

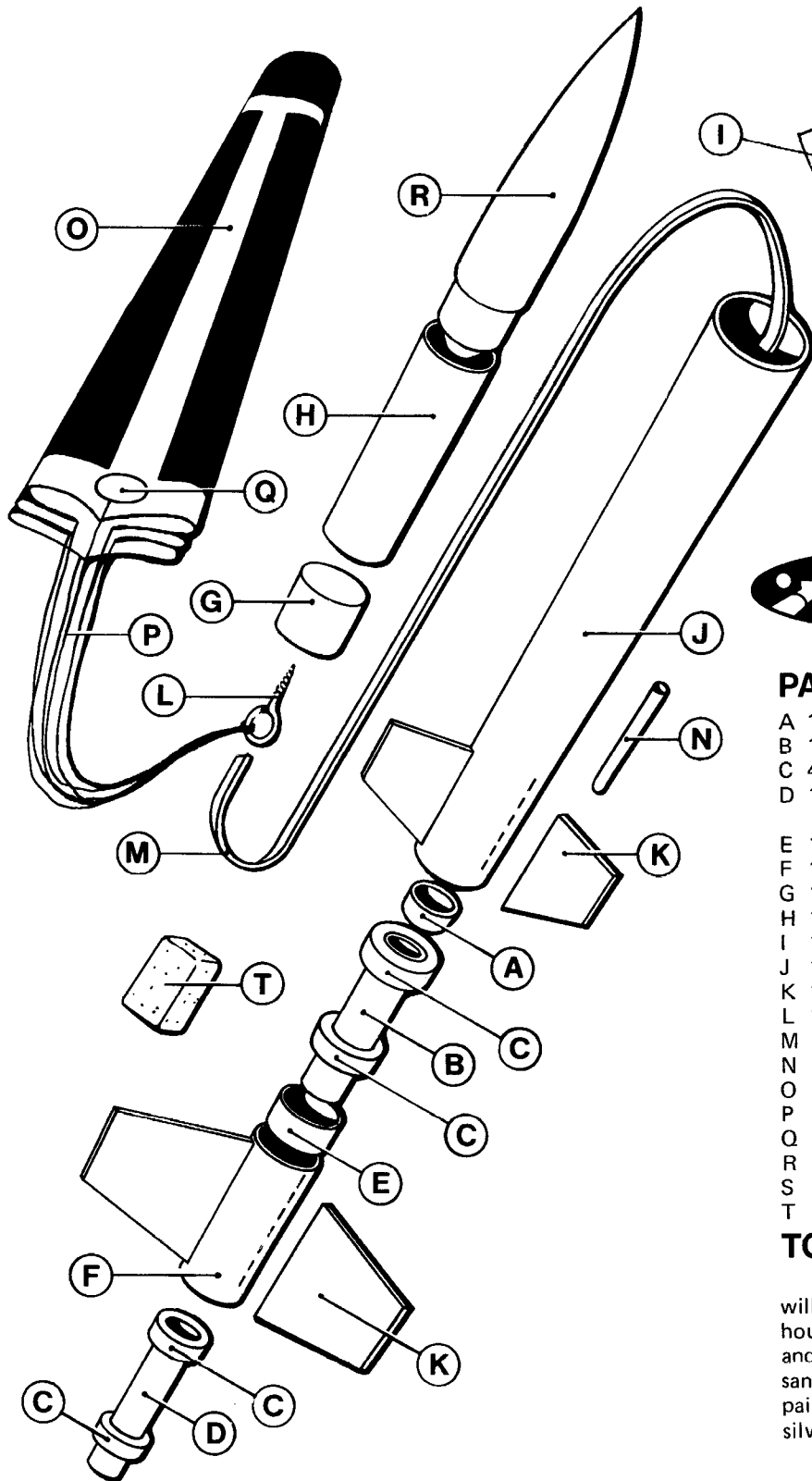


DELTA STAR

2-STAGE SPORT MODEL

SKILL LEVEL 2 – Recommended for Intermediate Rocketeers

Read all instructions before beginning work on your model. Make sure you have all parts and materials. When you are thoroughly familiar with the assembly procedure, begin construction. Check off each step as you complete it. In each step, test-fit the parts together before applying any glue. If some part doesn't fit properly, sand lightly or build up as needed for precision assembly.



