About Semroc Astronautics Corporation

Semroc Astronautics Corporation was started by Carl McLawhorn in his college dorm at North Carolina State University in November, 1967. Convincing a small group of investors in his home town of Ayden, North Carolina to invest in a small corporation, the company was re-incorporated as Semroc Astronautics Corporation on December 31, 1969.

Semroc produced a full line of model rocket kits and engines. At its peak, Semroc had twenty-five full time employees working at two facilities. One was for research and development, printing, shipping, and administration. The other was outside town and handled all production and model rocket engine manufacturing. For several years, Semroc was successful selling model rocket kits, supplies, and engines by mail-order and in hobby shops. In early 1971, Semroc became insolvent and had to close its doors.

After 31 years of dreams and preparations, Semroc Astronautics Corporation was reincorporated on April 2, 2002 with a strong commitment to helping put the fun back into model rocketry.

About the WAC Corporal™

The WAC Corporal was the first US sounding rocket. Funded by the Army, project ORDCIT was selected to develop a sounding rocket based on the Corporal. Frank Malina, the director of ORDCIT, along with other Caltech engineers, developed the "little sister" to the Corporal. This could be the origin of the WAC (Women's Army Corps) in the name. The other suggested possibility is Without Any Control, since it was unguided. Used as the upper stage of a V-2, the Bumper WAC was the fist two-stage liquid fueled rocket and set speed and altitude records. The Aerobee series was born out of the WAC Corporal program.

About Deci-Scale™

Semroc's new line of Deci-Scale™ models includes 1/10 (deci) scale kits of many of the early sounding rockets. The Deci-Scale™ kits are intended to be fun to build, providing the beginning average modeler with all the parts needed to build a reasonably close scale model. An advanced scale modeler will find the included parts are very close to the exact scale that are needed for much closer models.

The Deci-scale™ line was inspired by G. Harry Stine who said, "the best beginner's scale model I've ever found is the Thiokol-NASA I.Q.S.Y Tomahawk." He designed a 1/10 scale model for Centuri Engineering Company that was very popular and sold for many years. As he and others have found, 1/10 scale is almost perfect for many of the favorite rockets and missiles of the early days of space flight.

