

K-22

*Flying Scale Model*

# V-2

**PARACHUTE  
RECOVERY**

**EASY  
TO  
BUILD  
KIT**



**Specifications**

Length	11.2 in.
Body Dia.	1.325 in.
Weight	1.4 oz.

**Only  
\$1.75**



**Industries, Inc.**



Devoted to Safety and Education in Rocketry

Box 227,

Penrose, Colorado

# V-2

## General Information

The V-2 (A-4) was developed as an artillery weapon. It's development was partly due to the Versailles Treaty which included a clause prohibiting the Germans from developing or building certain weapons, but failed to mention rockets. The length and diameter of the missile were chosen to make it possible to transport it by both road and rail. The average range for the weapon was 180 miles with a 2,150 pound payload (including 1,650 pounds of high explosive).

The first successful V-2 launching took place on October 3, 1942. The first operational missiles were launched against

Paris on September 6, 1944, followed by launchings against Great Britain and Allied occupied areas on the Continent. Some 4,000 such launchings were made in addition to 600 experimental and training launchings.

At the end of the war in Europe the Allied forces captured a considerable number of unfired V-2's and parts. Of those captured by the Americans, enough missiles and supplies were brought to this country for over 60 launchings. These rockets were fired in upper atmosphere research programs from 1946 through 1952, providing a considerable amount of information on both upper atmospheric conditions and rocket performance.

### SPECIFICATIONS

Length 46.1 ft.                      Span 11.7 ft.  
Diameter 65 in.                      Weight loaded 27,376 lb.  
Thrust 56,000 lb.

## V-2 Parts List

Your V-2 scale model rocket kit consists of the following parts as illustrated in the drawing at right:

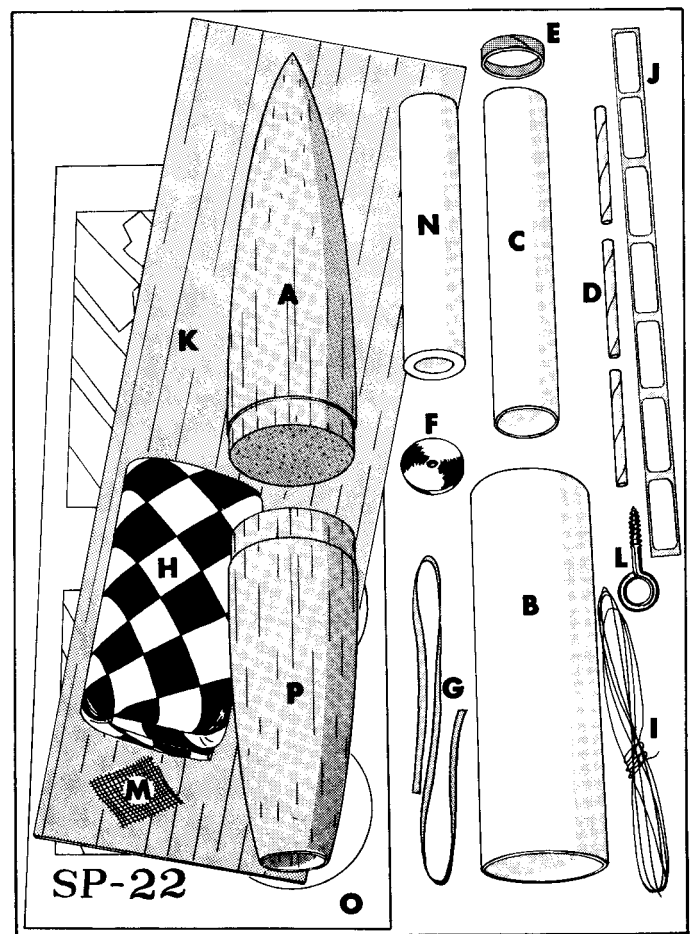
- (A) 1 nose cone--Part #BNC-55F
- (B) 1 body tube--Part #BT-55S
- (C) 1 engine holder tube--Part #BT-20G
- (D) 3 launching lugs--Part #LL-2A
- (E) 1 engine block--Part #EB-20A
- (F) 1 nose cone weight--Part #NCW-1
- (G) 1 shock cord--Part #SC-1
- (H) 1 parachute--Part #PK-12A
- (I) 72" shroud line cord--Part #SLT-1B
- (J) 7 tape strips--Part #TD-2G
- (K) 1 sheet balsa fin stock--Part #BFS-30
- (L) 1 screw eye--Part #SE-1
- (M) 1 gauze reinforcing--Part #GR-4
- (N) 1 reject engine casing--Part #EC-2
- (O) 1 pattern sheet--Part #SP-22
- (P) 1 tail cone--Part #BTC-55Z

