

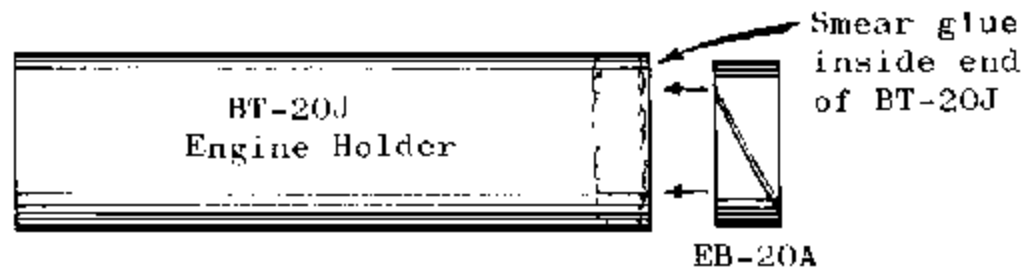
# Estes Industries Rocket Plan No. 25

## MARS SNOOPER

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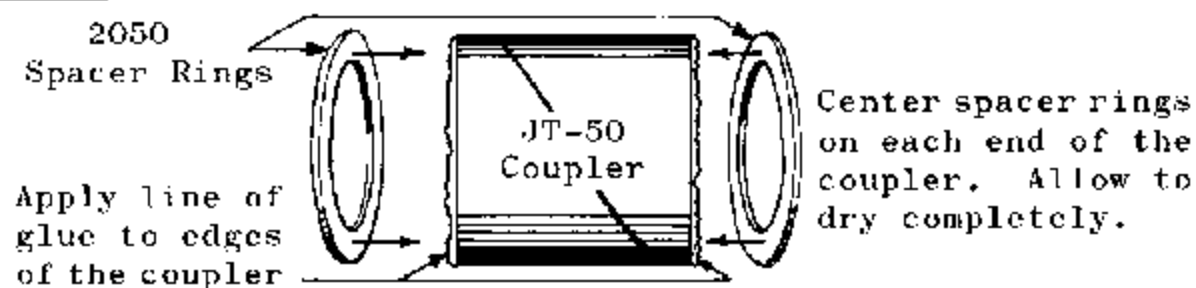
### Step 1: INSTALL THE ENGINE BLOCK

Smear glue on the inside of one end of the BT-20J engine holder tube. The glue should extend no more than 3/16" into the tube. Insert the engine block into the glued end of the tube so that the front end of the block is flush with the front end of the tube.



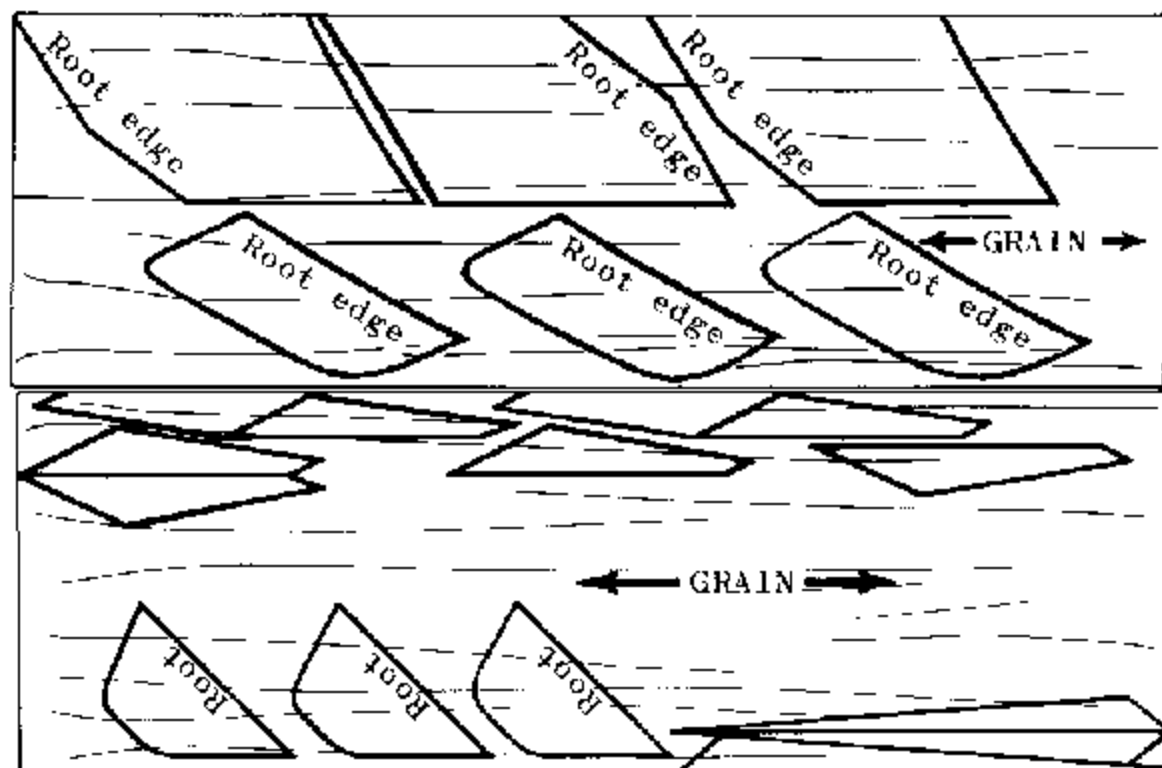
### Step 2: ATTACH SPACER RINGS TO JT-50 COUPLER

Apply a line of glue to each end of the coupler. Center one spacer ring on each end of the coupler. Set aside to dry completely.



