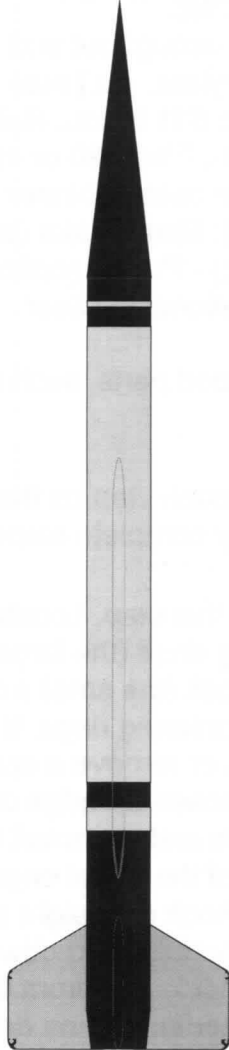




WAC CORPORAL

**A SCALE MODEL ROCKET
KIT FOR 18MM ENGINES**



Specifications:

Length: 15.75"/40 cm Dia.: .976"/24.8 mm

Weight: 1.47 oz/42 gm

12" Parachute Recovery

Recommended Engines:

A6 - 4; A8 - 3; B6 - 4; C6 - 5; C6 - 7

Scale: approx. 1/12

Skill Level: Beginner/Intermediate



www.asp-rocketry.com

ABOUT THE WAC CORPORAL

The WAC Corporal was the United States first sounding rocket. Seventeen WAC and WAC B rockets were flown from 1945 to 1947. The WAC was launched with the aid of the Tiny Tim solid propellant booster. After the booster burned out, it fell away and the liquid fuel propelled sustainer stage continued its' upward flight. For further information and scale data on the WAC Corporal see the references listed below.

References:

Rockets of the World: A Modelers Guide,
Fourth Edition, Peter Alway, National
Association of Rocketry, 2008

Aerospace Speciality Products has taken reasonable care in the design and manufacture it's products. Aerospace Speciality Products cannot control the use and storage of same once sold and cannot assume any responsibility for personal or property injury resulting from the use, storage and/or handling of its products. The buyer assumes all risks and liabilities therefrom and accepts the uses Aerospace Speciality Products products on these conditions. No warranty either expressed or implied is made regarding Aerospace Speciality Products products, except for replacement or repair, at Aerospace Speciality Products option, of those products proven to be defective in manufacture within one month from date of original purchase. For repair or replacement under this warranty, please contact Aerospace Speciality Products. Proof of Purchase will be required. Note: Your state may provide additional rights not covered by this warranty.

© 2014 Aerospace Speciality Products

Please be sure to read the instructions thoroughly before beginning. Test fit all parts before applying adhesive.

Parts List - Be sure to check the following list to be sure your kit is complete:

1 Red Engine Tube; 1 Engine Block; 2 Centering Rings; 1 Metal Engine Hook; 1 Metal Screw Eye; 2 Metal Washers (Nose Weights); 1 Kevlar® Cord (Shock Cord Mount); 1 White Elastic Shock Cord; 1 Launch Lug; 1 White Body Tube; 1 Set of Three Laser-cut Fins; 1 Square Basswood Stick; 1 Balsa Nose Cone; 1 Tube Marking Guide; 1 Parachute Kit.

Tools and Materials - The following will be needed to build your model:

Adhesives (Wood glue, such as Elmer's Carpenters Glue, can be used throughout and is recommended for most construction. Other adhesives [epoxy, cyanoacrylate, etc.] may be used if you are familiar with their use and prefer them.); Hobby Knife with sharp #11 Blade; Ruler; Pencil; Masking Tape; Sandpapers (Coarse - 50 or 60 grit, Medium - 180 or 220, Fine 320 or 400, & [optionally] Extra-Fine - 500 or 600); Sanding Sealer (or other balsa filler coat); Thinner (appropriate for the type of sanding sealer used); Small Paint Brush (to apply sealer); Spray Paint (such as Testors or Krylon is recommended, do not mix brands/types with testing) - Primer (optional, but recommended), White and/or Yellow (see Step #15), Black, Silver & (optionally) Clear.

Recommended, but not required: Sanding Block; Tack Cloth.

Optional: Material to fill body tube seams and/or any imperfections in wood parts, such as Elmer's Carpenters Wood Filler, Interior Spackling Paste, etc.