NOTE: The engine casing provided with this kit is one which has been rejected as unsuitable for use in the construction of a rocket engine. It is provided as a measuring device only, and is not suitable for any other use.

In addition to the materials included with your kit you will also need the following tools and supplies:

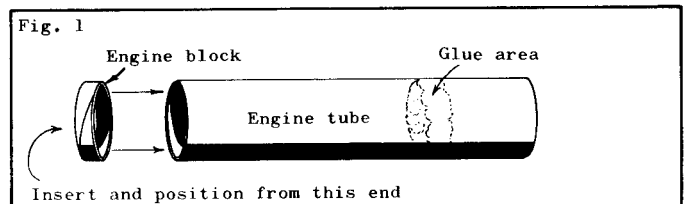
- 1) Modeling knife or single edge razor blade
- 2) Scissors
- 3) Extra strong white glue
- 4) Ball point pen or pencil
- 5) Fine and extra fine grit sandpaper
- 6) Paint or dope

Read the entire assembly instructions carefully before beginning work on your rocket. Then start construction, following each step in order, checking off each step as it is completed.

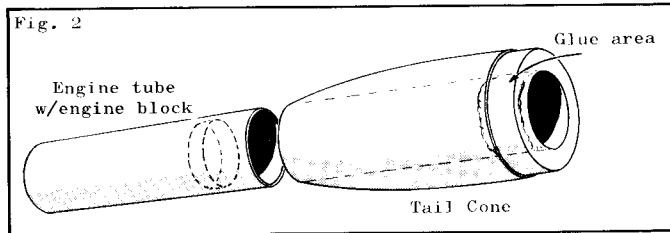


## Assembly Steps

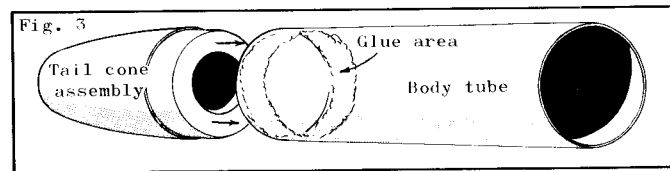
- (1) Smear glue around the inside of the BT-20G engine holder tube 1" from one end. Insert the engine block into the other end of the tube and push it forward with the reject engine casing until the end of the casing is even with the end of the tube. Do not pause during this operation or the glue may set with the block in the wrong position. Remove the casing immediately.



□ (2) Smear glue around the inside of the tail cone near its front (the large end). Let the glue set a minute, then insert the engine holder tube, engine block end first, into the rear of the tail cone. Quickly slide the tube forward until its rear is even with the end of the tube. Do not pause during this operation or the glue may set with the block in the wrong position. Remove the casing immediately.



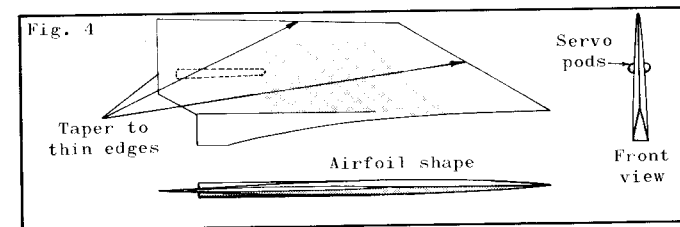
□ (3) Apply glue to the inside of the body tube to cover a 1/2" area at one end. Slide the tail cone into this end of the tube and set the assembly aside in a vertical position to dry.