December 16, 2011

Box 1271 Knightdale, NC 27545 (919) 266-1977

WAC Corporal

1/10 SEMI-SCALE MODEL

EASY TO BUILD & FUN TO FLY

BALSA FINS & NOSE CONE

FLYING MODEL ROCKET KIT

LASER CUT FINS

DECI/SCALE

MADE IN THE USA

SEMROC

Made in the U.S.A by Semroc Astronautics Corporation - Knightdale, N.C. 27545

WAC CORPORAL™

Kit No. KD-1

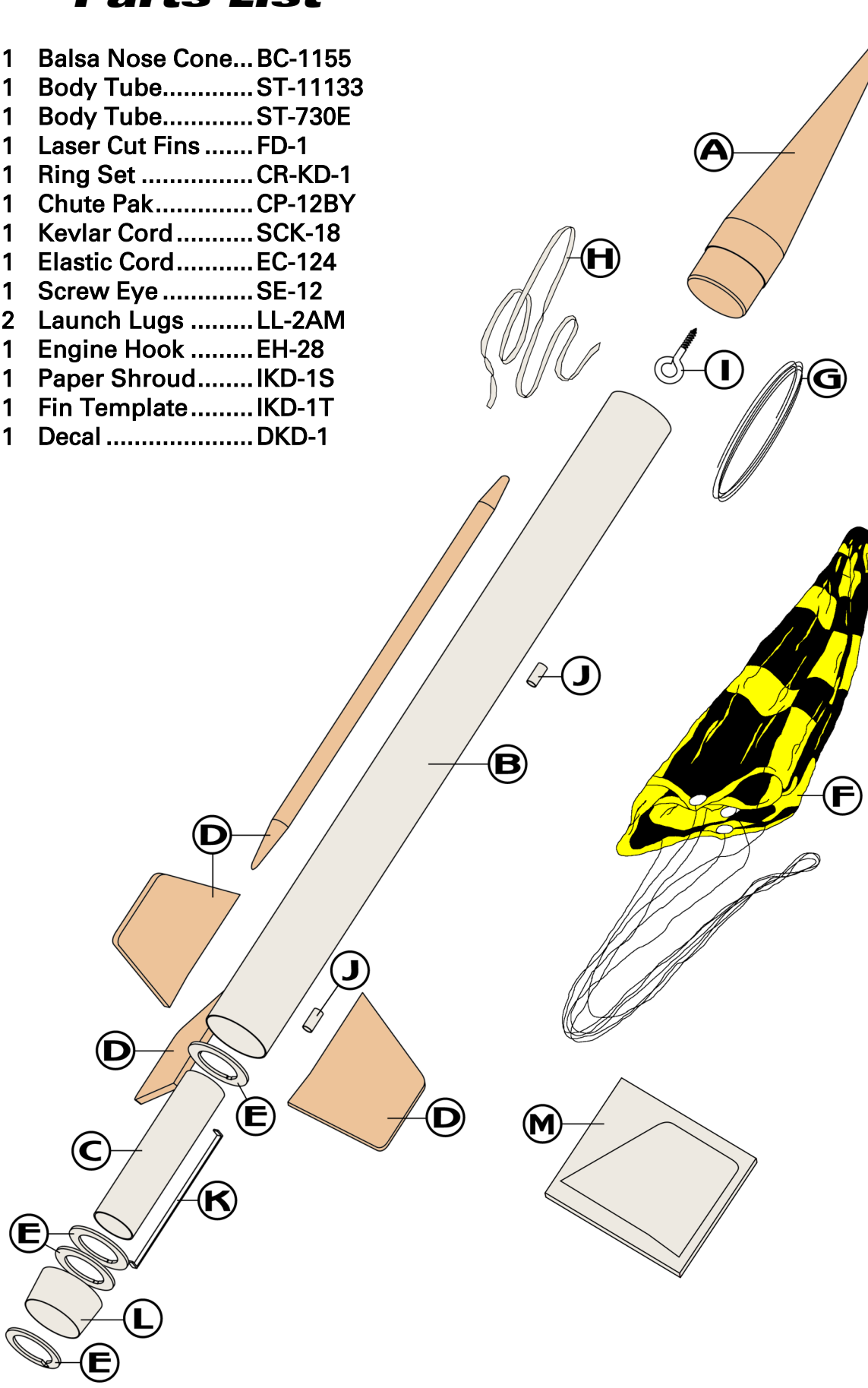
Specifications		Engine	Approx. Altitude
Body Diameter	1.17" (3.0 cm)	A8-3	250'
Length	19.4" (49.3 cm)	B6-4	550'
Fin Span	4.9" (12.4 cm)	C6-5	1100'
Net Weight	1.1 oz. (31.2 g)		

PARACHUTE RECOVERY

Parts List

A	1	Balsa Nose Cone	BC-1155
B	1	Body Tube	ST-11133
C	1	Body Tube	ST-730E
D	1	Laser Cut Fins	FD-1
E	1	Ring Set	CR-KD-1
F	1	Chute Pak	CP-12BY
G	1	Kevlar Cord	SCK-18
H	1	Elastic Cord	EC-124
I	1	Screw Eye	SE-12
J	2	Launch Lugs	LL-2AM
K	1	Engine Hook	EH-28
L	1	Paper Shroud	IKD-1S
M	1	Fin Template	IKD-1T
N	1	Decal	DKD-1

EXPLODED VIEW



BEFORE YOU START!

Make sure you have all the parts included in this kit that are listed in the Parts List. In addition to the parts included in this kit, you will also need the tools and materials listed below. Read the entire instructions before beginning to assemble your rocket. When you are thoroughly familiar with these instructions, begin construction. Read each step and study the accompanying drawings. Check off each step as it is completed. In each step, test-fit the parts together before applying any glue. It is sometimes necessary to sand lightly or build-up some parts to obtain a precision fit. If you are uncertain of the location of some parts, refer to the exploded view. It is important that you always ensure that you have adequate glue joints.