Assembly Instructions - You can use the checkboxes to mark off each step as they are completed. Note: while waiting for glue to dry in steps up to #5, you may complete steps #6 & 7.

□ 1) First you'll make the engine mount, refer to Figure A as needed for this step. Locate the red engine tube, the Kevlar® cord, the metal engine hook, the two centering rings (the larger ring shaped pieces that fit the outside of the engine tube) and the engine block (the small ring shaped piece that fits inside the engine tube). Test fit the engine tube into the centering rings. If the engine tube does not fit smoothly, you may need to sand the inside of the rings or remove a layer or two of the paper wrap from the inside of the centering ring (use your knife to loosen an edge of the paper and carefully pull it out). Take the engine tube, and with your hobby knife make a small horizontal slit about 1/8" wide and 1/4" from one end of the tube. Slip the "hook" end of the metal engine hook into the slit (hold the hook in place with a small piece of tape) - be sure the hook is straight along and parallel to the tube. Slip one of the centering rings over the top end of the tube and down over the hook. Apply a thin layer of glue to the outside of the engine tube about 1/2" - 3/4" from the end (see drawing, this is the location of the "First Centering Ring") and slide the centering ring down until it is in the proper location - be sure to check the alignment of the engine hook.

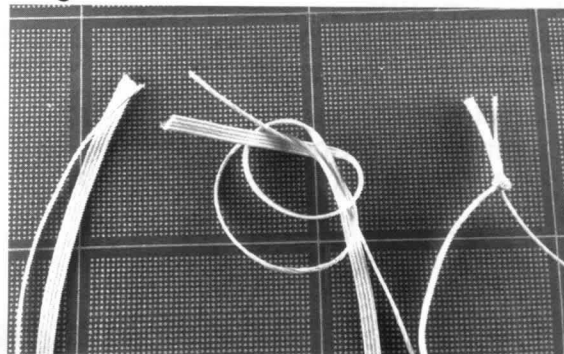
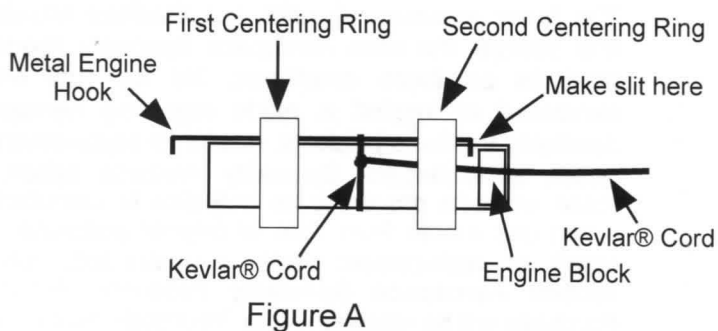


Figure B

Take the Kevlar® and tie firmly around the middle of the engine tube and hook as shown in Figure A. Slip the remaining centering ring over the loose end of the Kevlar® and down over the end of the tube. Apply glue and slide the second ring in place as shown. Apply a small amount of glue inside the top of the tube above the end of the metal hook and push the engine block into place. Allow the glue to dry thoroughly. If desired, you can add glue fillets to the joint between the centering rings and the engine tube for extra strength.

□ 2) Locate the white elastic shock cord. Take the loose end of the Kevlar® and one end of the elastic and hold the ends evenly. Tie a simple overhand knot about 1/2" to 1" from the ends and tighten down the knot firmly so the two pieces of material are held tightly together. If needed, trim the loose ends to about 1/4" to 1/2" long. See these steps shown left to right in Figure B.

□ 3) If you wish to fill the spiral seam in the white body tube, do so now by applying a small amount of one of the recommended filler materials (see "Tools and Materials") along the seam and allow to dry. Sand the filler material with medium or fine sandpaper until the material is flush with the surface of the tube. Repeat as needed to totally fill the seam.