### Step 3: CUT OUT THE FINS

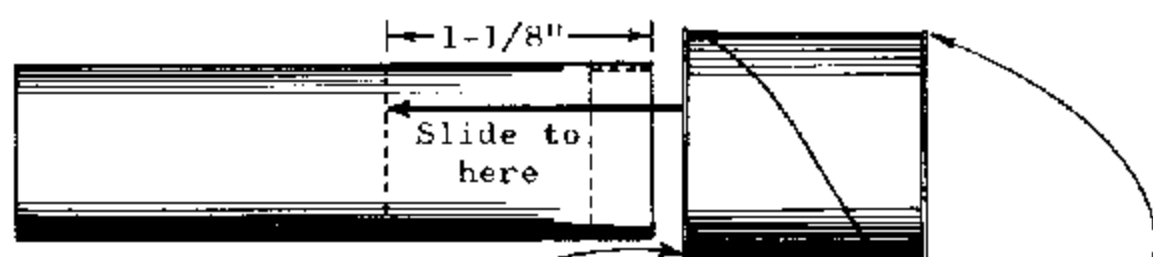
While the ring-coupler unit is drying cut out all the main and outboard fin pieces as well as the "cooling fins". Trace the cutting lines as shown for all the main fin sections and outboard pieces on a sheet of BFS-30. The cooling fins and forward fins are laid out next on a sheet of BFS-20 as shown below.



There are 8 cooling fins. Placing parts "back to back" as above will minimize the cuts to be made, but use care in cutting when one cut makes an edge for two pieces.

### Step 4: COMPLETE THE ENGINE MOUNT

Mark the engine holder tube 1-1/8" from the forward end. Apply a line of glue around the tube at this point and slide the coupler assembly onto the tube so the rear ring is on the mark. Apply a fillet of glue to both ends where the rings join the body tube. Let this assembly dry thoroughly.



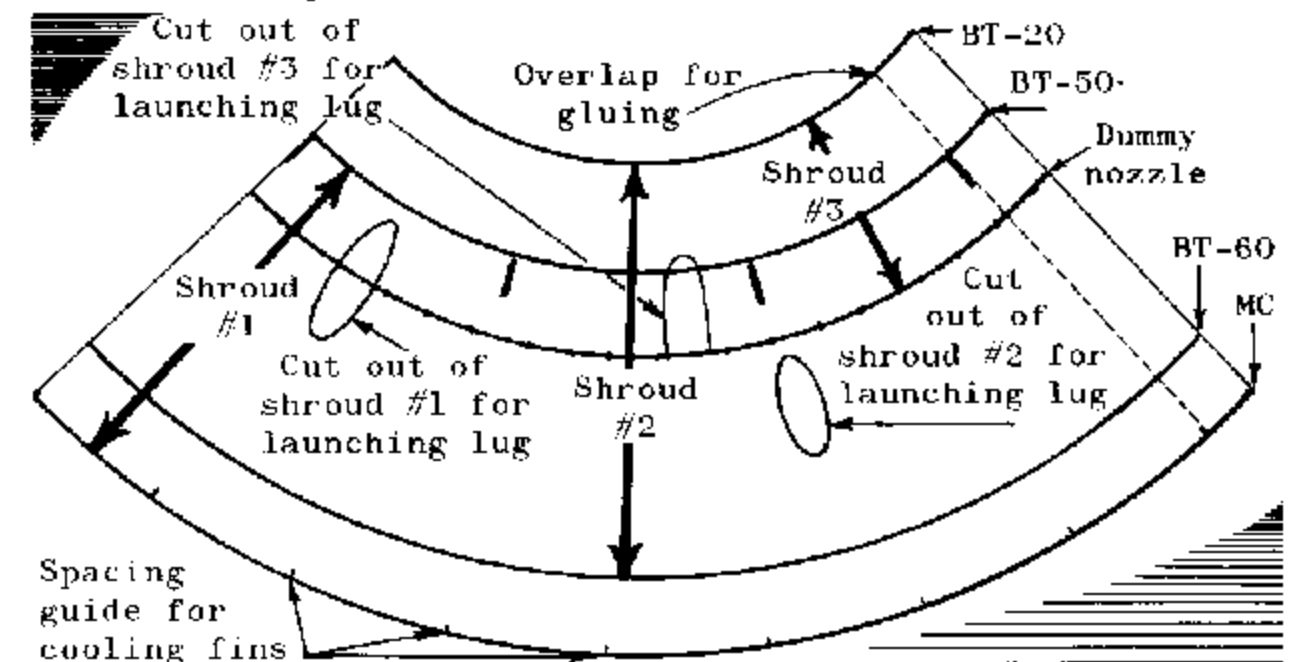
This edge will act as a flange for BT-50H to "seat" against.