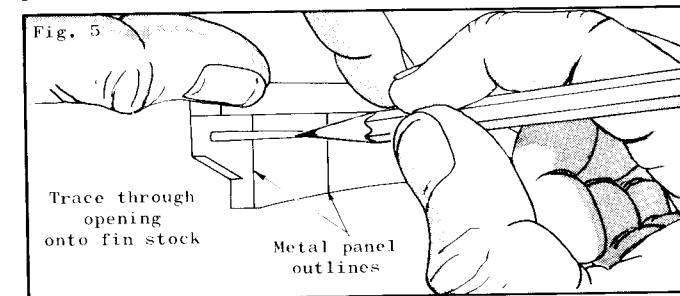
## Scale or Semi-Scale ...

□ (4) The V-2 may be built as either a scale or semi-scale model. The difference is in the size of the fins—the semi-scale version has larger fins for greater stability and straighter flights. Select the fin pattern for the version you wish to build and cut it out. Position the pattern on the balsa as with the grain direction on the pattern. Trace around the pattern to make four fins, then cut them out with an extra sharp blade.

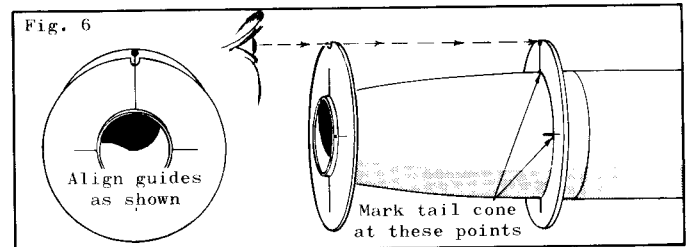
□ (5) Sand the fins to the shape shown in Fig. 4. An emery board is recommended for this. Leave the root edges of the fins square and flat.



□ (6) Cut the servo pod section from the fin pattern with a sharp knife. Lay the pattern over a fin, match the edges and trace around the inside of the cut-out. Repeat this on both sides of all four fins. Trace eight servo pods on the smooth edges of the remaining balsa stock and cut the pods out. Glue the servo pods onto the fins in the positions marked.

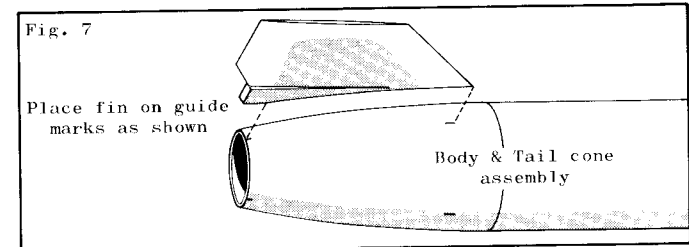


□ (7) Carefully cut out the two circular spacing guides. Place them on the balsa tail cone as shown and match them up by sighting along the model so the corresponding marks on the two circles are exactly in line with the body tube. Mark the tail at the points where the lines on the guides touch the balsa.