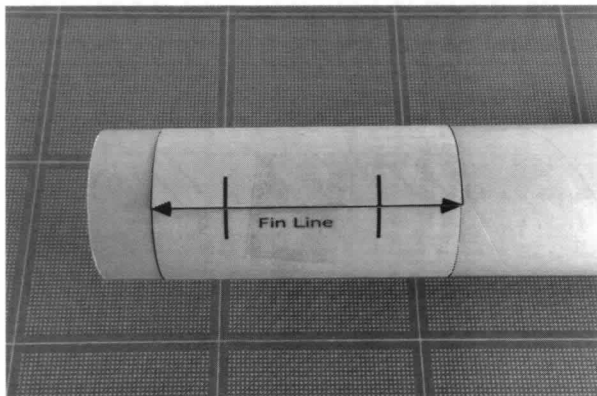


Figure C



Figure D

□ 4) Locate the Tube Marking Guide and cut it out. Wrap the guide around the body tube and use the marks on each end to align the guide (see Figure C). Use a piece of tape to hold the guide together. With a sharp pencil mark the body tube at the arrows at the end of each line for the fins and launch lug (be sure to note which line is for the launch lug). Remove the marking guide and discard. Using a metal angle, door frame or other tube marking tool, connect the marks to make lines on the tube for the full length of the tube (see Figure D).

□ 5) Locate the engine mount you made earlier. To avoid getting glue on the shock cord, thread it down through the top of the engine mount so that the shock cord hangs out the rear of the mount. Test fit the engine mount into one end of the white body tube - you should be able to smoothly insert it, but it should still fit fairly snugly. If it doesn't fit smoothly lightly sand the centering rings and test again. With your finger or a piece of scrap wood, liberally spread some glue on the inside of the body tube where the engine mount will fit. Align the engine hook with the launch lug line on the body tube, and in one smooth motion insert the engine mount into the body tube (**Be sure to insert the end with the engine block first!**) until the ends of both tubes are even. The end of the metal hook will be hanging outside the end of the body tube as shown in Figure E. Allow to dry completely. After the mount is dry thread the shock cord back through the engine mount so that the cord is inside the main body tube.

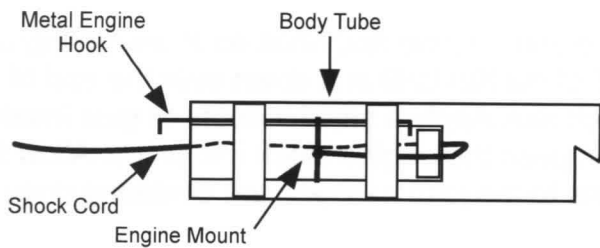


Figure E

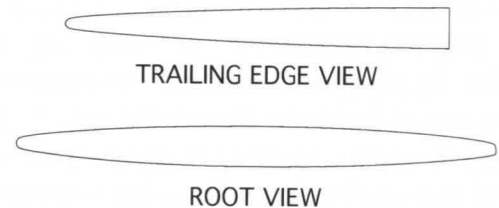


Figure F

□ 6) Locate the balsa sheet with the laser-cut fins. Using your hobby knife carefully remove the fins from the sheet. Using medium grit sandpaper, shape the fins as shown in Figure F. For the most scale appearing fin, the edges should come to a rounded, but fairly sharp point. Be sure to keep the root edge (the edge that will be glued to the body tube) square. Then use fine sandpaper to further smooth the rounded edges and the sides of the fins. Repeat with extra fine sandpaper if desired. If you want a slightly less scale fin, simply round all edges of the fins except the root edge. Set aside.

□ 7) Locate the square basswood stick. This will be shaped to simulate the conduit on the real rocket. Cut the stick to $6 \frac{5}{16}$ " long. Using coarse sandpaper shape as shown in Figure G. Use medium to fine sandpaper to further smooth and shape as needed and set aside.

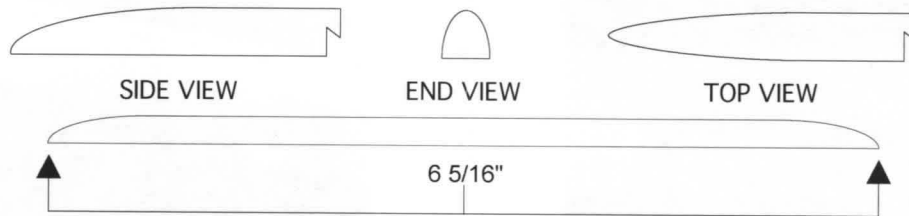


Figure G

□ 8) One at a time, glue the fins to the body tube along the fin lines you drew earlier. If using wood glue, we recommend the "Double - Glue Joint" method: apply a thin layer of glue to the root edge of each fin, and also to the body tube where the fin will be attached, and allow the glue to dry until no longer tacky. Apply another thin layer of glue to the root edge and wait a few moments until the glue becomes slightly tacky then firmly press the fin in place on the body tube. You may need to hold in proper position for several minutes.