Sand this ring edge only, for a smooth fit into the BT-50H.

### Step 5: ASSEMBLE THE SHROUD PIECES

While the engine holder assembly dries cut out all three shroud pieces. Cut out shroud #1 on the MC and BT-50 lines. Lay the shroud over the pattern and transfer the 8 marks for the cooling fin positions from the pattern to the shroud. Cut out the launching lug hole. Apply glue to the overlap, form the shroud into a cone, and press the ends together as described in the adapter instructions. Cut out shroud #2 on the BT-20 and BT-60 lines and cut out its launching lug hole and assemble.

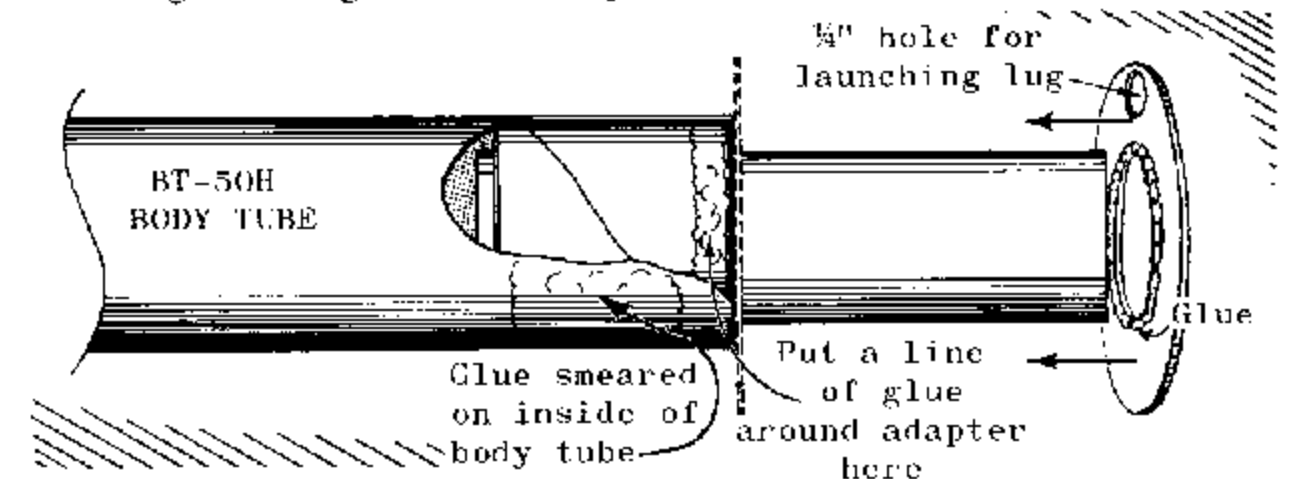
Finally, make the dummy nozzle shroud. For this one, you must make an additional line 7/8" up from the BT-20 line, and scribe an arc with your compass. If no compass is available, make several dots, measured 3/8" up from the BT-50 line as illustrated. Then connect these dots with a line following the curve as best you can.



Cut the nozzle shroud from the shroud sheet on the line you have just made and the BT-20 line. In the above illustration the lines we are concerned with on the shroud sheets are shown as heavier than the ones that are not used. Heavy arrows show where to cut for each shroud.

### Step 6: INSTALL THE ENGINE MOUNT

Apply glue to the inside of the body tube and around the adapter unit as shown. Slide the assembly into the body tube to the position shown. Cut a 1/4" hole in the 2060 spacer ring. Apply glue to the ring near the inside edge as shown and slide the ring into place. Make a fillet of any excess glue that squeezes out where the ring seats against the body tube.



### Step 7: INSTALL THE SHROUDS

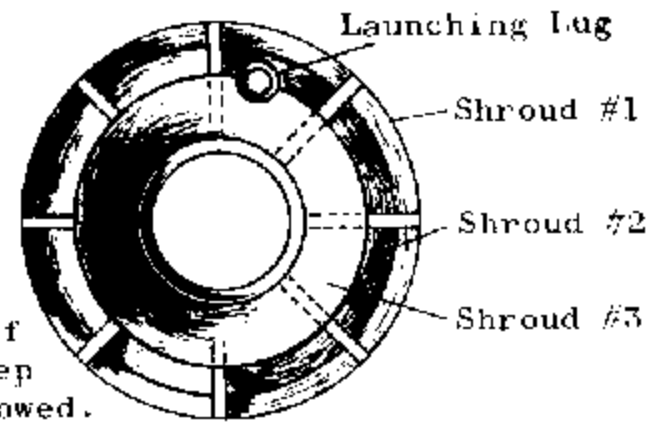
After the glue on the 2060 spacer ring has set slide shroud #1 into place on the body tube. It should fit snugly around the 2060 ring and extend about 9/32" beyond to the rear as shown. Mark the body tube at the forward end of the shroud and remove the shroud, sliding it far enough up the body tube to fully expose the mark just made. Apply a line of glue around the body tube at this point and around the edge of the 2060 ring. Turn the shroud so the opening for the launching lug lines up with the 1/4" hole in the ring and slide the shroud into place, seating it solidly against the 2060 ring all around.