A DAMON COMPANY

PARTS LIST

KIT NO. 1322

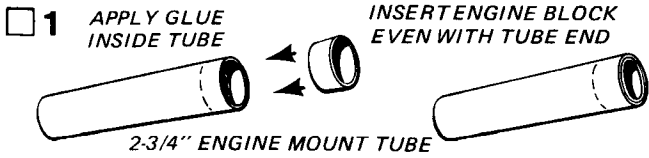
A	1 Engine Block (type EB-20A)	30224
B	1 Engine Mount Tube (type BT-20J) 2-3/4"	30326
C	4 Adapter Rings (type AR-2050)	30164
D	1 Booster Engine Mount Tube (type BT-20M) 2-1/4"	30334
E	1 Stage Coupler (type JT-50C) 1"	30260
F	1 Booster Body Tube (type BT-50J) 2-3/4"	30362
G	1 Balsa Nose Block (type NB-50)	70158
H	1 Payload Section Tube (type BT-50S) 4"	30368
I	1 Pattern Sheet (type SP-100)	84043
J	1 Main Body Tube (type BT-50L) 12-3/4"	30366
K	1 Die-Cut Balsa Sheet (type BF-100)	32287
L	1 Screw Eye (type SE-2A)	38252
M	1 Shock Cord (type SC-1)	85730
N	1 Launch Lug (type LL-2B)	38178
O	1 Parachute (type PK-12A)	85564
P	1 Shroud Line Cord (type SLT-72) 72"	38237
Q	1 Set of Six Tape Discs (type TD-3F)	38406
R	1 Plastic Nose Cone (type PNC-50Y)	71009
S	1 Decal (type KD-1322)	37103
T	1 Clay Balance Weight (type CB-M4)	85260

TOOLS AND MATERIALS

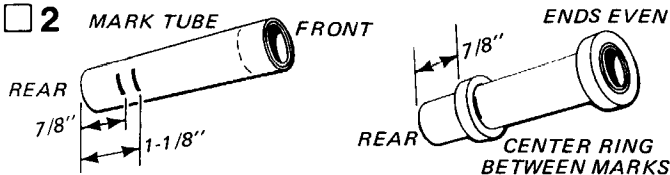
In addition to the parts included in this kit you will need white glue (Titebond glue, Elmer's, or similar household white glue is recommended), scissors, pencil and ballpoint pen, fine and extra-fine grit sandpaper, sanding sealer, masking tape and a medium size modeling paint brush. To paint your model we recommend gloss silver enamel spray paint.

ESTES INDUSTRIES
PENROSE, CO 81240 USA

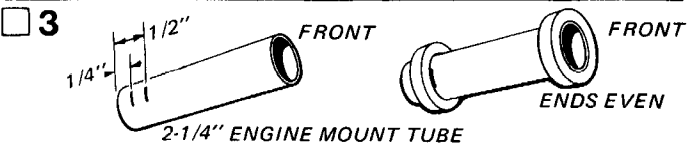
ASSEMBLY INSTRUCTIONS



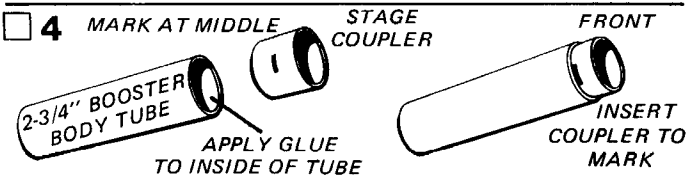
Glue the engine block (part A) in one end of the longer (forward) engine mount tube (part B). To do this, apply glue around the last 3/16" on the inside of the tube. Immediately slide the engine block into the same end of the tube so the end of the block is even with the end of the tube. Let the unit sit a minute, then wipe away any extra glue.



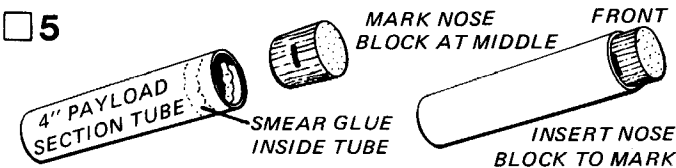
Mark the forward engine mount tube at 7/8" and 1-1/8" from the rear (the end away from the engine block). Apply a line of glue all around the tube between the marks. Slide an adapter ring (part C) onto the tube and over the glue until it is centered between the marks. Apply another line of glue around the tube at the front and slide a second adapter ring on so the front ends of the ring and the tube are even.



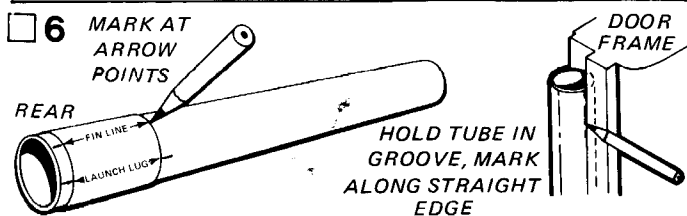
Mark the shorter (rear) engine mount tube (part D) at 1/4" and 1/2" from one end. Apply a line of glue around the tube between the marks and slide an adapter ring on over the glue so it is centered between the marks. This end will be the rear of the mount. Glue the last ring on so it is even with the front of the engine mount tube.



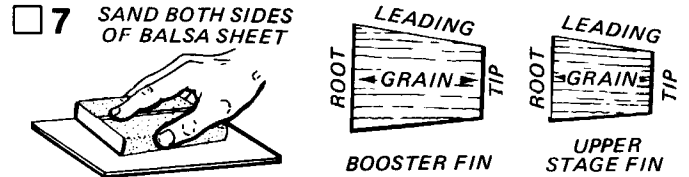
Mark the stage coupler (part E) at its middle (half-way from each end). Apply glue around the last 1/4" in one end of the booster body tube (part F). Immediately slide the coupler in until the mark is even with the end of the tube. Let the unit set a minute, then wipe off any excess glue.



