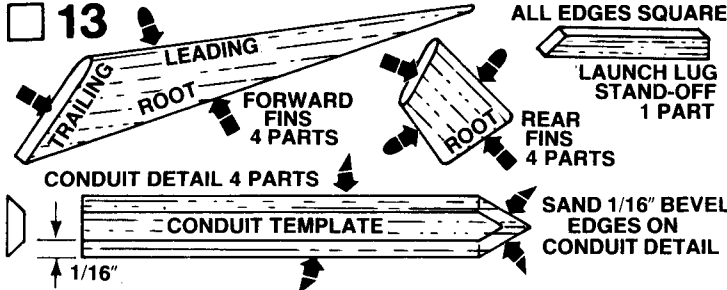


Mark the booster tube 2" from the front of the tube. Remove the centering rings from the ring set (part H). Slide one ring down to the mark and apply a bead of glue to both sides of ring joint. Slide second ring down front of tube about 1/16" from edge of tube. Apply glue to both sides of ring joint.

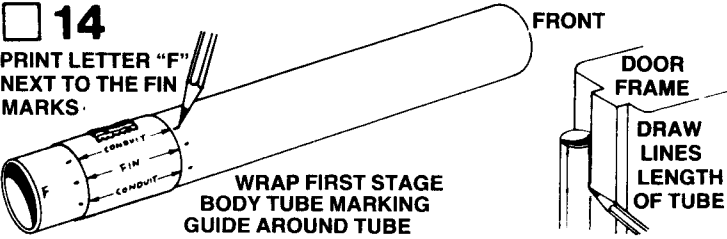


After the sanding sealer and glue are completely dry, paint the booster section from lower center ring down gloss white. Follow instructions on spray can for best results. We recommend spray enamel. Do not use lacquer paint. Shake can before spraying. Hold can straight up and spray in long, smooth "strokes". Spray with several light, dry mist coats of paint to avoid "runs". Shake can periodically. Let the paint dry overnight. Apply masking tape and paper to all four fins. Paint the booster section again with gloss black. Carefully remove the masking tape and paper as soon as the paint is dry. Set booster section aside for final assembly.

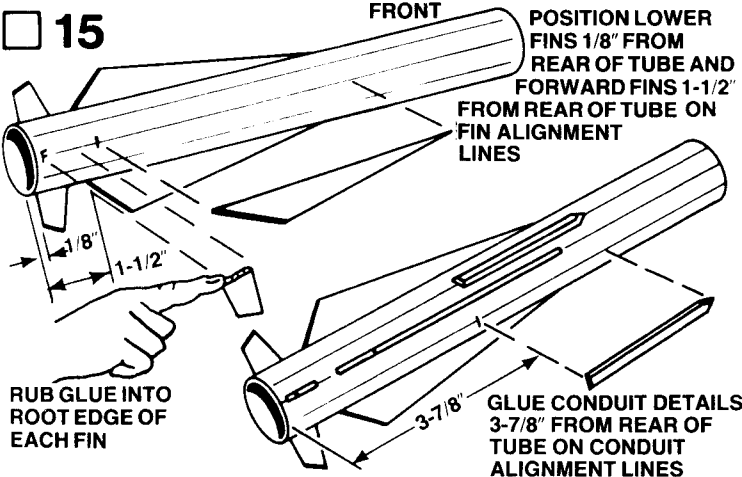
ASSEMBLY OF UPPER STAGE SECTION



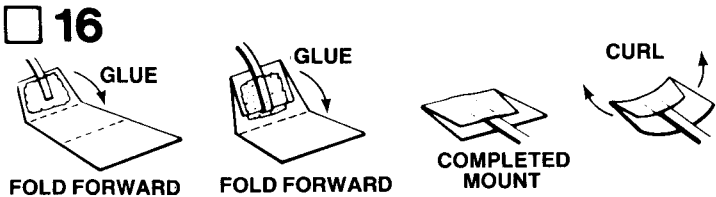
Remove the remaining die-cut balsa parts from the die-cut sheet. Stack like parts together and sand edges smooth then separate, and sand leading edge and trailing edges of each forward fin, and rear fin round. Sand all edges square and smooth on launch lug stand-off. Refer to the full scale conduit template above to sand a 1/16" beveled edge on all four conduit details.