Install shrouds #2 and 3 in the same way. First fit the shroud #2 in place and mark; remove it and apply a line of glue around the engine holder and the joint of the 2060 ring and shroud #1, then install the shroud, aligning the hole with the other two so the launching lug will slide through.

The shroud #3 makes a butt-joint fit against the shroud #2. Slide the shroud #3 back about a 1/4" and apply a ring of glue around the shroud #2-engine holder tube joint. Slide the shroud #3 into place, aligning the slot with the other 3 openings. Stand this entire assembly aside to dry thoroughly.

Step 8: GLUE ON THE COOLING FIN

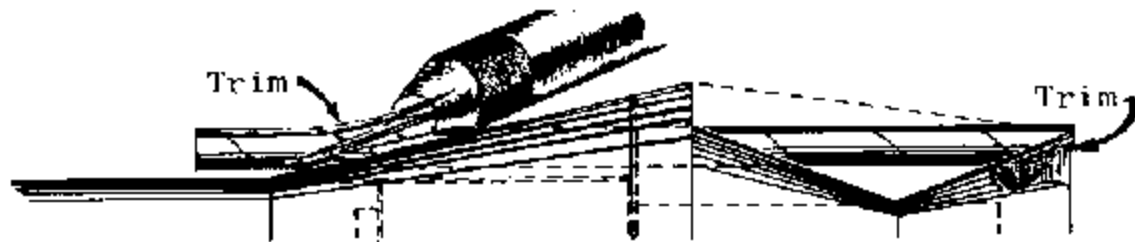
Set aside all fin pieces but the 8 you have cut for cooling fins. Lightly sand all these pieces, leaving the edges square. Glue the cooling fins in place, matching each to the marks on the shroud #1 and align each so it runs perfectly straight fore and aft. The diagram here shows the spacing for all eight fins as viewed from the nozzle end of your bird.



Shroud #1 should be marked for the correct spacing if directions in step 5 have been followed.

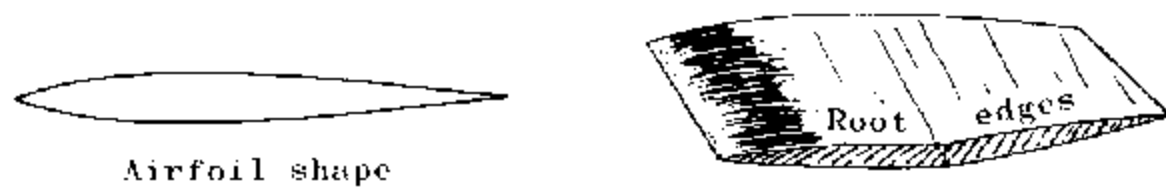
Step 9: INSTALL THE LAUNCHING LUG

Slide the launching lug through the holes so it protrudes from shroud #1 on the front and from shroud #3 at the rear. Trim the shroud openings if necessary to get a good fit around the lug. Once in place, run a fillet of glue around the lug where it touches the shrouds. Finally trim the launching lug as shown below.

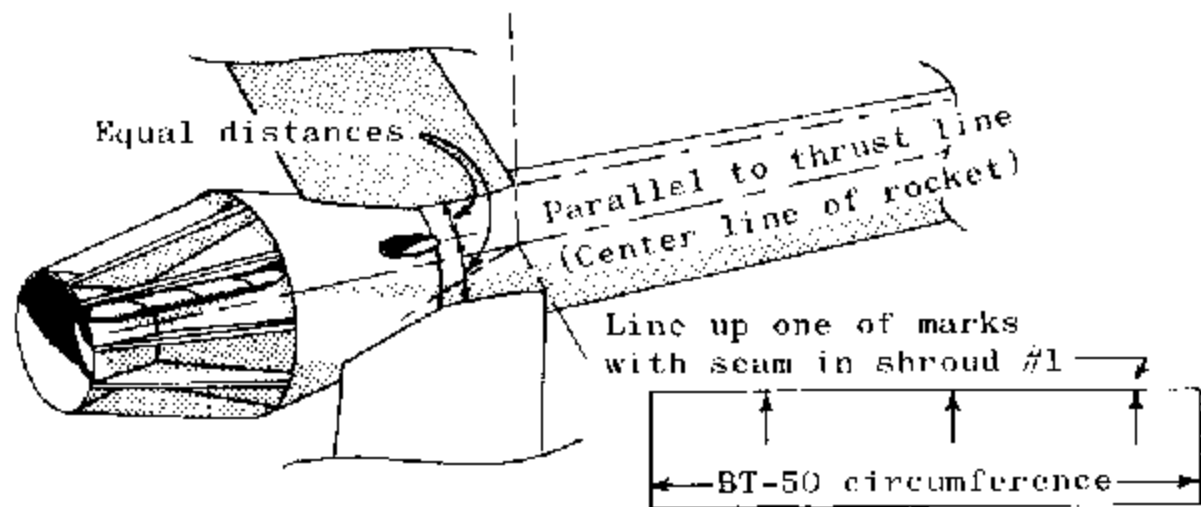


Step 10: GLUE ON THE MAIN FIN

Sand each main fin to a symmetrical airfoil, but do not round the outer edges where the fin pods will be glued. The root edges should be sanded perfectly flat on its two surfaces. From the overall view, you will note that part of the fins glue to the body tube and part to the shroud #1.