TOOLS

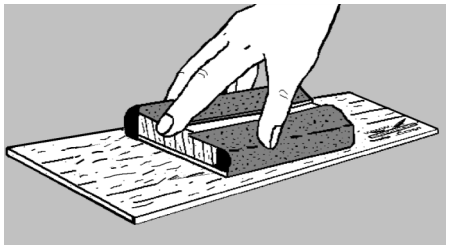
In addition to the parts supplied, you will need the following tools to assemble and finish this kit.

ASSEMBLY

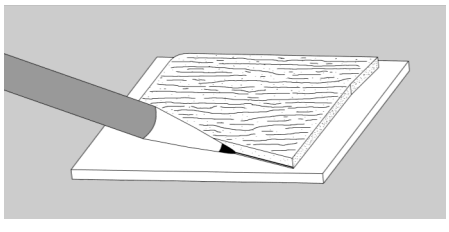
❑ **1.** These instructions are presented in a logical order to help you put your WAC Corporal together quickly and efficiently. Check off each step as you complete it and we hope you enjoy putting this kit together.

FIN PREPARATION

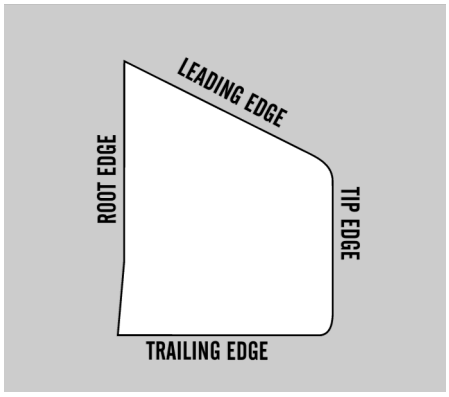
❑ **2.** Lightly sand each side of the laser-cut balsa sheet **(FD-1).** Carefully push the laser-cut fins and shroud (conduit) from the sheet. Start at one point on each fin and slowly and gently work around the fin. Since the fin sheet is 3/16" thick, a hobby knife may be needed to cut around some of the fins.



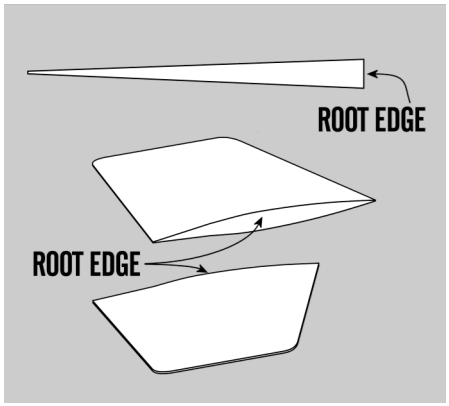
❑ **3.** The fins and shroud are the most difficult task. Patience and careful sanding will provide a good scale shape for the fins. Begin by marking the centerline around all the fins. Sand any hold-in tabs that will keep the fins from fitting inside the marking template (**IKD-1T**). Place a fin inside the template as shown and use a sharp felt-tip pen or sharp, soft pencil to place the mark. This will be used while sanding to keep the sides symmetrical.



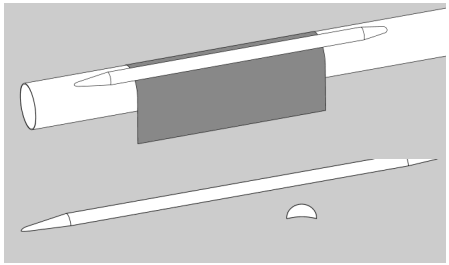
❑ **4.** The fin edges are identified in the next drawing. When finished, all the edges except the root edge will be very thin. The root edge will be bi-convex.



❑ **5.** Sand the top and bottom of each fin with a bevel from the root edge to the tip edge. Leave the root edge at its nominal size and sand so the tip is about .05" thick. Use the marks around the fins to get the sides even. After the bevel is completed, sand a convex shape on each side leaving the chord (middle of the fin from root to tip) of each side alone. Refer to the drawings below. Use the centerline drawn as a guide. Fill the thin edges with cyanoacrylate (CA) glue for more strength.

