RC-35 WRISTOCRAT INSTRUCTION MANUAL

INTRODUCTION

The concept of being able to hand-launch a sail plane into a thermal is not a new one. While we may never know the origins of the concept, a gentleman named Dave Thornburg was probably the first to write about it in the modeling press.

We believe the **Wristocrat** to be one of the best hand-launched sailplane designs available today and certainly one of the most complete kits of its kind. With 335 sq. in. of wing and a subsequent low wing loading, it will work the lightest of lift. With practice, realistic launch heights of 35 to 45 feet can be achieved by persons of average build, resulting in "dead air" (no lift) times of 40 to 60 seconds per launch. By learning to launch your Wristocrat over lift generators, such as baseball diamonds, tennis courts, etc.... (patches of land with dark, contrasting topography), you can experience the thrill of hooking and riding your first low-level thermal.

The **Wristocrat** isn't just a thermal ship, you'll find it excellent on the slope as well. It's aerobatic and the airfoil allows it to be flown in a fair wind. Installation of the optional towhook allows the use of small hi-starts for even greater heights on flat land. It's a versatile model and a lot of fun on trips such as vacations.

You'll note on the plans that we've even shown a flap option. This additional control function is easy to build and makes your **Wristocrat** even more versatile in the performance department! This simple option is explained well in this manual and on the plans, give it some consideration.

Choose your radio system carefully for your Wristocral, there are several factors to address; size, weight, etc. As shown, our prototypes are being flown with Airtronics #501 servos, standard six-channel receivers and SR 300 Mah battery packs of either square or flat configuration. There are several systems that will also work; Futaba, Cannon, Tower "Mini Flight Pack", etc. We do urge you to have the radio system that you plan to use available to you before you start construction.

Build your **Wristocrat** to the plans and instructions provided and you are going to have a strong, light model that is up to the task it was designed for.

Included in this kit is a 1/4" scale model of the same airplane, the **Wristocrat II.** This model, when built properly, can provide your children or grandchildren with hours of enjoyment *and* help them to understand some of the simple laws of aerodynamics that apply to models as well as full-size aircraft. We urge you to take the time to work with that special child in your life on this project and to take them with you when you fly *your* **Wristocrat.** We believe that you'll be amply rewarded with not only the flight characteristics of this small model, but also with the time spent together. While the instructions provided with the **Wristocrat II** are simple, your own special input to your child can be an experience that will be long remembered. Sharing the wonders of model aviation with a child is its own reward.

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IMPORTANT NOTE:

TOP FLITE MODELS, INC. certainly recommends the **Wristocrat** as a first R/C aircraft. However, if you are a beginner to the sport of R/C flying, we would *urge you to* seek and use experienced assistance in constructing and flying this airplane. Again, if you are new to this hobby, consider this:

Flying this or any other radio-control led model aircraft is a PRIVILEGE and not a RIGHT and this privilege begins with the utmost safety considerations to others and yourself as well. An R/C model airplane in inexperienced hands has the potential of doing serious personal or property damage. These safety considerations start at the building board by following instructions, seeking competent help when you are confused and avoiding shortcuts. These considerations have to be carried over to the flying field where safety must come first and limitations cannot be exceeded. We urge you to:

D 1. Send for and obtain your AMA (Academy of Model Aeronautics) membership which will provide insurance for your R/C activities — DO NOT RELY ON HOMEOWNERS INSURANCE.

D 2. Join an AMA sanctioned R/C flying club in your area where you can obtain competent, professional instruction in trimming and learning how to fly this model.

Check with your favorite local hobby shop for the required AMA forms or the address where they can be obtained.

WARNING!!!

A radio controlled model is not a "toy." Care and caution must be taken in properly building the model, as well as in the installation and use of the radio control device. It is important to follow all directions as to the construction of this kit as well as installation and use of the engine and radio gear. The advice and assistance of a well experienced builder and pilot is highly recommended. Don't take chances! Improper building, operation, or flying of this model could result in serious bodily injury to others, yourself, or property damage.