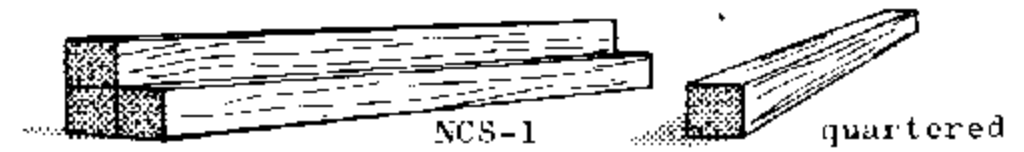


Cut out a strip of paper, wrap it around the BT-50 body tube and mark it for the exact circumference measurement of the tube. Divide the measurement into three equal parts, wrap the strip around the tube again next to shroud #1 and mark the tube at the three points spaced equally around the tube. Before marking, align the guide so one of the marks matches the seam in shroud #1. Put glue on the root edge of a fin and place it on one of the marks--align the fin by sighting down the body tube. Make sure the fin projects straight out from the body tube and is parallel to the line of thrust (centerline of the body tube).



Step 11: FORM THE FIN PODS

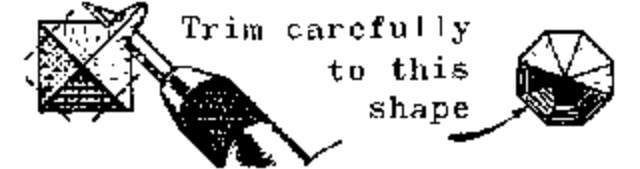
Take a piece of 1" nose cone stock (NCS-1) at least 5-1/4" long and quarter it lengthwise as shown. For best results use a razor saw or a hacksaw.



Select the best three pieces and scribe the fin pod pattern onto two sides. Carefully sand or carve away the excess wood down to these lines until you have a block like the one shown below.

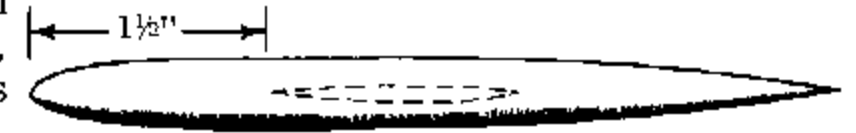


With a model knife, gently cut the corners as shown in the drawing to the right. This will give a generally rounded shape. Finish it off with medium and fine sandpaper to get a round pod. A good circle gauge can be a help in getting a perfectly round shape to your pod. The circles appearing on the pod pattern sheet are for this purpose. Glue the sheet to a piece of cardboard and carefully cut out each circle. Then use this guide as you sand the pods to shape.

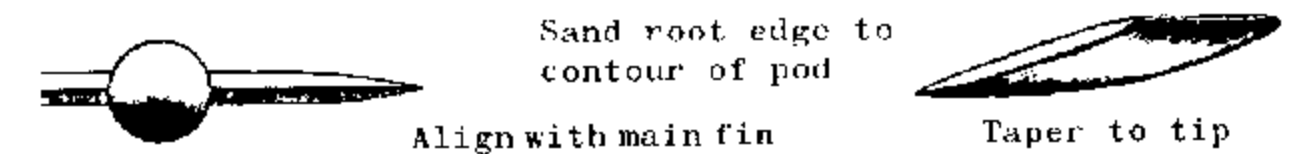


Step 12: GLUE FIN PODS AND OUTBOARD FIN IN PLACE

Mark each fin pod 1-1/2" from the lower end. This is where the pod and outer trailing edge of the main fin will meet. Apply glue to one main fin and position the pod, aligning it to run as straight fore and aft.