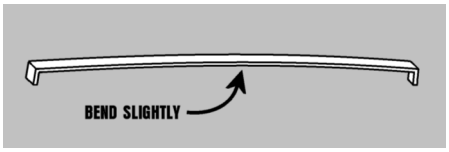


❑ **6.** Sand the shroud to a half round cross section as shown. Both ends should be rounded at the tip. The lengths of the two conical ends are not the same. The shorter end will be towards the top of the model.

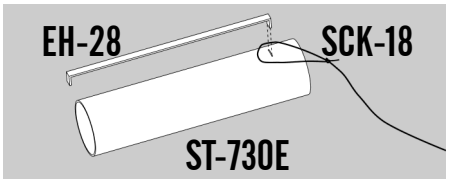


ENGINE MOUNT

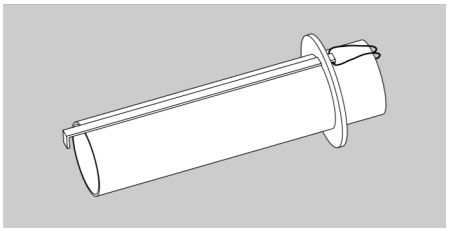
❑ **7.** Bend the engine hook **(EH-28)** slightly so it forms a slight bow in the direction shown.



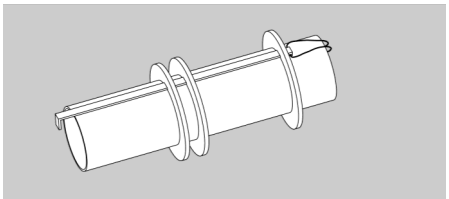
❑ **8.** Tie a loop in one end of the yellow Kevlar® cord (SCK-18). Insert one end of the engine hook (**EH-28**) through the loop and into the pre-punched engine tube (ST-730E).



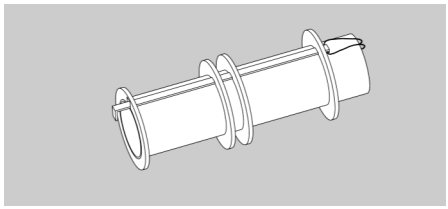
❑ **9.** Carefully punch out the four centering rings **(CR-KD-1)**. Slide the one or the large centering over the engine tube until it is about 1/8" from the end with the cord. Apply a bead of glue around each end of the joint between the ring and engine tube, keeping glue off the outside surface of the centering ring. Allow to dry. Tuck the shock cord into the engine tube to keep it out of the way.



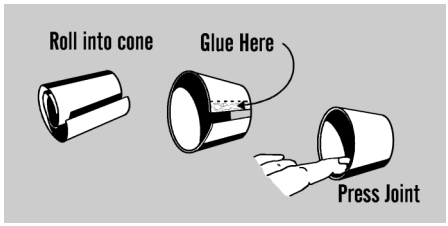
❑ **10.** Slide both of the remaining large rings over the engine tube, aligning the notches with the engine hook. Slide them near the middle and DO NOT GLUE.



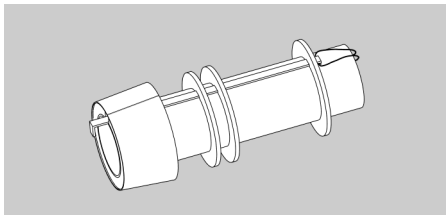
❑ **11.** Slide the remaining (small) centering ring (**CR-KD-3**) over the bottom end of the engine tube with the larch notch over the engine hook. Space it even with the bottom of the engine tube. Apply a bead of glue around both sides of the centering ring.



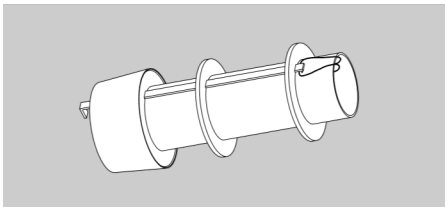
❑ **12.** Carefully cut out the paper shroud (**IKD-1S**). Roll the shroud carefully, forming it into a cone with the glossy side outward. Form this carefully to avoid creasing the paper. Apply glue on the indicated section, line up the edge with the dotted line and press together on a flat surface. Set the shroud aside to dry.



