

# BIG BERTHA

Only  
\$2.00

PARACHUTE RECOVERY

RELIABLE!

PERFECT FOR DEMONSTRATIONS

SIMPLE!

SINGLE ENGINE OPERATION



ESTES Industries, Inc.

Dedicated to Safety and Education in Rocketry

Box 227,  
Penrose, Colorado

## PARTS LIST

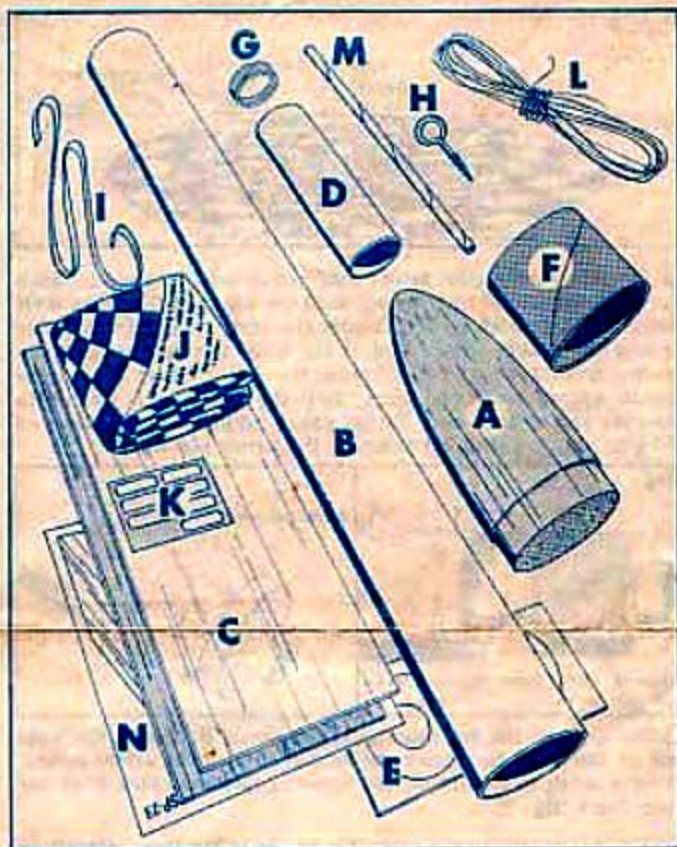
Your Big Bertha model rocket kit consists of the following parts as illustrated in the drawing at right:

- (A) 1 nose cone--Part #BNC-60L
- (B) 1 body tube--Part #BT-60
- (C) 2 sheets balsa fin stock--Part #BFS-40
- (D) 1 engine holder tube--Part #BT-20J
- (E) 1 ring set--Part #RA-2060
- (F) 1 stage coupler--Part #JT-60C
- (G) 1 engine block--Part #EB-20A
- (H) 1 screw eye--Part #SE-1
- (I) 1 shock cord--Part #SC-2
- (J) 1 parachute--Part #PK-18A
- (K) 7 tape strips--Part #TD-2G
- (L) 108" shroud line cord--Part #SLT-1C
- (M) 1 launching lug--Part #LL-2C
- (N) 1 pattern sheet--Part #SP-23

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

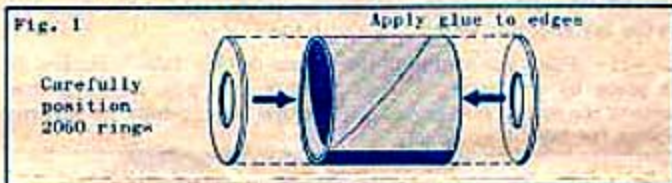
- 1) Modelling knife or single edge razor blade
- 2) Scissors
- 3) Extra strong white glue
- 4) Ball point pen or pencil
- 5) Fine and extra fine grit sandpaper
- 6) Paint or dope

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.

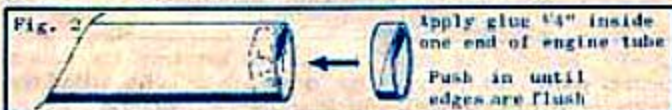


## ASSEMBLY

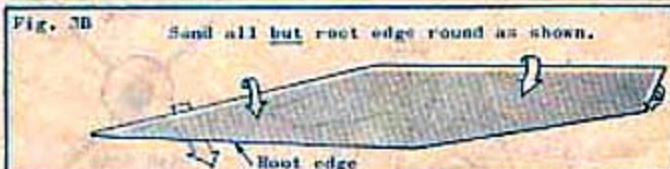
- (1) Glue one adapter ring to each end of the stage coupler as shown in fig. 1. The rings should be centered perfectly on the coupler. Apply enough glue to make a permanent, strong joint, but do not leave any excess glue on the outside of the unit. Set the assembly aside to dry thoroughly.