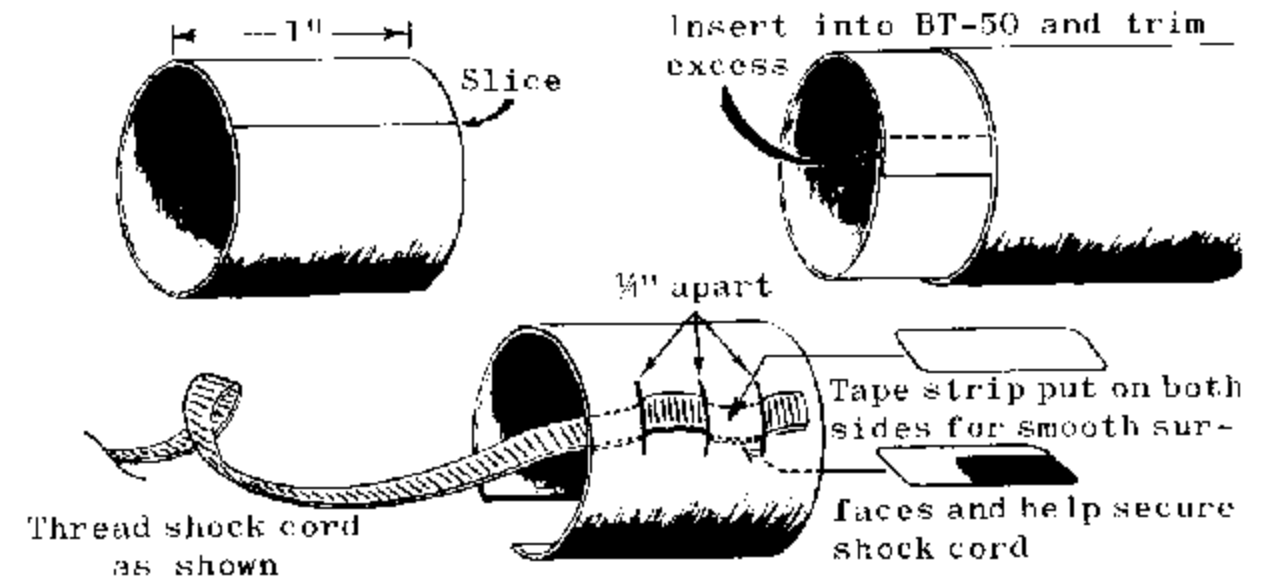
Glue all three pods in place as above and set the assembly aside to dry. Set the rocket on the front end of the body tube and avoid disturbing it until the fins and pods joints have set. While the pods are drying sand the outboard fins to the airfoil shape as in Step 10. These fins are tapered to a thin outer edge as shown in the drawing. The outboard fins are a continuation of the main fins, and so should be aligned perfectly with them. By the time



these pieces have been shaped, the main fin--pod joints should have dried sufficiently so you may now glue the outboard fins in place as described above.

Step 13: INSTALL THE SHOCK CORD

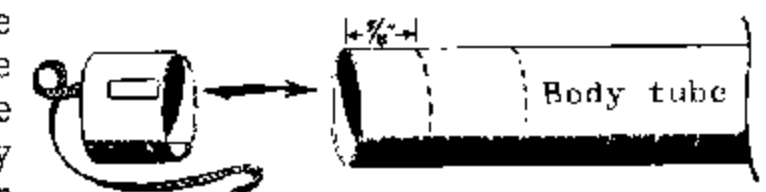
Cut a 1" piece of BT-50 and slice down one side. Squeeze the tubing together and insert it into the upper end of the body tube. Spread the tube inside until it makes a smooth sliding fit, and mark the amount of overlap. Remove this piece and cut off the overlapping section. Slot the piece on the side opposite the cut just made and install the shock cord as shown below.



Although the original model used the installation above, you may use the standard shock cord mounting procedure familiar to most every model rocketeer.

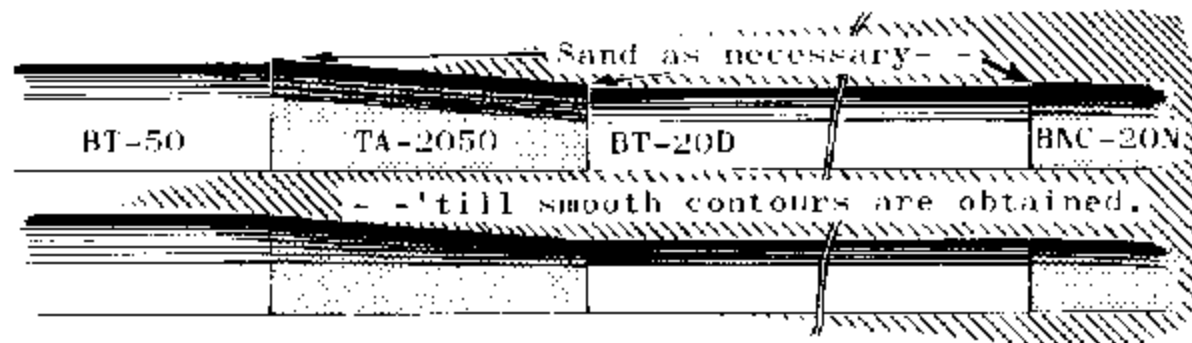
Step 14: INSTALL THE SHOCK CORD MOUNT

Smear glue around the inside of the body tube as shown in the drawing. Squeeze the shock cord mount together slightly and slide it into the body tube so the forward end of the mount is 5/8" from the forward end of the body tube. Press outward on the mount to bring it into firm contact with the body tube all the way around.