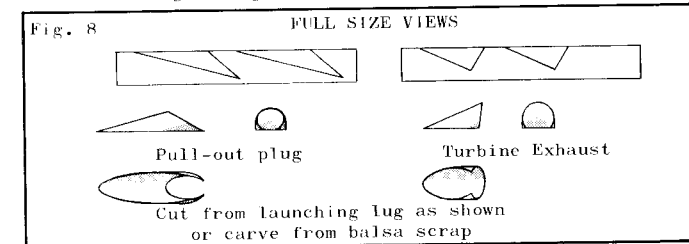


## Attach the Fins

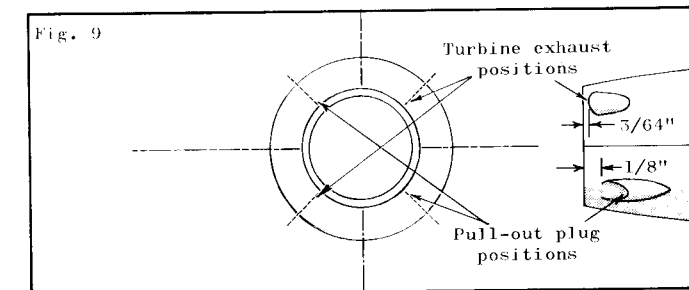
□ (8) Apply glue to the root edge of a fin. Press it against the tail cone exactly on a pair of the marks made in step 7. Align the fin so it projects straight away from the center of the rocket. The fin should be positioned as shown in Fig. 7. Repeat this operation with the other three fins.



□ (9) Form two turbine exhausts and two pull-out plugs from the extra pieces of launching lug. An extremely sharp blade is best for cutting these pieces, and a piece of 1/8" dowel or rod

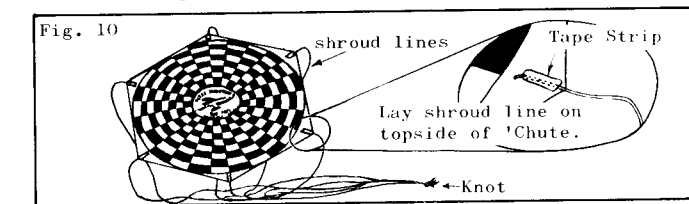


can be inserted through the lug to stiffen it while cutting. Glue the turbine exhausts and pull-out plugs on the rear of the rocket as shown in fig. 9