The trailing edge of the fins should be even with the bottom of the body tube. As the glue sets be sure the fin is straight out from and parallel to the tube. Viewing the fin from the rear of the model you can look down the fin line drawn on the body and this will help you tell if it's aligned properly. Allow the model to rest horizontally for the fin to dry well before proceeding to the next one (you can download the "Rocket Caddy" from our website to make a stand that will hold your model horizontally).

□ 9) When all the fins are dry, locate the launch lug (the small $1 \frac{1}{4}$ " long tube). Take the body and make a pencil mark on the launch lug line 4" from the bottom of the body tube - this is where the bottom of the launch lug will be glued to the body. Glue the launch lug in place. Be sure it is aligned properly and parallel to the tube. Allow to dry.

□ 10) Locate the conduit (basswood stick) you made in Step #7. With your pencil make a mark on the fin line *opposite* the launch lug line $2 \frac{1}{2}$ " from the bottom of the body tube - this is where the bottom end of the conduit will be glued to the body. Glue the conduit to the body and allow to dry.

□ 11) To strengthen the attachments, apply glue fillets to the fin and body tube joints as well as the launch lug. To make a fillet with wood glue, squeeze a small amount of glue into the joint between the

root edge of the fin and the body tube and smooth the glue with your finger to form the fillet and remove any excess glue. Allow the model to rest horizontally while the glue dries to prevent the glue from dripping or sagging as it dries. This type of glue may shrink as it cures and you may need to repeat this procedure until the fillet is as desired. For best scale appearance, use as small a fillet as possible on the fins just to hide any gap or seam that may show. Also apply thin glue fillets to just fill in the seam between the body tube and the basswood stick.

□ 12) Locate the nose cone, the screw eye and nose weights (washers). Test fit the nose cone in the top of the body tube. If it is too tight to fit smoothly, carefully sand the shoulder (the part that will fit into the body tube) with medium sandpaper. Gently thread the screw eye into the center of the bottom of the nose cone. Remove the screw eye and put some glue into the hole. Center the nose weights on the base of the nose cone and thread the screw eye back into the hole until all fits snugly. Be sure the weights are centered and don't extend outside the base of the nose cone. After the glue is dry, pull the shock cord from inside the body tube and securely tie the free end of the shock cord to the screw eye.

□ 13) Prior to beginning this step, be sure to read any instructions on the brand of sanding sealer you are using - follow the manufacturers directions if they vary from those below. Be sure to use the thinner recommended by the manufacturer to clean your brush. Using fine sandpaper (then extra fine, if desired) go over all the wood parts to ensure they are smooth. If there are any dents or "dings" in any of the balsa parts, apply one of the recommended filler materials to the area and allow to dry. Sand the area until smooth and repeat if necessary. Next apply a coat of sanding sealer to all wood parts - it is not necessary to seal the nose cone shoulder. Allow the sealer to dry then apply a second coat. After the second coat is dry, sand with medium or fine sandpaper until the surfaces are smooth. Continue with single coats of sealer, sanding in between each coat, as needed until the wood grain is completely filled and the surface is smooth.

□ 14) Wrap a single layer of masking tape (or Scotch tape) around the shoulder of the nose cone - this will prevent building up the thickness of the shoulder and will also help to hold the nose cone in place while painting the model. Insert the nose cone into the top of the body tube. You will need to use something such as a large dowel or a section of newspaper rolled into a tight cone inserted into the base of the model to hold it while painting. If desired, lightly go over the model with a tack cloth to remove any excess dust or other particles which could mar the finish. It is a good idea to do this before applying each coat of primer and paint. Be sure to read the instructions on the brand of paint you are using and follow the manufacturers directions carefully. Be sure not to mix different types or brands of paint without testing. It is recommended (but not absolutely necessary) that you apply one or more coats of primer before the color coats of paint - this will give a much smoother surface to your model and allow the paint to adhere better. If using primer, sand with fine and/or extra fine sandpaper after each coat is completely dry. Use as many coats as needed to get a smooth finish before proceeding to the color coats.