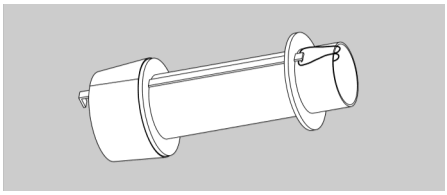
❑ **13.** Slide the cone over the lower ring until it is even with the bottom of the ring and the joint is over the engine hook. Do not glue yet.



❑ **14.** Slide the ring closest to the cone inside the top of the cone. Check that the bottom of the cone is still even with the bottom of the lower ring. Apply a bead of glue around both the top and bottom joint that the cone makes with the rings. Apply a bead of glue around the ring and engine tube joint. Allow to dry.

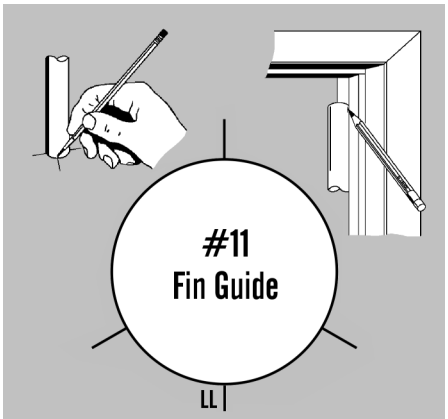


❑ **135** Slide the remaining ring until the bottom of the ring is even with the top of the cone or against the other ring. Apply a bead of glue around the ring and engine tube joint. Allow to dry.



MARK TUBE

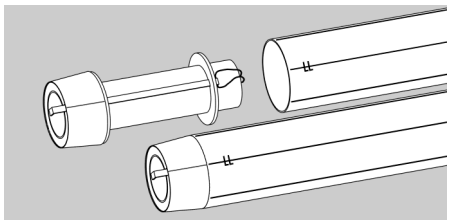
❑ **16.** Stand the body tube on the fin guide below and make the fin position marks and launch lug (LL) mark on the sides of the tube. Find a convenient channel or groove such as a partially open drawer, a door jamb (as shown,) or a piece of molding. Using the channel, extend the marks the full length of the tube to provide lines for aligning the fins. Mark the LL line for later.



GLUE MOUNT

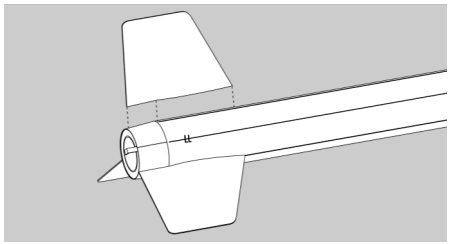
❑ **17.** Check the engine mount for fit in the body tube (**ST-11133**). If it has rough edges or excessive glue, sand lightly until it fits into the body tube. Apply a heavy bead around the inside of the body tube. Quickly and smoothly push the engine mount into the body tube until the

shroud is flush with the end of the body tube. Do not stop once you start inserting the mount or it might freeze in place too soon. Apply a fillet of glue around the shroud just where it contacts the body tube.

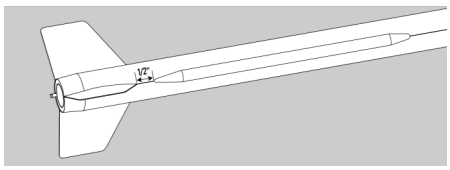


ATTACH FINS

❑ **18.** Apply glue to the root edge of one of the fins and position it along one of the lines drawn on the side of the body tube and even with the end of the tube. Remove, allow to almost dry, apply additional glue, and reposition. Repeat for the other two fins. Allow to dry in an upright position, checking frequently to make sure they remain aligned.