PRE-CONSTRUCTION NOTES:

The **Wristocrat,** like other Top Flite kits employs the use of die-cut wood to ease the task of construction, parts fit and identification. The dies used for this kit have been rigorously checked for absolute accuracy and should provide you with excellent fit. Die-cut parts should be carefully removed from their sheets by first lightly sanding the *back* of each sheet of parts and then carefully removing each part. Use a light garnet paper for the sanding and keep a sharp hobby knife with an X-acto #11 blade or equivalent handy for assistance in removing any parts that might not have been completely cut-through on the dies. Parts which oppose one another and must be precisely uniform—such as fuselage sides, **ribs, etc...—** should be carefully "matched" after their removal from the parts sheets. Matching is the process of holding the opposing pieces together with either pins, tape or spot gluing and lightly sanding the edges of the parts until they are identical. A sanding block with light garnet paper is most useful for this and other phases of construction.

Your building surface should be at least large enough to accommodate the wing panels. This surface should be as absolutely flat as possible and yet be able to accept pins easily. We have found that a product such as Celotex fiber board works quite well for this purpose. Another good surface can be found in most well-stocked hardware stores, this isa2'x4'fiber board ceiling tile — these are quite inexpensive and can be used for several airplanes before needing replacement.

As with most R/C kits that are constructed from wood, a selection of tools—most of which can be found in the average workshop—are a must to do the job correctly:

- Hobby knife and sharp #11 blades
- Single-edge razor blades
- T-pins
- Sanding blocks in assorted sizes
- Sandpaper in various grits
- Hand-held hobby saw, such as an X-acto
- Dremel tool or power drill and assorted drill bits
- Straight-edge, preferably metal, at least 36" long
- 90 degree triangle
- Soldering iron, flux (silver) and solder
- Carbide cut-off wheel for wire cutting
- Small power jig-saw, such as a Moto-Saw
- Razor plane
- Tapes such as masking and cellophane

Our Wristocrats' were constructed using a variety of common hobby adhesives including 5-minute epoxy and Cyanoacrylates. Since all of us have our own construction techniques and favorite adhesives, stick with the ones that you are familar with and prefer. However, in certain areas there will be callouts for certain types of adhesives and we urge you to try not to substitute since doing so could possibly cause problems structurally later on.

The last thing we should touch on before we begin actual construction is the sequence in which the Wristocrat is assembled. The sequence given to you in this booklet has been proven to be the most straight-forward and provides the finished components in the order that you will need them to progress to the next assembly phase. Try to stick with the building order presented here to avoid mistakes.

Spread the plans out on your work surface, cover them with a clear plastic material, such as the backing from a roll of Monokite or plastic food wrap an commence construction.

FLAP OPTION

This is the point that you must make up your mind about the installation of flaps or whether you are going to use your **Wristocrat** as a purely 2-channel sailplane. If you want the flaps then you should take the time to study the plans to see how we've accomplished this mechanism

with our prototype machines. Essentially, the flaps themselves are nothing more than the hinging and subsequent controlled movement of the 1" trailing edge stock itself. As shown, the flap extends from the polyhedral break, inboard to the point shown on the plans, next to the fuselage. You will need to pick yourself up some Sullivan #507 cable and tube material (one package is all that's needed) from your local hobby shop. The rest of the items needed are either in the kit itself as scrap and /or common household items.

The need to understand the drawings provided is essential — study them. The flaps are hinged from the bottom and driven by cable through the top of the wing. At the exit point for each of the cable housing tubes you will need to replace the stock balsa cap strip with a wider one (about 1/4" - 5/16" will do) to anchor the tubing. Also, each wing rib end must be trimmed 1/16" cap that is glued in place instead of the trailing edge stock itself. Note that we've also added 1/16 x 1/2" balsa sheet, top and bottom, to each inboard wing panel, at the trailing edge for strength and to facilitate covering The flap control horns were made and mounted in the same manner as was the rudder horn, and the connectors are also made from a common paperclip, as was the rudder connector.