□ 15) Refer to Figure H as needed for painting scheme. If you did not prime the model, first paint the entire model white - several light coats are preferable to one or two heavy coats (this will be true for all the colors you will be using). Apply as many coats as needed to get a nice even color. Allow to dry thoroughly. Note that some later WACs had a white base color, while the first ones had a yellow base color. If you wish to model a "Black & White" WAC, proceed to step #16. If you want your WAC to have a background of yellow, now paint the model yellow. Apply as many coats as needed to get a nice even color and allow to dry thoroughly.

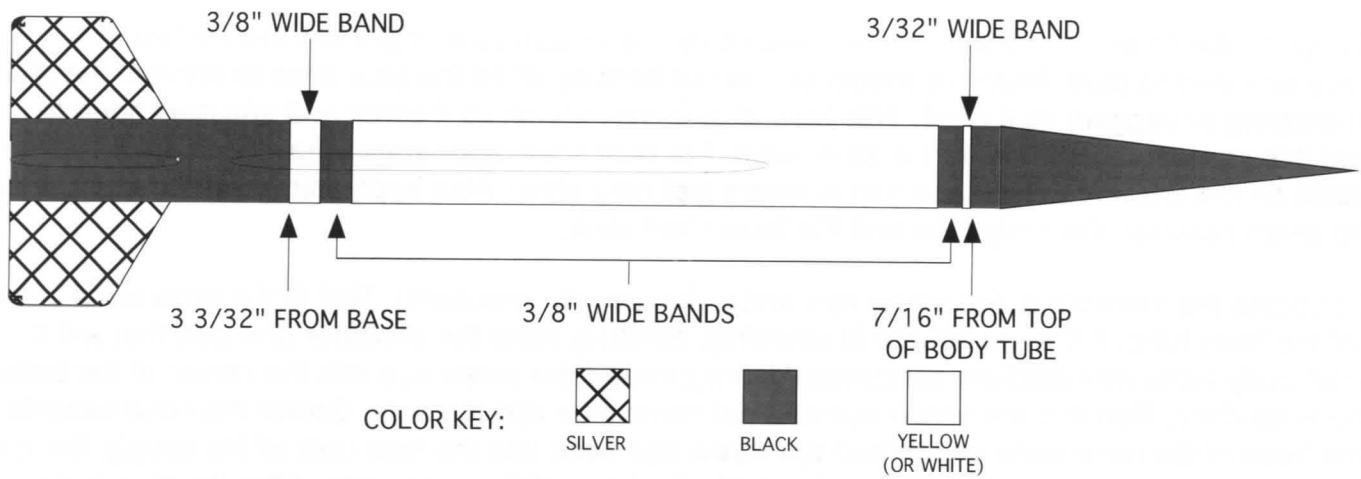


Figure H

- 16) Mask off the entire model except the two fins which are to be painted silver, then paint the exposed fins silver. Allow to dry thoroughly. Note that some silver paints do not mask well – you may want to apply a coat of clear over the silver before masking them in the next step.
- 17) Mask off all areas that are to remain white (or yellow) and the silver fins. Paint the remaining areas black. Allow to dry thoroughly then remove and discard the masking materials.
- 18) If desired, apply one or more coats of clear paint to protect the finish and allow to dry.
- 19) Refer to Figures I through M as needed for this step. Locate the small bag containing the parachute material, the round self-adhesive reinforcements, the four pieces of shroud line and the snap swivel.

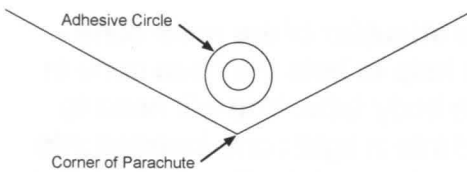


Figure I

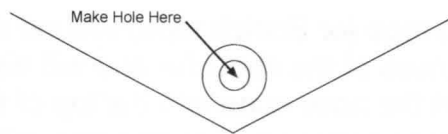


Figure J

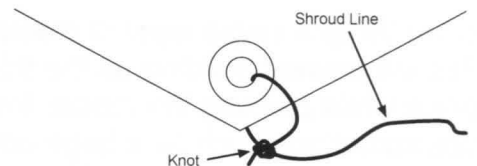


Figure K

Apply one of the self - adhesive discs to each corner of the parachute as shown in Figure I. Press each **firmly** in place. Next make a hole in the center of each disc with a hole punch or hobby knife (see Figure J). Press down again on the self - adhesive discs to make sure they are well attached. Tie one end of one of the shroud lines through the hole in one of the discs as shown in Figure K. **Do not** tighten the knot all the way down as this will weaken the parachute material. Tie the other end of the shroud line through the hole on the adjacent side of the canopy. Repeat for the remaining lines. It should now look like Figure L.