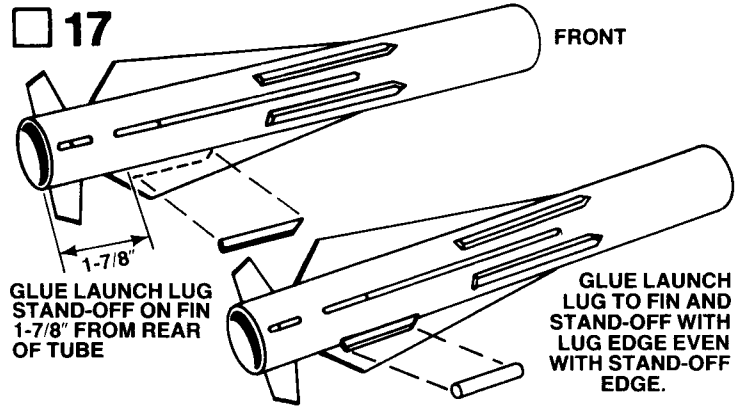
Cut out the upper stage body tube marking guide from the pattern sheet. Wrap it around the upper stage body tube (part I) and secure it with masking tape. Mark the body tube at each arrow point. Print the letter "F" next to each of the four rear fin marks. Remove the marking guide and draw straight lines connecting each pair of marks. Extend the lines the length of the tube.



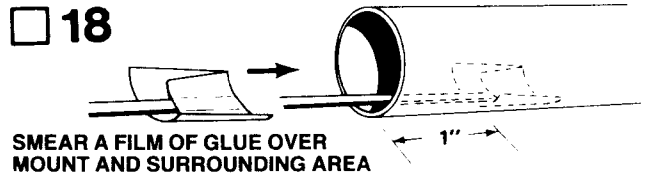
Rub glue into the root edge of each fin as stated in step 6 and position as shown on alignment lines noted with the letter "F", lower fins 1/8" from the rear of tube, forward fins 1-1/2" from rear of tube. Adjust fins so they project straight away from body tube and are 90° to one another. Glue conduit details 3-7/8" from rear of tube on the conduit alignment lines. **DO NOT** set the upper stage body on its fins while glue is wet.



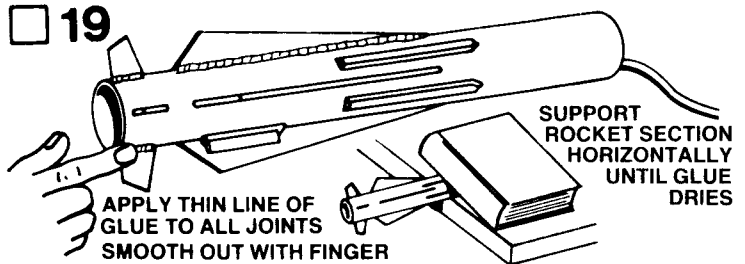
Cut out the shock cord mount from the pattern sheet. Fold on dotted lines, then unfold and apply glue to Section 1. Lay the end of the shock cord (part J) into the glue. Fold over and apply glue to the back of Section 1 and the exposed portion of Section 2. Fold again to complete mount. Curl the edges of the mount up so it will match the contour of the body tube and hold with your fingers until the glue sets.



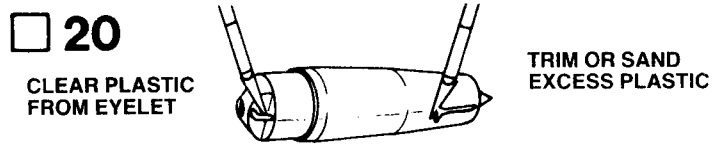
Locate launch lug stand-off, and rub glue into edge and side. Apply glue to edge and side again and position 1-7/8" from rear edge of tube, as shown, on one of the fins. Apply glue to launch lug (part K) and position on fin and stand-off with lug edge even with stand-off edge.



Use a finger or stick to apply glue to the inside of the front of the body tube, 1" to 2" from the front of the tube. Press the shock cord mount firmly into position in glue far enough from the front edge of the tube to allow clearance for the nose cone to fit into place. To insure a good bond use a stick or your finger to smear a film of glue over the mount and surrounding area in the body tube.



When the glue joints have dried, apply a glue reinforcement to each fin body tube joint, around launch lug, and around each conduit detail. Holding the model level, apply a line of glue to the joint, then smooth out the glue with your finger and wipe away any excess glue. **IMPORTANT** - Support rocket section level, or horizontally, on table edge until glue dries.