Mark the nose block (part G) at its middle. Glue it in one end of the 4" long payload section tube (part H) so the mark on the block is even with the end of the tube.

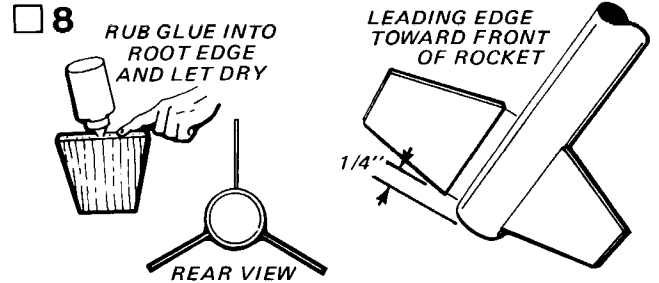
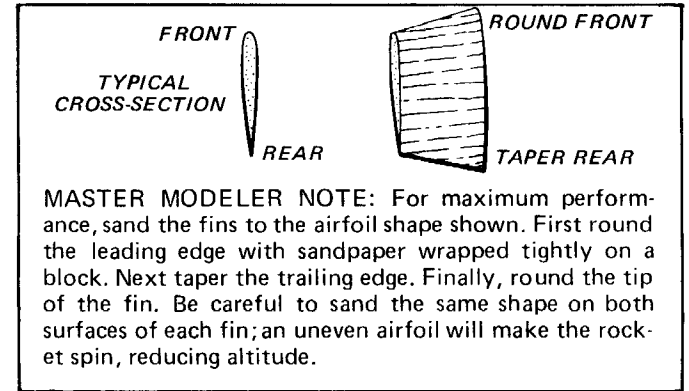


Cut out the body tube marking guide from the pattern sheet (part I). Wrap it around one end of the 12-3/4" long main body tube (part J). Mark the tube at each arrow point, front and rear. Draw a straight line connecting each matching front and rear mark. The "V" formed by the side of the stop on a door frame makes a good guide for drawing straight lines on a tube. Extend the launch lug line forward 6". Mark the booster tube for three fins in the same way.

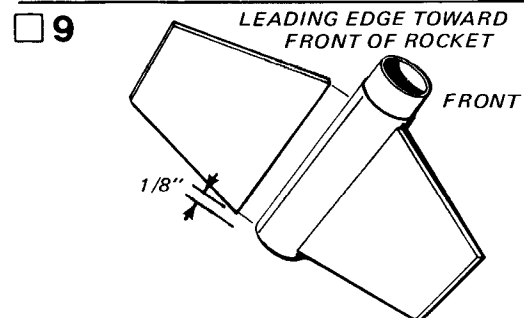


SANDPAPER AROUND BLOCK

Fine-sand the balsa sheet (part K), then carefully remove the fins from the sheet. Free the edges with a sharp knife. Sand all edges except the root edge to a rounded shape. Make sure the root edge stays square.

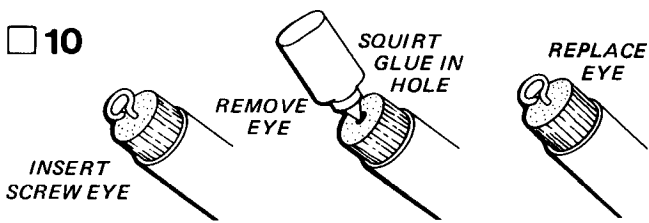


Rub a line of glue into the root edge of each fin and allow to dry. Mark each of the fin lines on the main body at 1/4" from the rear of the tube. Glue the upper stage fins to the main body on the alignment lines, with the rear of each fin on the mark, 1/4" from the rear. Adjust the fins so they stick straight out from the body tube. Do not set the rocket on its fins while the glue is wet.



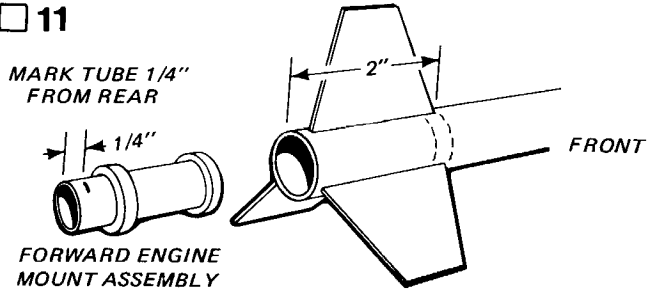
Mark each fin line on the booster body at 1/8" from the tube's rear. Glue the booster fins to the tube on the lines, with the rear of each fin on a mark, 1/8" from the rear. Make sure the fins stick straight out from the body. Do not set the booster on its fins while the glue is wet.