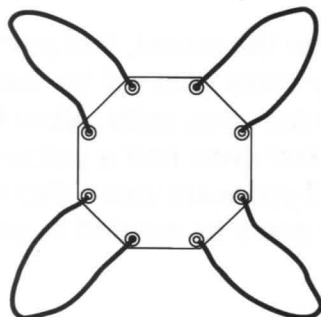


Figure L

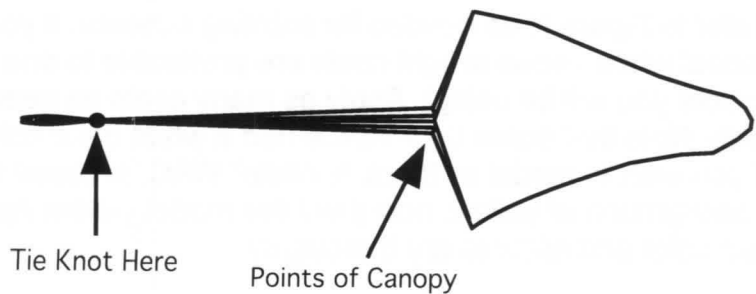


Figure M

With one hand, pick up the parachute by the top center of the canopy. With your other hand, gather together the shroud lines. Pull down on the lines so that the points of the canopy are all even (see Figure M). Tie a knot about two inches from the bottom of the lines. Thread the ends of the lines through the eyelet of the snap swivel (moisten the lines if needed) and tie firmly. Apply a small amount of wood glue to the knot and allow to dry. Connect the parachute to the rocket by attaching the snap swivel to the screw eye at the bottom of the nose cone.

Flight Preparation & Launching

Remove the nose cone and loosely insert some flame - proof recovery wadding. Lightly tamp the wadding down towards the top of the engine tube (you can use a small dowel or some other similar tool to push the wadding down). Also add enough wadding to main body to fill the tube to a depth of two body diameters (about 2").

Pack the parachute according to the following directions (or use any method that you feel comfortable with). Hold the parachute by the top of the canopy and the ends of the shroud lines until the canopy of the parachute is formed into a spike. Fold the canopy in half vertically then roll into a cylinder small enough to fit easily into the body. Wrap the shroud lines around the parachute. Insert the shock cord, then the parachute down into the body tube. Slide the nose cone into the body tube. Be sure to check the fit of the nose - if too tight, sand the shoulder down - if too loose wrap with tape. The nose cone should be loose enough to slip out easily, but tight enough so that you can turn the model upside down without it falling out.