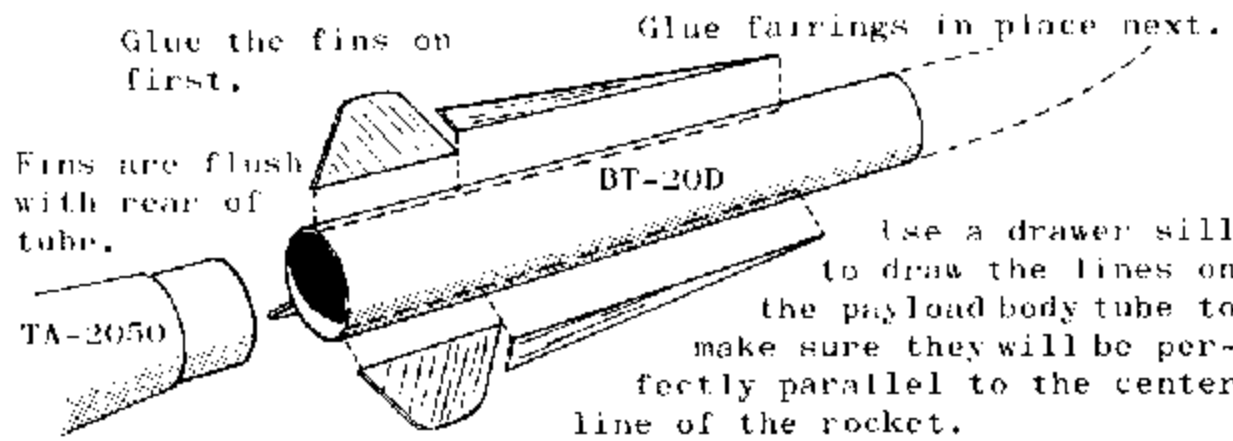
Step 15: FIT THE ADAPTER AND NOSE CONE

Slide the nose cone and adapter into place in the body tubes as shown. If necessary, sand their edges with extra fine sandpaper to make a smooth joint.



Step 16: GLUE THE FORWARD FIN IN PLACE

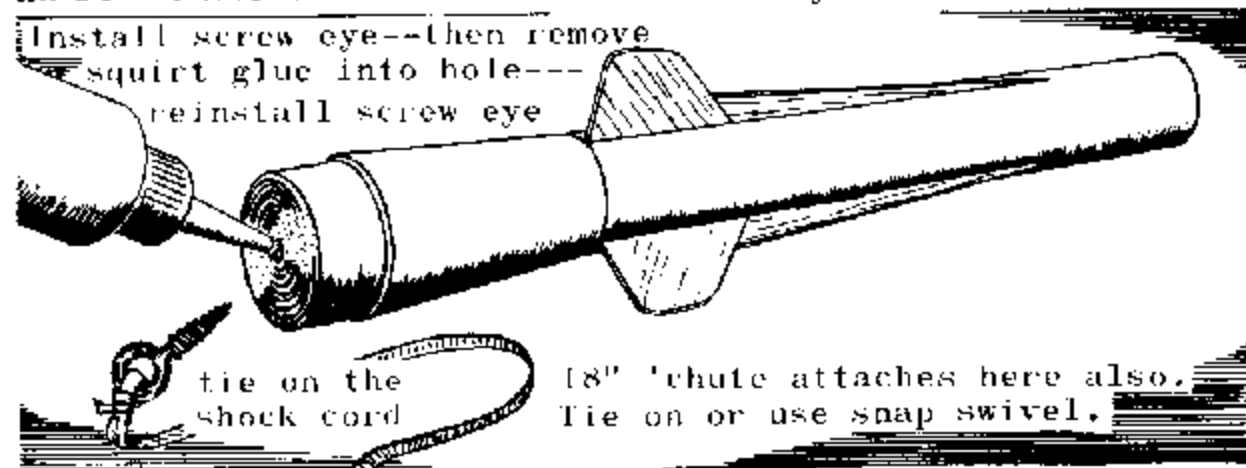
Forward fins are usually "taboo" on a model rocket. By making them small and balancing the rocket so its center of gravity is sufficiently far forward, the rocket can be made stable enough to obtain a good upward flight. Mark the payload section tube (BT-20D) at the adapter end for 3 fins. (Follow the same procedure as was used on the main body). Glue the fins to the



payload section, aligning them with extra care so they run perfectly parallel to the body. Glue the fairings in place, aligning them perfectly also. When the glue has set round the edges of the fins and fairings, using extra fine sandpaper.

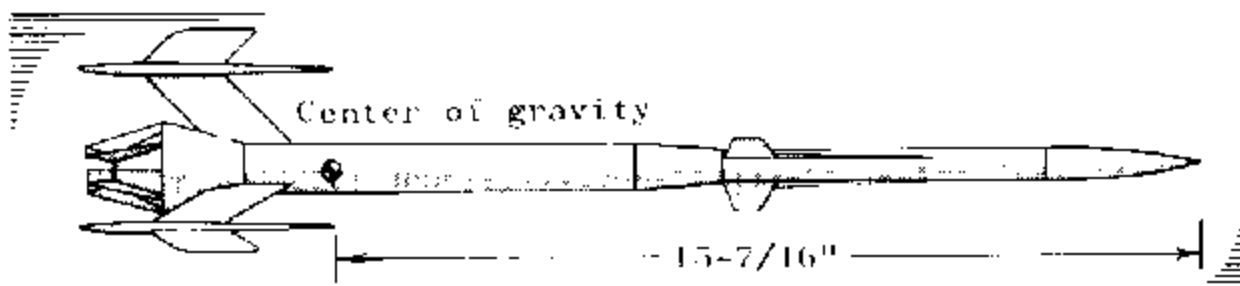
Step 17: FINISH THE PAYLOAD SECTION

Glue the forward end of the adapter into the rear of the payload tube. Insert a screw eye into the base of the adapter, remove it, squirt glue into the hole and replace the screw eye. Tie the free end of the shock cord to the screw eye. Assemble an 18" chute and attach it to the screw eye.