10

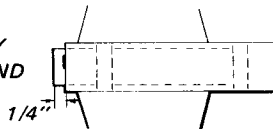


Insert the screw eye (part L) into the rear of the nose block. Remove the screw eye and squirt a small amount of glue into the hole. Re-insert the screw eye, set aside to dry.

11

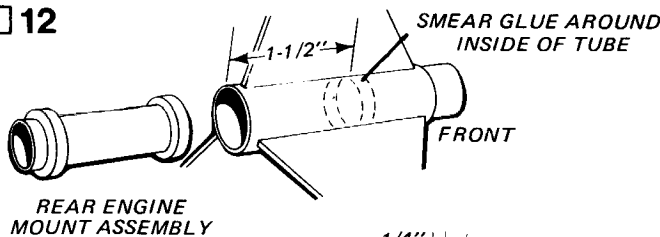


INSERT ENGINE MOUNT ASSEMBLY UNTIL MARK IS EVEN WITH TUBE END

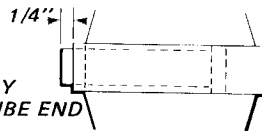


Mark the forward engine mount tube 1/4" from the end opposite the engine block. Apply a line of glue around the inside of the main body about 2" from the rear of the tube. Slide the engine mount unit, engine block end first, into the body until the mark is even with the body end. (The engine mount is in the right place when 1/4" of the engine holder tube sticks out of the body.) Do not pause when pushing the mount in, or the glue may "grab" at the wrong place!

12

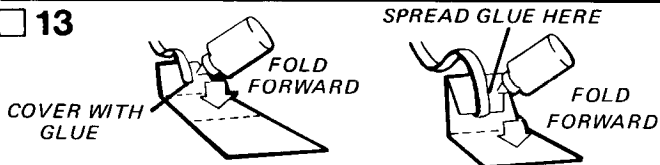


INSERT ENGINE MOUNT ASSEMBLY UNTIL RING REAR IS EVEN WITH TUBE END



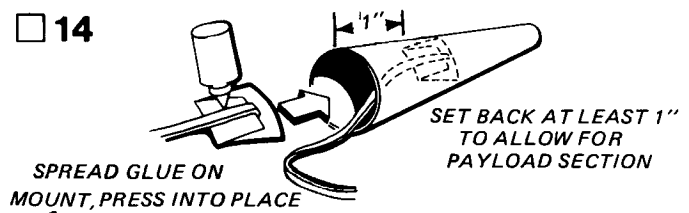
Apply a line of glue around the inside of the booster body about 1-1/2" from the rear (the end away from the stage coupler). Check the illustration to be sure which end of the booster engine mount is the front. Slide the engine mount, front end first, into the body until the back of the rear adapter ring is even with the end of the tube. Apply a line of glue around the joint between the rear ring and the body.

13



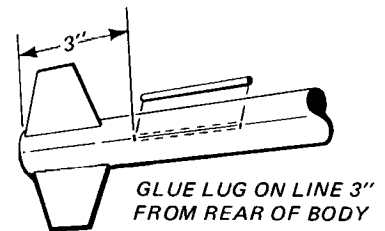
Cut out the shock cord mount from the pattern sheet. Crease it on the dotted lines by folding. Spread glue on the first section (1) and lay the end of the shock cord (part M) into the glue. Fold over and apply glue to the back of the first section and the exposed part of section 2. Lay the shock cord as shown and fold over again. Clamp the unit together with your fingers until the glue sets.

14



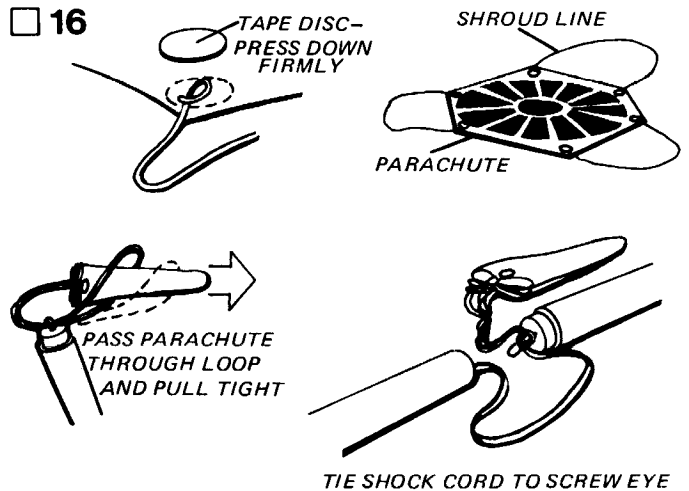
Apply glue to the back side of section 2 and the exposed part of section 3 of the shock cord mount. Hold the mount (wide end toward tube) as shown, and press it into place in the main body tube. Make sure the front of the mount is at least 1" from the end of the tube. Hold the mount in place until the glue sets.