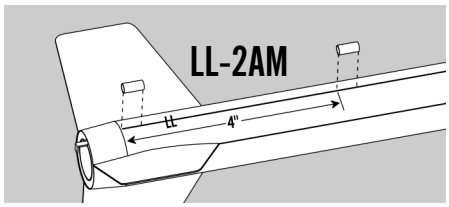


❑ **19.** Apply glue to the root edge of the shroud and position it along one of the lines drawn on the side of the body tube 1/2" from the leading edge of the fin on the opposite side from the LL line. The shorter conical end should be towards the top. Allow to dry in an upright position, checking frequently to make sure it remains aligned.

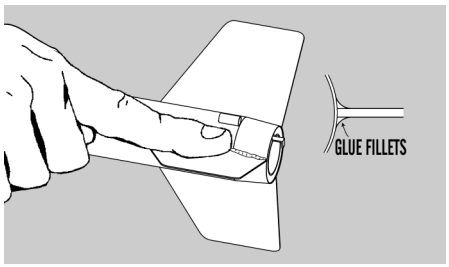


LAUNCH LUGS

❑ **20.** Glue one of the launch lugs (**LL-2AM**) on the line marked LL and even with the bottom of the tube. Glue the second launch lug about 4" from the bottom of the tube and in line with the first launch lug on the line marked LL. Sight down the tube to make sure they are aligned.



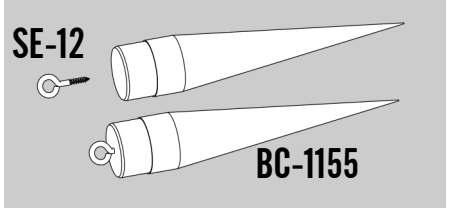
❑ **21.** After the fin assembly is completely dry, run a very small bead of glue along both sides of each fin-body tube joint. Using your forefinger, smooth the glue into fillets. Since this is a scale model, it should not have fillets showing. Wipe any excess glue and allow to dry.



NOSE CONE

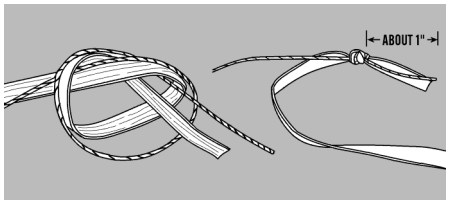
❑ **22.** Insert the nose cone **(BC-1155)** in the top of the body tube and check for proper fit. The nose cone should be snug to hold itself in alignment. If it is too loose, add some masking tape. If it is too tight, sand the shoulder slightly.

❑ **23.** Twist the screw eye (**SE-12**) into the center of the base of the nose cone. Remove it and squirt a drop of glue into the hole. Reinsert the screw eye and run a bead of glue around the shaft against the nose cone.

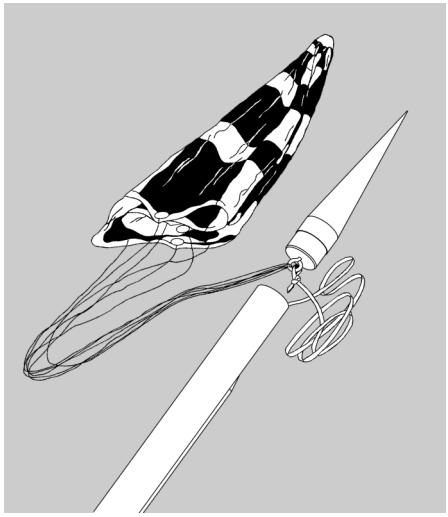


FINAL ASSEMBLY

❑ **24.** Using a pencil or dowel, push the Kevlar cord out through the top of the main body tube. Tie the free end of the Kevlar® cord to one end of the elastic cord (**EC-124**) using an overhand knot.



❑ **25.** Assemble the chute **(CP-12BY)** using the instructions that come with the Chute Pak. Pull the lines tight on the chute and make sure they are all of equal length. Attach the chute by tying them to the screw eye. Put a drop of glue on the joint to keep the lines from moving. Attach the free end of the elastic cord to the screw eye. Put a drop of glue on that joint as well.