- (2) Glue the engine block in one end of the 2-3/4" long engine holder tube. To do this, apply glue to the last 1/4" of the inside of the tube, then slide the engine block into the tube until the end of the block is even with the end of the tube (see fig. 2).



- (3) Cut out the fin pattern. Lay the pattern on the balsa fin stock as shown with the grain of the wood and the grain shown on the pattern matched perfectly. Trace out four fins, two on each sheet of the balsa. Cut out the fins carefully and sand them as shown in fig. 3B.



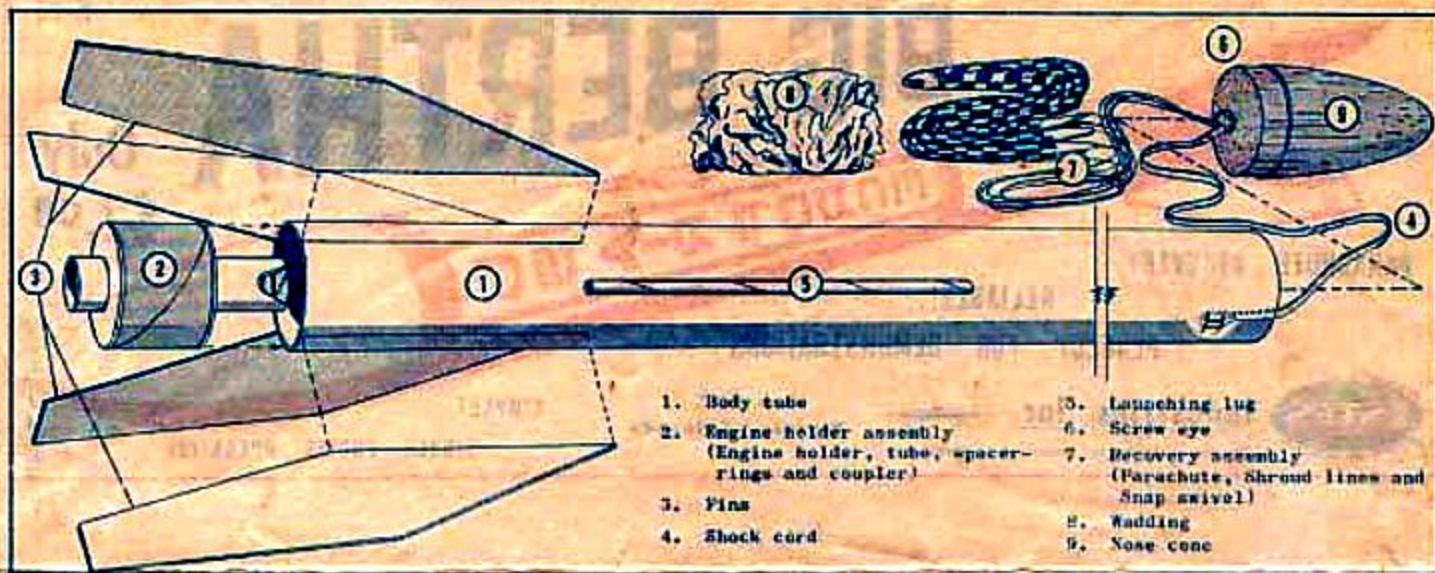
- (4) Slide the engine holder tube into the ring-coupler assembly so the end that does not have the engine block projects 1/2" from the coupler. Apply a heavy glue fillet all the way around each ring-tube joint as shown. Set aside to dry.



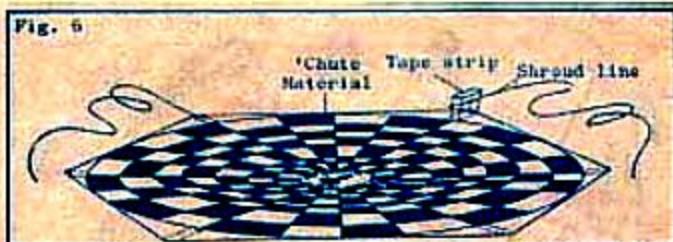
- (5) Insert the screw eye into the base of the nose cone. Remove the screw eye, press the nozzle of the glue bottle to the hole and squirt glue into the hole. Replace the screw eye and wipe away any excess glue.