15



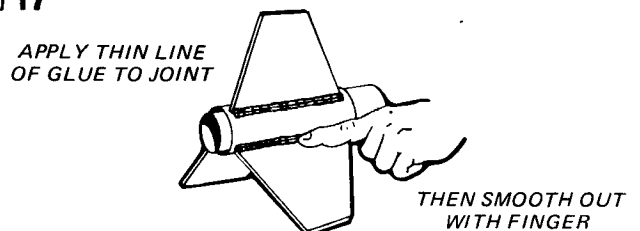
Glue the launch lug (part N) to the body on its line. The rear of the lug should be 3" from the rear of the main body. Align the lug straight on the body.

16



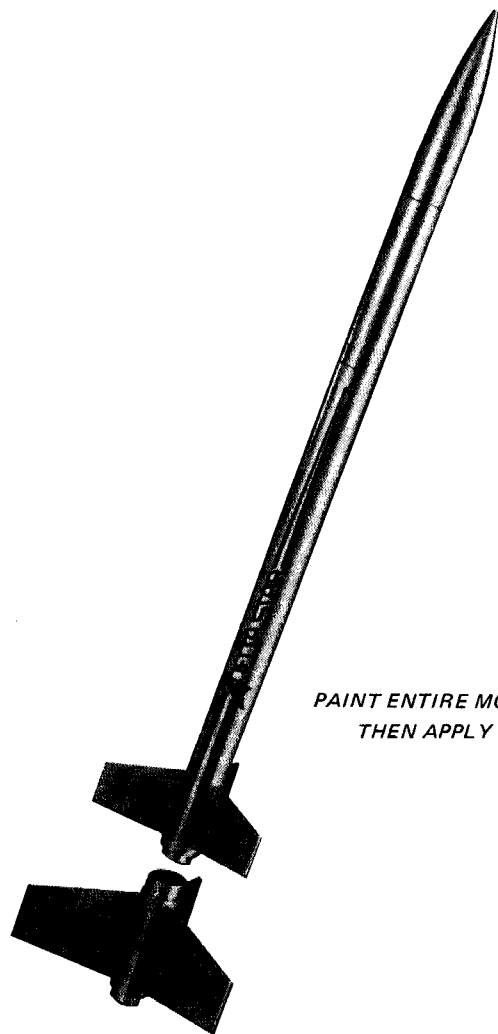
Cut out the parachute (part O) on its edge lines. Cut three 24" lengths of shroud line (part P). Attach line ends to the top of the parachute with tape discs (part Q) as shown. Pass the shroud line loops through the screw eye on the payload section. Pass the parachute through the loop ends and pull the lines tight against the screw eye. Set the knot with a drop of glue. Tie the free end of the shock cord to the screw eye.

17



When the fin joints have dried, apply glue reinforcements to each joint. Holding the model level, apply a narrow line of glue to both sides of each fin joint. Smooth out the glue with your finger. Keep the model level until the glue dries.

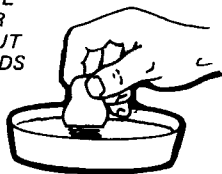
PAINTING AND DETAILING



*PAINT ENTIRE MODEL SILVER
THEN APPLY DECALS*

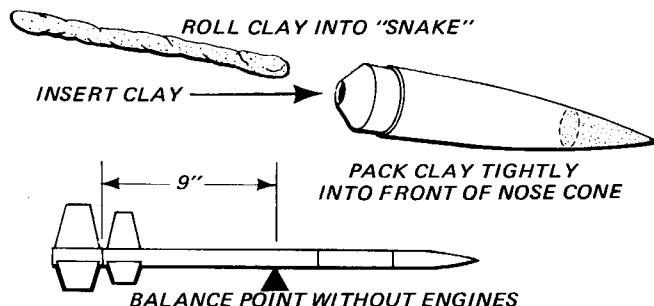
When all glue on the outside of the body is dry, prepare the fins for painting. Apply at least two coats of sanding sealer to the fins. Let dry and sand thoroughly between coats. Do this until the tiny holes in the wood are filled and everything looks and feels smooth. Install the nose cone (part R) in the front of the payload section. Paint the entire model with gloss silver enamel. Let the paint dry overnight.

*DIP DECAL
IN WATER
FOR ABOUT
10 SECONDS*



*HOLD DECAL UNTIL IT
UNCURLS, THEN SLIDE
IT OFF BACKING PAPER
INTO POSITION*

When all paint is completely dry, apply decals (part S) in the positions shown. To apply decals, cut out a decal section, dip it in lukewarm water for 10 seconds, and hold it until it starts to uncurl. Slip the decal off the backing sheet and onto your model. Blot excess water away. When all decals are in place, let the model dry overnight. After drying, apply a coat of clear spray to protect the decals.