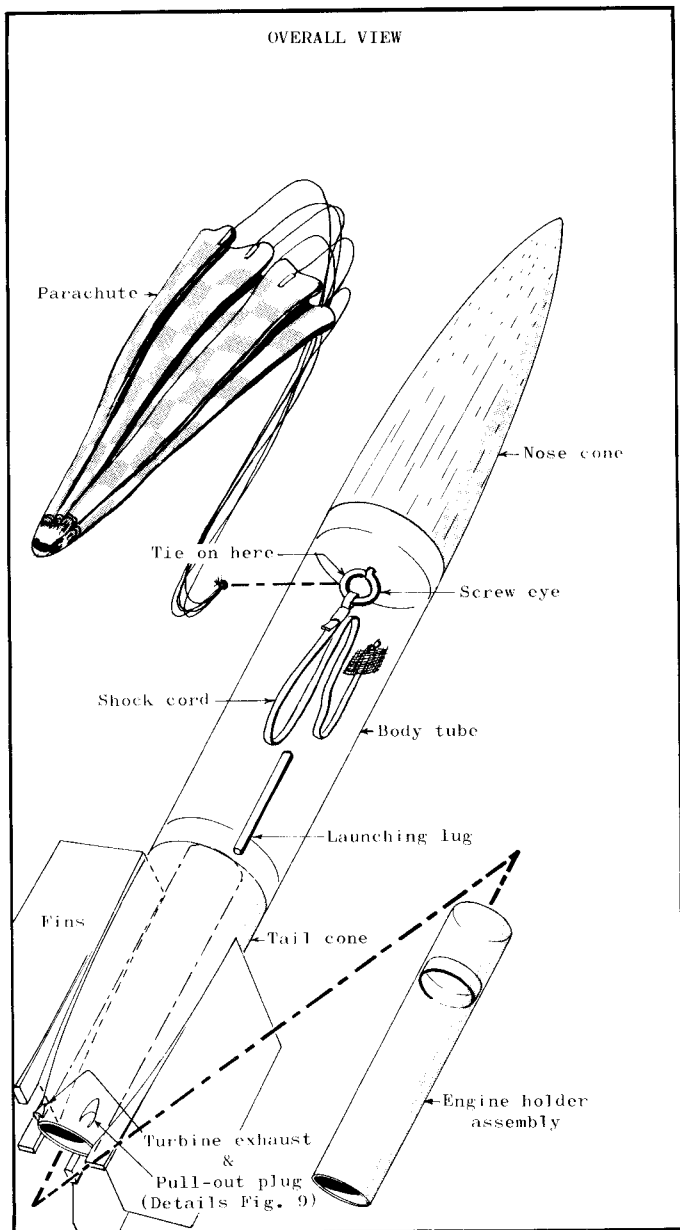


## Parachute Assembly

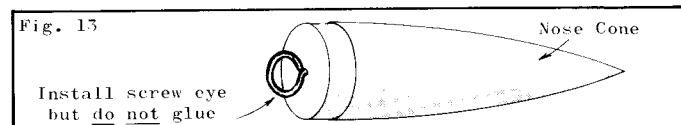
□ (10) Cut out the parachute on its edge lines as indicated on the plastic. Cut six 12" lengths of shroud line cord and attach one shroud line to each point of the parachute with a tape strip as shown in fig. 10. Tie the free ends of the lines together.



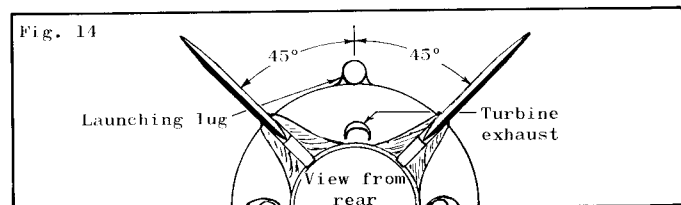
□ (11) When the glue on the fin joints has dried completely apply two or three glue fillets along the joints. These fillets should be thin at the leading edge and spread out to a very heavy layer at the rear as shown. Each fillet should be allowed to dry separately while other steps are being carried out.



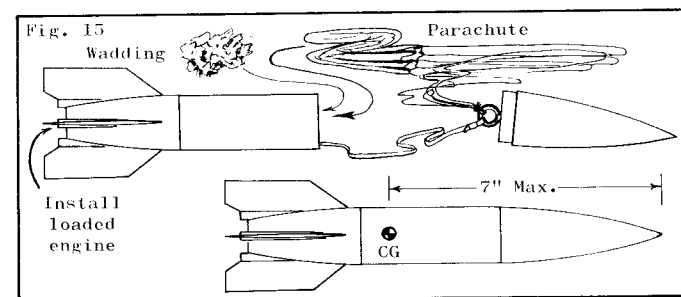
□ (13) Screw the screw eye snugly into the base of the nose cone. Do not glue it in place yet.



□ (14) Glue the launching lug to the body tube in the position shown in fig. 14. Sight along it and make sure it is aligned perfectly with the body tube and is centered between two fins.

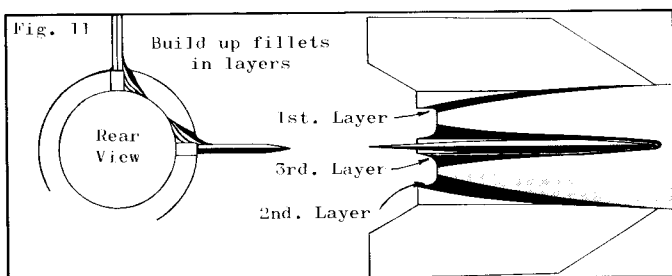
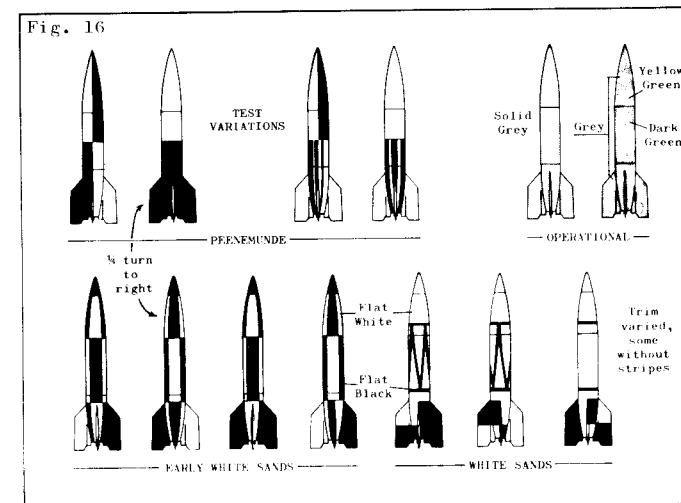