Trim or sand any excess plastic from around the sides of the nose cone (part L). Use a sharp knife to remove any excess plastic from the inside of the molded eyelet at rear of nose cone. Wash the nose cone with lukewarm soapy water, rinse well, and dry.



Apply a coat of sanding sealer to all balsa wood parts. When sealer is dry, lightly sand all the sealed surfaces. Repeat sealing and sanding process until balsa grain is filled and smooth.

22

TAPE DISC

SHROUD LINE

PRESS DOWN FIRMLY

COMPLETED 'CHUTE

PASS THROUGH AND PULL TIGHT

Cut out the parachute (part M). Cut three equal lengths of shroud line (part N). Form a small loop in the end of a shroud line. Holding loop, gently center loop inside tape disc (part O) on the sticky side. Then firmly press the tape disc into place on the parachute material, press until tape disc is molded around the shroud line loop. Repeat for other shroud line ends and tape discs. Pass the shroud line loops through the loop on the nose cone. Pass the parachute through the shroud loops and pull lines tight against nose cone.

Pack parachute and shock cord into rocket section and slip nose cone into place.

23

USE ROLLED PAPER FOR ROCKET HOLDER

PAINT ENTIRE MODEL GLOSS RED

After the sanding sealer and glue are completely dry, paint the upper stage section gloss red. Follow instructions on spray can for best results. We recommend spray enamel. Do not use lacquer paint. Shake can before spraying. Hold can straight up and spray in long, smooth "strokes". Spray with several light, dry mist coats of paint to avoid "runs". Shake can periodically. Let the paint dry overnight.

24

TEST FIT BOOSTER BODY AND SAND RING IF NECESSARY

APPLY GLUE APPROXIMATELY 1" UP INSIDE OF FIRST STAGE TUBE

ALIGN FINN OF UPPER STAGE WITH BOOSTER STAGE

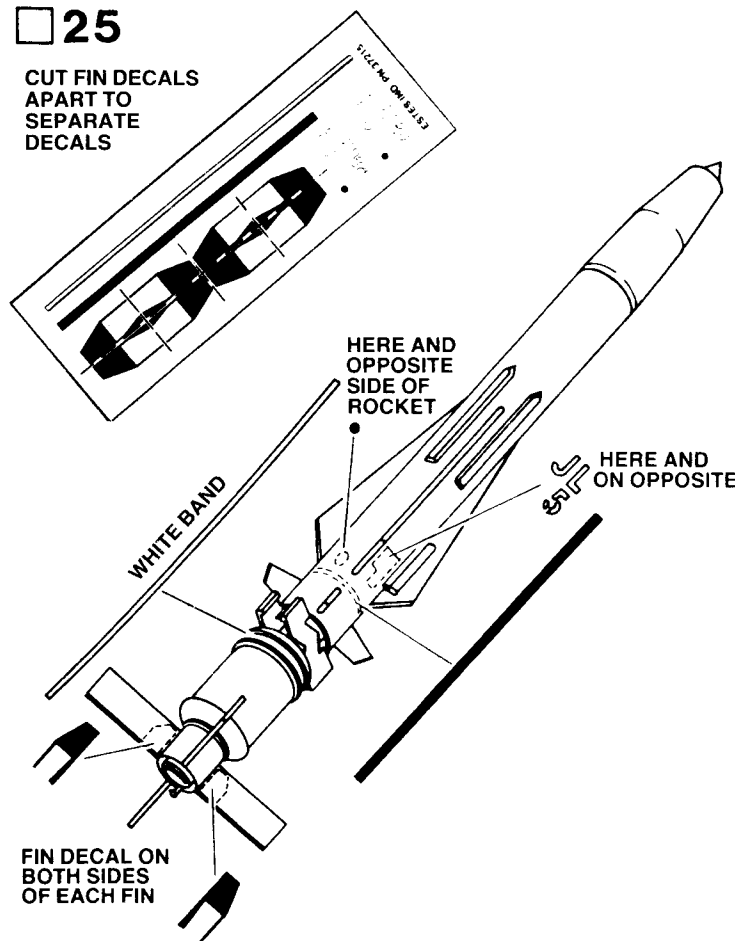
FRONT VIEW

When paint is dry on both sections of rocket, remove parachute and nose cone from upper stage, test fit booster section into upper stage body. Sand rings if necessary to assure a smooth fit. Remove booster section, apply glue around the inside surface of upper stage body tube