Cut the clay balance weight (part T) in half. Roll one half between your hands to make a "snake" about 1/4" diameter. Break off sections of the clay about 1" long. Poke a couple of pieces of clay through the hole in the rear of the nose cone. Use a flat-ended pencil or dowel to push the clay forward in the cone until it is packed tightly in the front of the cone. Place the nose cone in the front of the model and check the model's balance point. Without engines the complete model should balance at a point 9" ahead of the rear of the main stage body. If necessary, add more clay until the model balances correctly.

FLYING THE DELTA STAR

Your Delta Star model has been designed as a high performance two-stage payload sport model. The upper stage may also be flown by itself as a single stage payload or demonstration model. Here are some suggestions for getting the best results from your model:

Obtain a copy of Estes Industries Technical Report TR-2 and study it before flying two-stage models.

Always be extra careful when installing engines. Make sure they face the correct direction for proper staging. Make sure they are held tightly in place to insure proper recovery operation.

Have an extra person with you when launching to watch the booster stage and retrieve it after flight.

Launch in calm weather. The upper stage will drift a long way in a wind.

When flying as a single stage model, make sure the engine is securely held in place.

Always follow the Countdown Checklist when launching your model.

LAUNCHING COMPONENTS

To launch your rocket you will need the following items:

Masking tape and transparent tape.

An Estes model rocket launching system.

Flameproof recovery wadding (Estes Cat. No. 2274).

Estes Booster and Upper Stage engines.

RECOMMENDED ENGINES

BOOSTER	UPPER STAGE
1/2A6-0, A8-0, B6-0, C6-0	1/2A6-4, A8-5, B4-6, B6-6, C6-7

Use an A8-0 and an A8-5 for the first multi-stage flight.

SINGLE STAGE LAUNCHES
A8-3, B4-4, B6-4, B14-5, C6-5

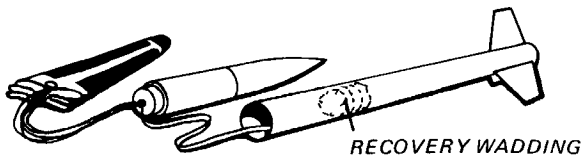
Use an A8-3 engine for the first single stage flight.

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

*HIAA-NAR -- Hobby Industry Association of America
National Association of Rocketry

COUNTDOWN CHECKLIST

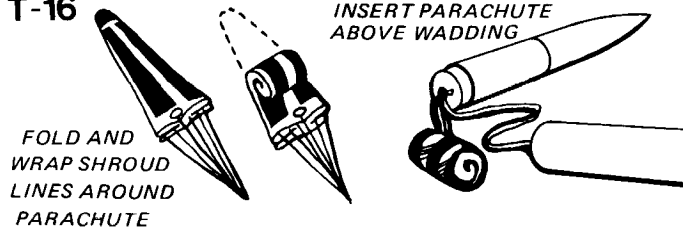
T-17



RECOVERY WADDING

Pack four squares of loosely crumpled recovery wadding into the body tube from the front.

T-16



INSERT PARACHUTE ABOVE WADDING

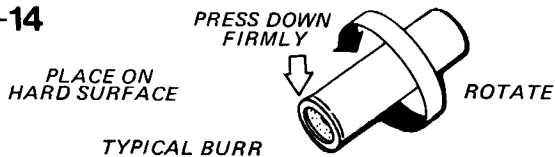
FOLD AND WRAP SHROUD LINES AROUND PARACHUTE

Fold the parachute into a triangular shape. Roll the chute tightly as shown and wrap the shroud lines around it. If chute is too large, unroll it and repack until it slides easily into rocket. A fit that is too tight may prevent the parachute from ejecting properly.

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-15 Pack parachute, shroud lines, and shock cord neatly into body tube. Slide payload section into place. Payload section should separate easily from rocket body tube, but should not be extremely loose. If it is too tight, sand inside of body tube and shoulder of nose block with extra-fine sandpaper. If fit is too loose, add a wrapping of transparent tape or masking tape to the shoulder of the nose block.

T-14



PLACE ON HARD SURFACE

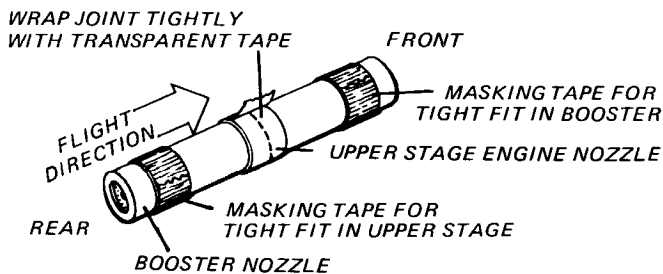
PRESS DOWN FIRMLY

ROTATE

TYPICAL BURR

Select an upper stage engine and a booster engine. Remove any burrs from the ends of the engines by holding them against a smooth surface and turning as shown at right.