□ (15) Hook the shock cord, nose cone and parachute together as shown. Pack the recovery system into the body and insert a loaded engine into the rear of the rocket. Locate the center of gravity (balance point) of the model. The CG must be no more than 7" from the tip of the nose cone. If the rocket balances behind this point remove the screw eye, thread it through the nose cone weight and reinstall it. If the fins are crooked or unevenly shaped the rocket may wobble in flight. To correct for this the balance point should be closer to the nose. If in doubt, test fly the model with a 1/2A.8-2 engine before finishing it. When the rocket has been balanced correctly and you are sure it will fly straight, remove the screw eye, squirt glue into the hole and reinsert the screw eye.

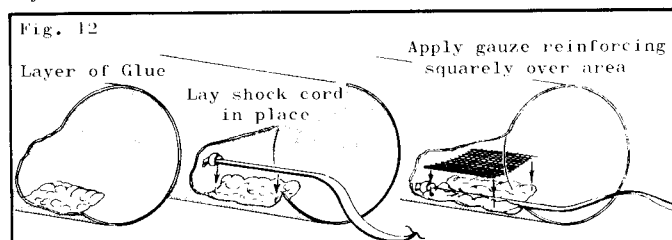


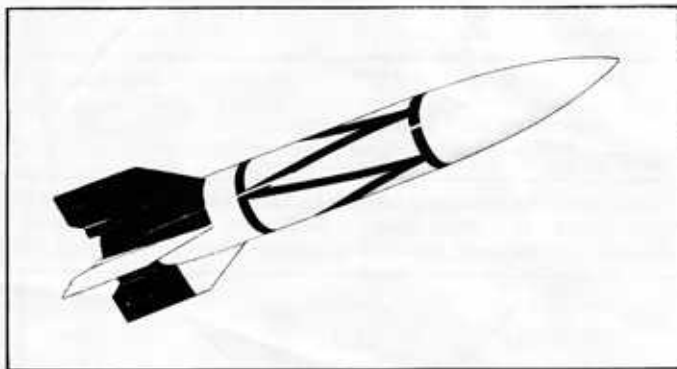
## Bird of Many Colors

□ (16) A variety of paint patterns have been used on the V-2. Several typical patterns are illustrated below. Be sure all glue on the outside surfaces of the rocket has dried so it is hard and clear. Sand all balsa parts with extra fine sandpaper. Apply a coat of sanding sealer to the balsa, let dry and sand again. Repeat as needed to fill all the pores and grain marks in the balsa. Sanding sealer may also be used on the body tube to completely eliminate the seam marks. Enamel paint should be used for the final coats.



□ (12) Tie a knot in one end of the shock cord. Smear a thick layer of glue over a 1" square area of the body tube beginning about 3/4" from the front of the tube. Quickly lay the knotted end of the shock cord on the glued area and place the gauze reinforcing over the shock cord so that it is centered in the glue layer.