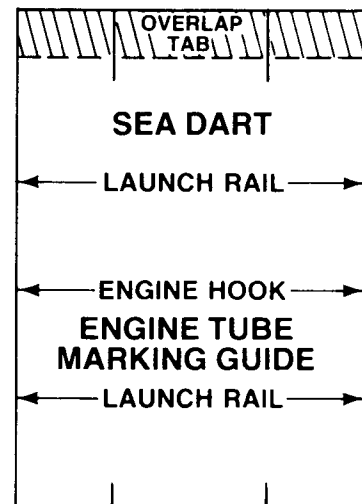
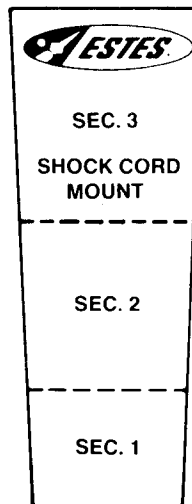
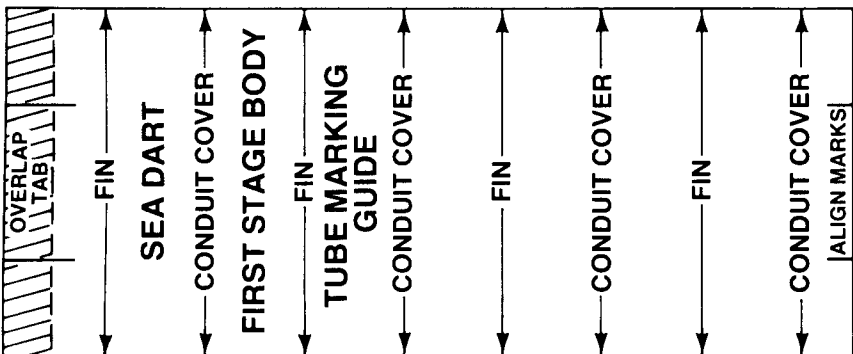
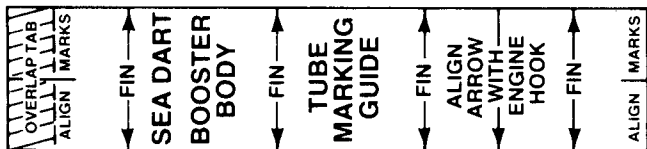
approximately 1" from rear edge of tube. With one smooth motion slide booster section into upper stage tube, up until edge of upper stage tube is against launch rail detail. Sight down the rocket from the front, and quickly adjust upper stage so fins align with the fins of booster section before glue sets. Tie free end of shock cord firmly to nose cone loop, pack parachute and shock cord into rocket body and slip nose cone into place.

25

CUT FIN DECALS APART TO SEPARATE DECALS



Apply the decals (part P) in the positions shown. (A) Cut fin decals apart to make eight individual fin decals and six other decals. (B) Dip one decal at a time in lukewarm water for 10-20 seconds, and hold it until it starts to uncurl. (C) Slip decal from backing paper on model. (D) Move decal into exact position and carefully blot away excess water with a soft cloth. If decal "sticks" before you have it in position, apply water to decal so decal can be moved. (E) Smooth out all wrinkles and air bubbles before decals dry. We recommend that the completed model be sprayed with a clear flat, or clear gloss to protect the model's finish.



LAUNCHING COMPONENTS

To launch your rocket you will need the following items:

- An Estes model rocket launching system
- Flame resistant recovery wadding (Estes Cat. No. 2274)
- Estes A8-3, B4-4, B6-4, or C6-5 model rocket engines. Use an A8-3 engine for your first flight.

Be sure to follow the HIAA-NAR* Model Rocket Safety Code when carrying out your model rocket activities.

*HIAA—Hobby Industry of America

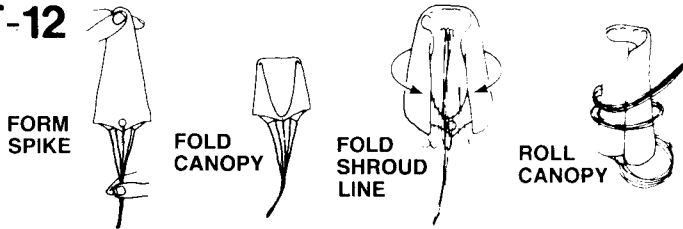
*NAR—National Association of Rocketry

COUNTDOWN CHECKLIST

T-13

Remove nose cone. Pack 4 squares of loosely crumpled recovery wadding into the body tube.