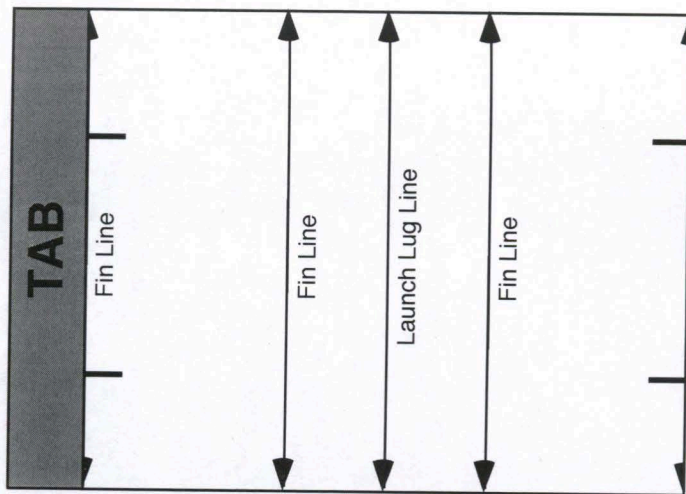
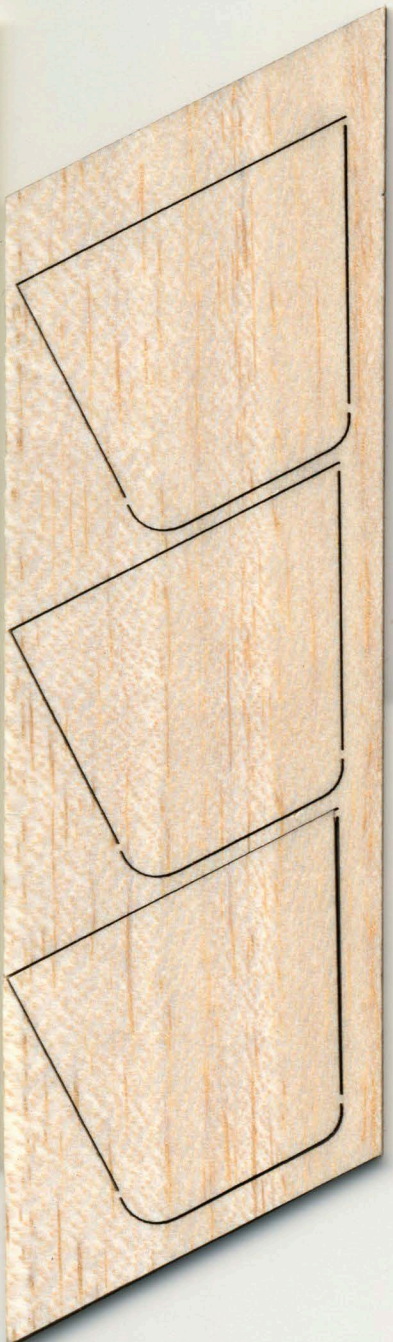
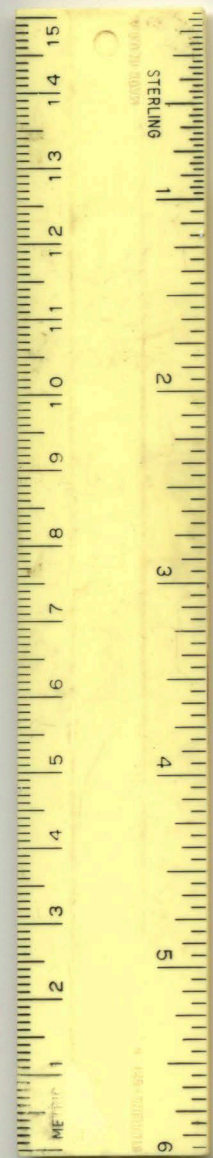
Select an engine from the list of recommended engines (it's usually best to use a lower powered engine for the first flight). Slip the engine into the rear of the engine mount (be sure the nozzle end is facing out!) until the metal hook holds the engine in place. Insert the igniter according to the manufacturers directions.

Place the rocket on the launcher by sliding the launch lug over the launch rod. Use something like a clothes pin on the launch rod to support the bottom of the model a few (2 or 3) inches up from the blast deflector. Be sure the safety key is out of your launch system and attach the micro - clips to the igniter. Move back to a safe distance and be sure the launch area is clear. Check for low - flying aircraft, insert the safety key, give the countdown and launch!

Be sure to read & follow the NAR Safety Code before flying this or any other model rocket!

(Note: the NAR Safety Code is normally included with each package of Model Rocket Engines and can also be found on the National Association of Rocketry web site at www.nar.org)

KEVLAR® is a registered trademark of E.I. du Pont de Nemours and Company



WAC Corporal 18mm Tube Marking Guide

balsa fins are 1/8"

**BT-50
tube is 12"**



**basswood
stick is
3/16" sq x 8"**

**parachute is
12" mylar**

WAC CORPORAL

1/12.3 Scale Flying
Model Rocket Kit of
America's Historic
First Sounding
Rocket from the
1940's!

Features hand
Balsa Wood nose
cone, Laser-Cut
Balsa Fins, Quick-
Change Engine Mount
and Inrig Parachute
Recovery. Great fun
for the Beginner or
Advanced Modeler!

Length: 10.75" / 40 cm
Diameter: 0.875" / 22.5 mm
Weight: 1.5 oz / 42 gm

Recommended
Engines: A0 - 4;
A0 - 5; C6 - 4;
C6 - 5; C6 - 7



This is a model rocket kit requiring construction.
Tools, adhesives, finishing materials, launch equipment
and engines are not supplied.

KWAC - 18

ASPHEN SPECIALTY PRODUCTS

www.asp-rocketry.com