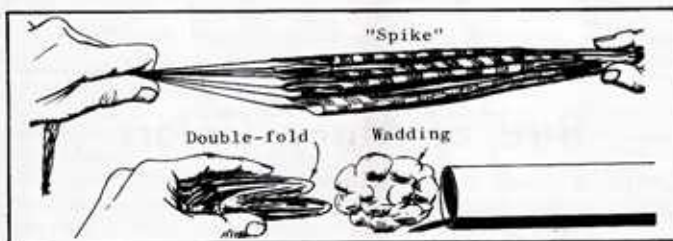


## Launching the V-2

The engine types recommended for use in the V-2 are the 1/2A, 8-2, A, 8-3 and B, 8-4. For the first test flights 1/2A, 8-2 engines should always be used. Due to the critical stability characteristics of the scale version it is important to correct for any wobbling in flight before proceeding to larger engines. For the same reason the model should be launched only when there is little or no breeze. Launch the V-2 using a standard electrical launching system with a 1/8" diameter launch rod at least 36" long.

## Countdown Checklist

-13- Pack flameproof recovery wadding into the body tube from the top. The wadding should fill the tube for a distance of about 1-1/2 to 2 inches and fit along the sides of the tube (5 or 6 squares of RP-1A are recommended). Hold the parachute between two fingers at its center and pass the other hand down it to form a "spike" shape. Fold this spike in three sections as shown in the illustration. Push the folded parachute down into the tube on top of the wadding and pack the shroud lines and shock cord in on top of the parachute. Slide the nose cone into place.



-12- Install an electrical igniter in the engine as directed in the instructions which came with the engine.

-11- Wrap the engine with masking tape until it makes a tight fit in the engine holder tube. This fit must be tight so the engine will not blow out when the ejection charge is activated. Insert the engine into the tube until its forward end rests against the engine block.

-10- Remove the safety interlock or key from the launch control panel. (If a simple spring switch is used, install the protector on the switch to separate the contacts.) Carry the key or interlock on the person of the launch control officer.

-9- Place the rocket on the launcher. Check to be sure the panel is disarmed. Clean the micro-clips and attach them to the igniter.

-8- Clear the launch area, alert the recovery crew and the trackers.

-7- Check for low flying aircraft and unauthorized persons in the recovery area.

-6- Arm the launch panel.

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

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## PARACHUTE RECOVERY

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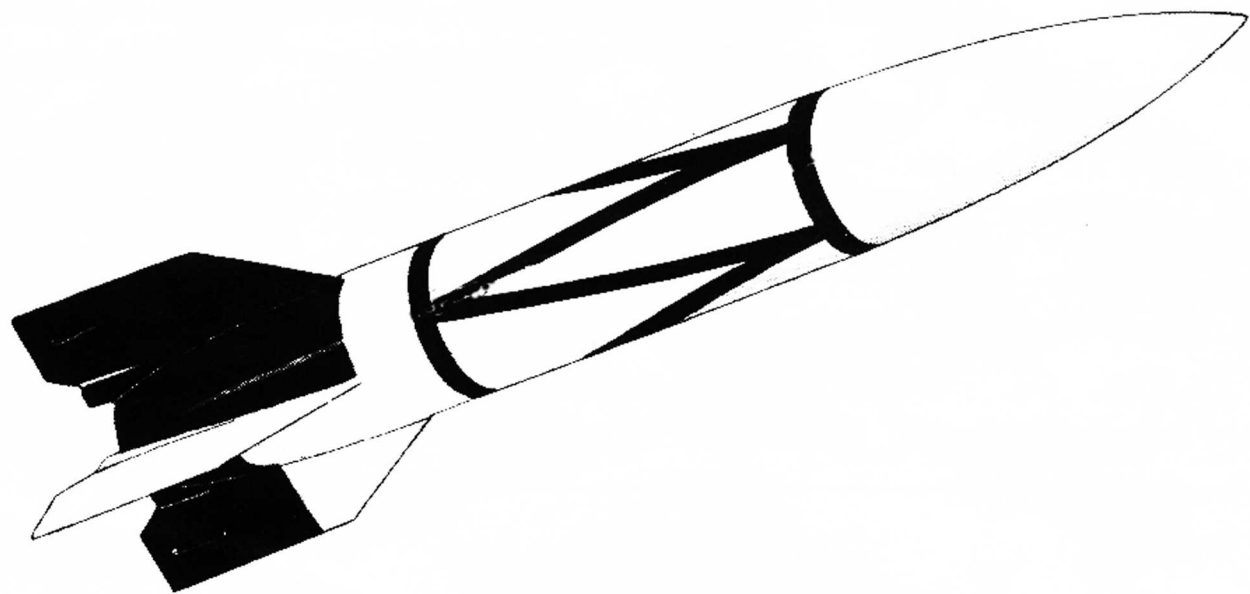