Step 18: BALANCE YOUR BIRD

Check the balance point of the rocket (its center of gravity) with recovery system and a loaded engine in place. The rocket must balance at a point no more than 15-7/16" behind the tip of the nose cone.



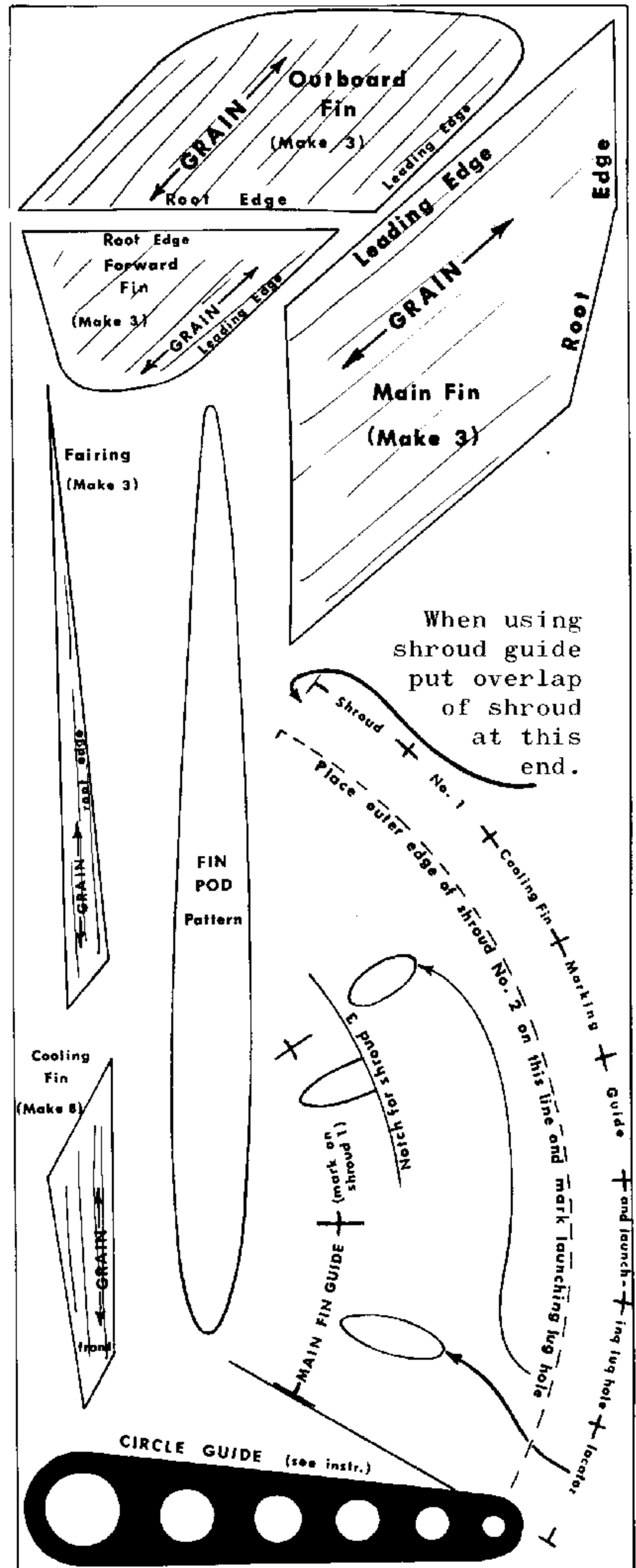
If the fins are crooked the rocket's balance point must be closer to the nose cone. Attach enough weights (NCW-1) to the cone to bring the C/G forward to the required position, then string test the model following the method described in the Technical Report TR-1.

Step 19: NOW PAINT IT!

Apply a liberal coat of sanding sealer to all balsa surfaces, let dry, and sand with extra fine (320 grit) sandpaper. Apply the sealer again, let dry and sand again, repeating this procedure until all pores in the balsa are closed. Apply at least one clean base coat of white enamel or butyrate dope, let dry and follow with the final colors. NOTE: Enamel paint may be applied over completely dry butyrate dope, but never apply dope over enamels as the dope will make the enamel surface craze and blister.

Step 20: INSTALL THE ENGINE

The engine must fit tightly to eject the upper section and chute properly. Use only 1/2A, 8-2, A, 8-3 or B, 8-4 engines in your MARS SNOOPER. Follow the procedures described in the instructions which come with your engines for installing the igniter and launching the rocket.



## PARTS LIST

1 Engine Mount	#EH-2050	1 Paper Adapter Set	#TA-1
1 Body Tube	#BT-50H	1 Nose Cone Stock	#NCS-1
1 Body Tube	#BT-20D	1 Stage Coupler	#JT-50C
1 Nose Cone	#BNC-20N	1 Shock Cord	#SC-
1 Balsa Adapter	#TA-2050	1 Launching Lug	#LL-1C
1 Sheet Fin Stock	#BFS-30	1 Screw Eye	#SE-1
1 Sheet Fin Stock	#BFS-20	1 Parachute	#PK-18