T-13



WRAP JOINT TIGHTLY WITH TRANSPARENT TAPE

FRONT

MASKING TAPE FOR TIGHT FIT IN BOOSTER

UPPER STAGE ENGINE NOZZLE

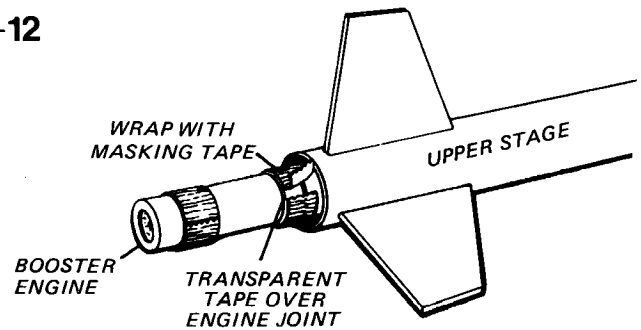
REAR

MASKING TAPE FOR TIGHT FIT IN UPPER STAGE

BOOSTER NOZZLE

Position the engines with the nozzle of the upper stage engine against the top end of the booster engine. Wrap a layer of transparent tape tightly around the joint as shown at right. Check to be sure the nozzle of the upper stage engine is against the top of the booster engine.

T-12



WRAP WITH MASKING TAPE

BOOSTER ENGINE

TRANSPARENT TAPE OVER ENGINE JOINT

UPPER STAGE

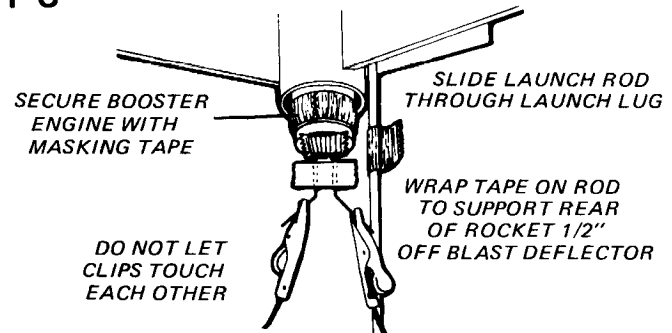
Wrap masking tape around the top of the upper stage engine so it makes a tight friction fit in the engine mount tube. Insert the upper stage end of the engine unit into the upper stage engine mount. Finish securing it by wrapping a layer of masking tape tightly around the end of the engine mount tube and the end of the engine as shown. Press the tape down firmly against the engine.

T-11 Slide the booster into place on the engine unit from the bottom. Position it so the stage coupler fits all the way into the upper stage and the fins are in line. Secure the booster in place by wrapping a layer of masking tape around the end of the engine mount tube and the engine. Press the tape down tightly.

T-10 Install an igniter in the booster engine as directed in the engine instructions.

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

T-8



SECURE BOOSTER ENGINE WITH MASKING TAPE

SLIDE LAUNCH ROD THROUGH LAUNCH LUG

DO NOT LET CLIPS TOUCH EACH OTHER

WRAP TAPE ON ROD TO SUPPORT REAR OF ROCKET 1/2" OFF BLAST DEFLECTOR

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

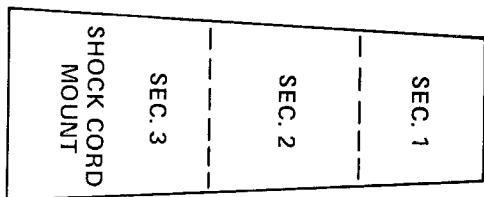
T-7 Clear the launch area, alert recovery crew and trackers. Check for low flying aircraft and unauthorized persons in the recovery area.

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

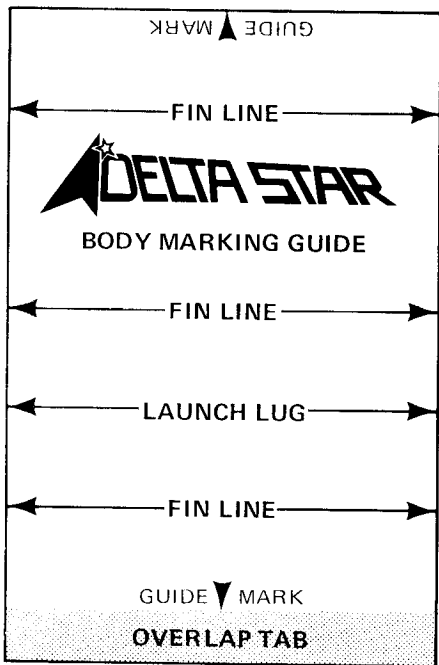
-5-4-3-2-1-LAUNCH!!