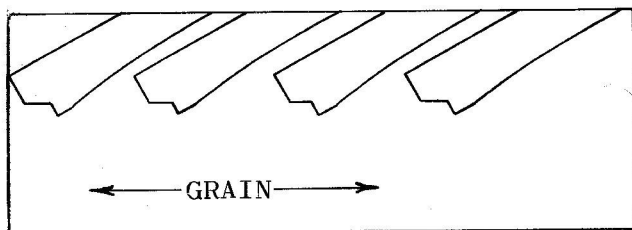
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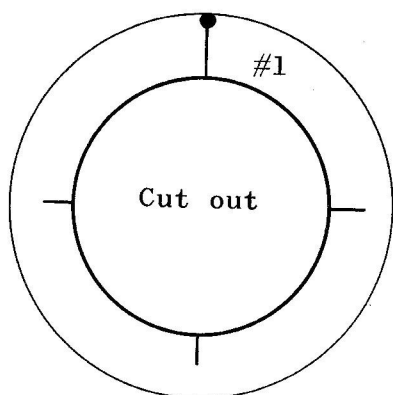
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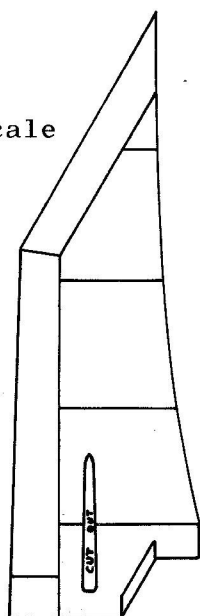




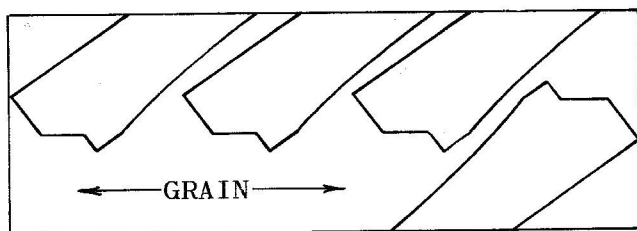
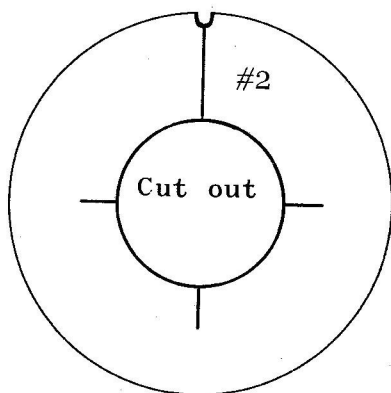
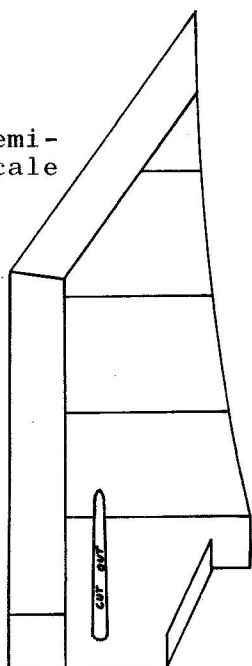
For Scale fins



Scale



Semi-Scale



For Semi-scale  
fins



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