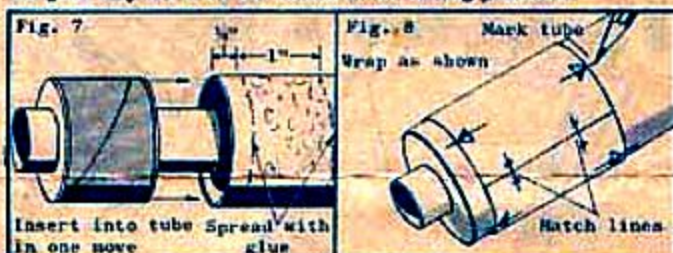
- (6) Cut out the parachute on its edge lines as indicated on the pattern. Cut six 18" lengths of shroud line cord and attach one shroud line to each point of the parachute with a tape strip as shown in fig. 6. Tie the free ends of the lines together.



- |  |   |
|--|---|
| 1. Body tube   | 5. Launching lug  |
| 2. Engine holder assembly<br>(Engine holder, tube, spacer-rings and coupler) | 6. Screw eye  |
| 3. Fins  | 7. Recovery assembly<br>(Parachute, shroud lines and Snap swivel) |
| 4. Shock cord  | 8. Wadding  |
|  | 9. Nose cone  |



(7) When the engine mount unit has dried completely check its fit in the BT-60 body tube. Sand the edges of the rings until they make a smooth slide fit inside the body tube. Smear glue around the inside of one end of the body to cover an area extending from 1/4" to 1-1/4" from the end. Insert the engine mount, engine block end first, until the rear ring is flush with the rear end of the body. Do not pause during this operation or the glue may set with the mount in the wrong position.



(8) Cut out the fin spacing guide, wrap it around the rear end of the body and mark the tube at each of the arrow points. Draw a straight connecting line between each matching front and rear mark (fig. 8).

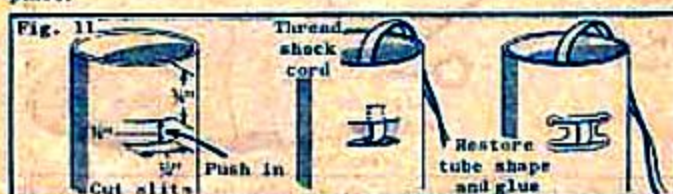
(9) Apply glue to the root edge of one of the fins. Attach the fin to the rocket's body tube with the edge of the fin along one of the lines drawn in step 8. Align the fin so it projects straight away from the body tube. Following the same procedure, attach the other three fins. Do not set the rocket on its fins while the glue is wet.



(10) Glue the launching lug to the body tube so its rear is even with the front of the fins and is halfway between two fins as shown. Sight along the tube and align the lug so it runs parallel to the body tube.



(11) Cut two 1/2" wide slits in the forward end of the body as shown in fig. 11. Cave in the section between the slits and hook the shock cord through the slits. For an extra secure attachment, knot the inside end of the shock cord. Press the caved-in portion of the tube outward until it is round again and apply glue to the cut edges and to the shock cord to anchor it in place.



(12) Connect the shock cord, parachute and screw eye as shown in fig. 12. Push the parachute into the body tube, packing the shroud lines and shock cord over it. Push the base of the nose cone to the forward end of the body tube.



(13) Apply a heavy white glue fillet to the fin-body joints and to the launching lug. Support the rocket on its side while the glue dries.

(14) Before finishing let all the glue on the outside of the rocket dry so it is hard and clear. Sand all balsa surfaces with extra fine sandpaper. Apply a coat of sanding sealer to the balsa, let dry and sand again. Repeat until all surfaces look and feel smooth. Give the rocket at least one clean base coat of glossy white enamel or dope, then give it two or more coats of the final colors to produce the best appearance.

### GENERAL INFORMATION

The engine type recommended for use in the Big Bertha is the B.8-2. Due to the model's slow takeoff characteristics, it is best to launch it on calm days. Launch the Big Bertha using a standard electrical launching system with a 1/8" diameter launch rod at least 36" long.

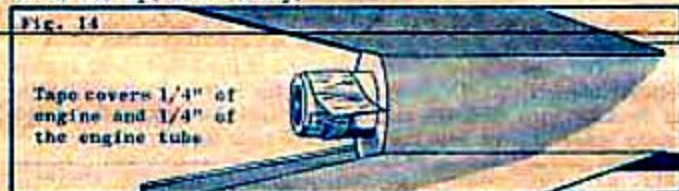
### COUNTDOWN CHECKLIST

-13- Pack flameproof recovery wadding into the body tube from the top. The wadding should fill the tube for a distance of about 2-1/2 to 3 inches and seal tightly along the sides of the tube (8 to 10 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 two or 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- Place the engine in the engine holder tube. Secure it in place by wrapping a 3" long piece of 1/2" wide masking tape around the end of the engine and engine holder tube as shown. Press the tape down firmly.



-10- Remove the safety interlock or key from the launch control panel. (If a simple spring switch is used, install the protector around 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 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!