MISFIRE PROCEDURE

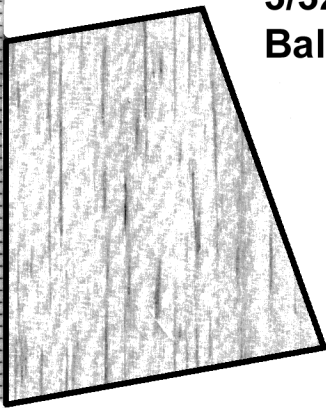
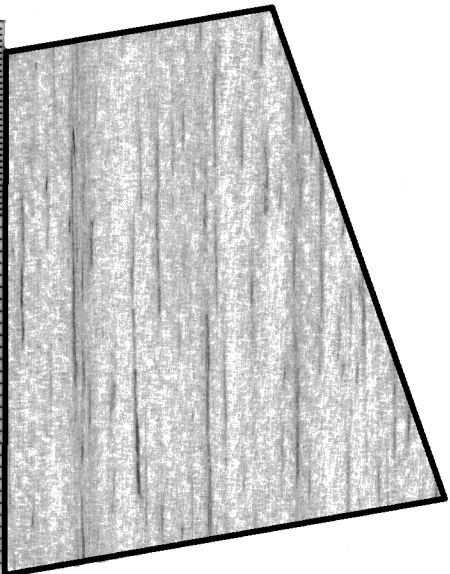
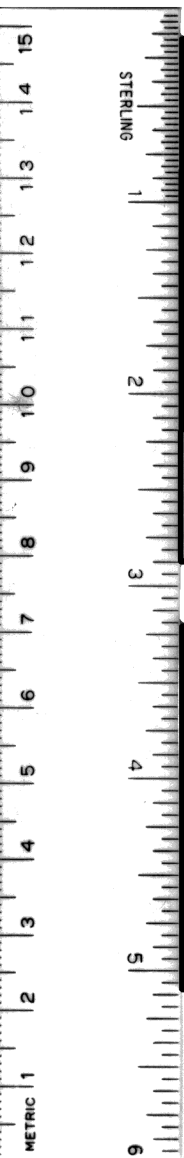
Occasionally the igniter will heat and burn into two pieces without igniting the engine. This is almost always caused by a failure to install it correctly. REMOVE SAFETY KEY from launch panel, remove the model, clean the igniter residue from the nozzle and install a new igniter. Follow the launching procedure again.



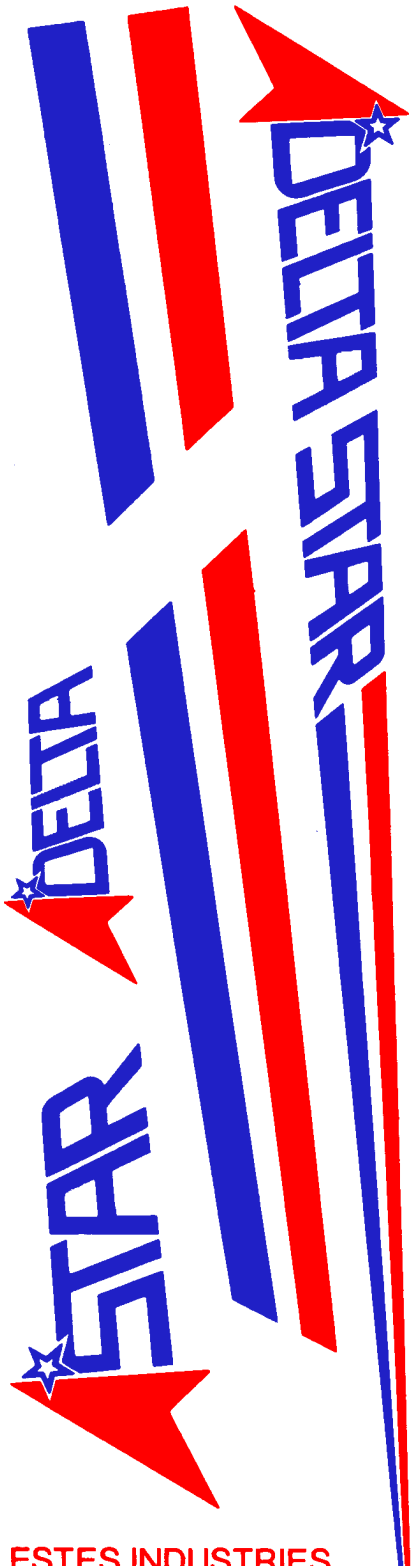
CUT OUT ON OUTLINE



ESTES INDUSTRIES KIT 1322 DELTA STAR
 PATTERN SHEET PN 84043



**3/32"
Balsa**



ESTES INDUSTRIES
PN37103

NEW DELTA STAR



- Revised Motor Can Carry 1 lb. of Payload to 1000' with "C" engines
- Canards - High Velocity Color Scheme
- Flexible 2 Stage Performance
- Can Be Flown Single Stage Only
- Single Configuration
- One-Kit Beta Plan



Delta Star: 10" Body - 1.5" Diameter - 1.5" Length - 1.5" Diameter - 1 Stage

Weight: 1.5 lbs. (incl. motor)
 Length: 10" (incl. motor)
 Diameter: 1.5" (incl. motor)

Motor: 1.5" (incl. motor)
 Weight: 1.5 lbs. (incl. motor)
 Length: 10" (incl. motor)
 Diameter: 1.5" (incl. motor)