T-12



Hold the parachute at its center and pass the other hand down it to form a "spike" shape. Fold this spike in half. Fold shroud lines back along parachute and then back down to lower edge of parachute to reduce length of shroud line "left over". Roll parachute into tube shape to fit easily into body. Any remaining shroud line should be loosely wrapped around parachute. Pack 'chute into the body tube on top of the wadding. Pack the shroud lines and shock cord in on top of the parachute and slip the nose cone into place.

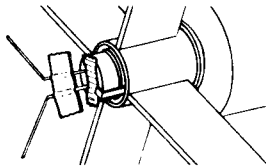
NOTE: DO NOT pack parachute until you are actually ready to launch. For maximum parachute reliability, lightly dust the 'chute with ordinary talcum powder before each flight, especially in cold weather.

T-11

Select an engine and install an igniter as directed in the engine instructions. The engines recommended for use with this rocket are the A8-3, B4-4, B6-4, or C6-5 made by Estes. A8-3 first flight.

T-10

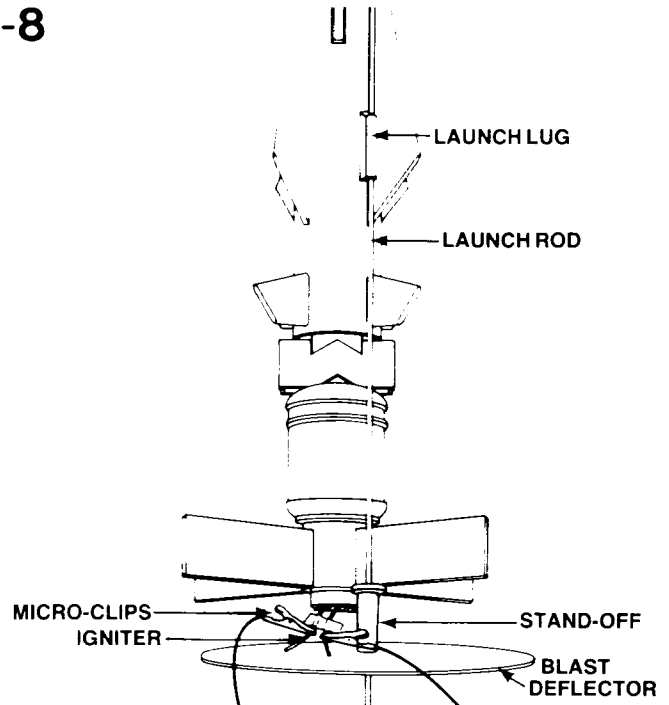
ENGINE HOOK MUST LATCH SECURELY



Insert engine into rocket engine mount. Engine hook must latch securely over end of the engine.

T-9 Disarm the launch panel—REMOVE SAFETY KEY!

T-8



Slide the launch rod through rocket launch lug and place rocket on launch pad. Make sure the rocket slides freely on the launch rod. Clean the micro-clips and attach them to the igniter wires. Arrange the clips so they do not touch each other or the metal blast deflector. Attach clips as close to protective tape on igniter as possible.

T-7 Clear the launch area. Alert recovery crew and trackers. Check for low flying aircraft and unauthorized persons in the recovery area.

T-6 Arm the launch panel—INSERT SAFETY KEY!

5-4-3-2-1-LAUNCH!!

Repeat Countdown Checklist for each flight.

MISFIRE PROCEDURE

Disarm the launch panel. Wait one minute before approaching the rocket on the launch pad. Remove the rocket, clean the igniter residue from the nozzle of the engine, and carefully install a new igniter. Repeat the Countdown Checklist.

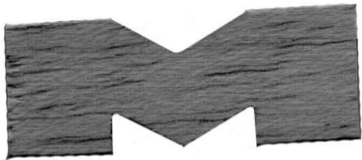
Failure of the rocket engine to function properly is nearly always caused by a failure to install the igniter correctly. This failure permits the igniter to heat and burn into two pieces without igniting the engine.

SEA DART

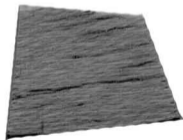


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**4 of each
3/32"**





3

4

5

6

7



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