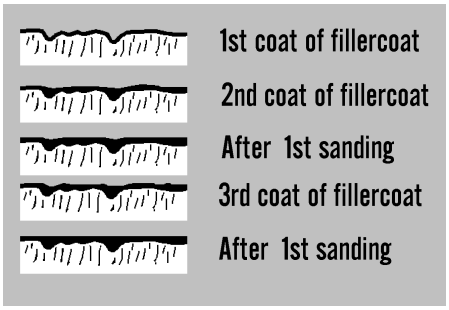


This completes the assembly of your

WAC Corporal

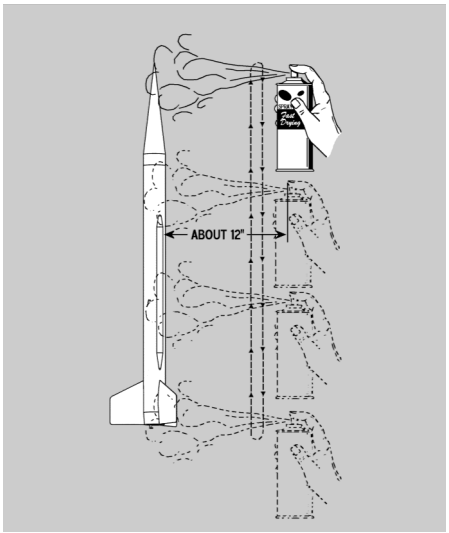
FINISHING

❑ **26.** For a smooth professional looking finish, fill the wood grain with balsa fillercoat or sanding sealer. When dry, sand with fine sandpaper. Repeat until smooth.

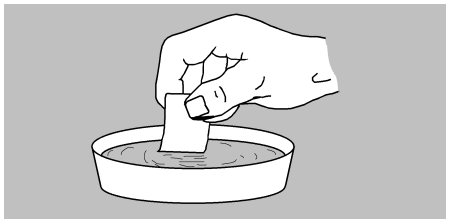


❑ **27.** After all balsa surfaces have been prepared, wipe off all balsa dust with a dry cloth. First spray the model with an enamel primer. Choose high visibility colors like yellow and black for the final color. Refer to the front for suggested (scale) painting.

❑ **28.** Spray painting your model with a fast-drying enamel will produce the best results. PATIENCE...is the most important ingredient. Use several thin coats, allowing each coat to completely dry before the next coat. Start each spray a few inches above the model and end a few inches below the model. Keep the can about 12" away and use quick light coats. The final coat can be a little heavier to give the model a glossy wet-looking finish.



❑ **29.** After the paint has dried, decals should be applied. The decals supplied with the WAC Corporal are waterslide decals. They are not scale, since the original WAC Corporals had very few markings, other than the round number. They may be used to identify you model if it is built as a semi-scale. Each decal should be cut separately from the sheet. Think about where you want to apply each decal and check for fit before wetting the decal. Use the cover photo for suggested placement. Dip each decal in a small dish of water that has a drop of detergent. It will take about 30 seconds before the decal is loose enough to apply.



❑ **30.** Slide the decal in place and use the paper backing to work the bubble out. Repeat for all the decals. Be careful with covering decals with a clear coat. Many of the new sprays are not compatible. Future floor polish is suggested.

FLIGHT PREPPING

❑ **31.** Mounting the engine: Insert the engine and make sure the engine hook keeps the engine in snugly. The hook may be slightly bent to make sure the engine is retained.

❑ **32.** Apply a few sheets of recovery wadding in the top of the body tube. Fold the parachute and pack it and the shock cord on top of the recovery wadding. Slide the nose cone into place, making sure it does not pinch the shock cord or parachute.

❑ **33.** Refer to the model rocket engine manufacturer's instructions to complete the engine prepping. Different engines have different igniters and methods of hooking them up to the launch controllers.

❑ **34.** Carefully check all parts of your rocket before each flight as a part of your pre-flight checklist. Launch the WAC Corporal from a 1/8" diameter by 36" long launch rod.

❑ **35.** After each flight, promptly remove the spent engine casing and dispose of properly.