The flap system is driven by a single servo that is mounted, as shown, in the wing's center section. This servo protrudes down into the fuselage itself and is connected to the receiver's "throttle" connection. Therefore, on a typical Mode II transmitter, where aileron (rudder) and elevator are on the right stick and throttle is on the left, the positionable throttle stick becomes your control over the flaps. Our prototypes have been set-up so that "full throttle" (stick all the way up) and full down trim is "neutral" flap— in other words, no flap, up or down, what-so-ever. Therefore, by moving the throttle stick downward, the flaps come down also, to whatever desired location. Moving the stick back up to "full throttle" moves the flaps back to neutral. The flaps can also be "reflexed" or moved upward forgetting quickly through "sink" or down air or for compensating for high winds, by moving the throttle trim lever upward to whatever desired position. On our Airtronics equipment, we typically can achieve about 6 to 8 degrees of reflex, which is more than sufficient to make our **Wristocrats** really scoot!! Honestly, you can't begin to appreciate what an incredibly useful tool this system is until you've tried it.

As you can see, the flap servo, at least in our prototypes, is mounted in the wing's center section, with the output arm literally inside the structure. This means that the two center ribs,W-1, must be cleared out, at this point, to allow the servo to be mounted in place. The best time to do this is after the two inboard wing panels have been glued together and before the top, rear center section sheeting is installed. In fact, it is at this point that the entire system is installed, tubing, cables, etc... Note that the drive system in the wing's center section is essentially a "blind mount". This means that all of the connections inside of the center section must be fitted to the servo's output arm before covering it up with the top sheeting. Afterfitting and making sure that the servo, by radio command, does indeed actuate the cables in the correct direction, with no binding, and that the geometry is correct, then and only then can the servo be removed from the wing and construction proceed. Later, after covering, the servo is carefully installed, screwed in place and the last connections are made to the flaps themselves.

There are no guarantees that **your** particular radio system will work this option and you therefore need to determine this for yourself by first making sure that the shape and dimensions of the servo you plan to use will indeed fit as shown. Then you need to find out if your radio system has the capability of offering you "reflex" flap off of the throttle trim lever (some systems don't). Our opinion is that even if you can't get flap reflex, due to the type of radio you have, the flap option itself is still worth the extra bit of work.

With the proceeding information still fresh in your mind, we'll now move to the wing construction sequence of this manual. The following assumes that you are building the stock, non-flapped wing.

WING CONSTRUCTION

Be sure and protect your plans by covering them with backing from a roll of Monokote™ or a material such as clear food wrapping. Take a minute to study the plans and understand them. We suggest building a right and left wing panel, starting with the inboard sections first and then joining these two completed structures at the appropriate time in the building sequence. We'll start with the left wing first. If you're planning on the flapped version, it is at this point that you'll start adding the structures shown (dashed lines) on the plans.

D 1. From the 1/16"x 3" x 30" sheeting provided in your kit, cut, fit and locate over the plans, the bottom leading edge sheet (use a long straight edge to develop the correct width and to true-up the edges). From the 1/8" x 1/16" spruce spar stock provided, measure and cut the required 15" length for the bottom spar, set this aside for a moment. Now cut and locate over the plans, the 1/4" x 1" length of shaped trailing edge stock. Now cut and glue the bottom center section sheeting in place to the trailing edge stock and the forward bottom wing sheet. Cut, fit and glue in place the six bottom 1/16" x 3/16" cap strips from the stock provided. Using one of the die-cut W-2 wing ribs as a location guide, the bottom spruce spar (cut earlier) can now be glued in place. Lastly, note in the cross sections that the leading edge of the bottom wing sheeting needs to be lifted up and supported in order to match the bottom contours of the wing ribs, forward of the spar. This is best done with a length of trailing edge stock.

D 2. Note that we've provided you with "tick" marks just in front of and just behind the wing panel drawings. These correspond with the rib locations. Use a straight edge and a soft lead pencil to now mark the rib locations directly on the leading edge and center section sheeting. The first wing rib to be installed is the first W-2 rib, inboard from the polyhedral break (the inboard end of polyhedral brace

W-10 will butt against this rib when it is installed). Continuing to work inboard, toward the center, install the next three W-2 ribs. From their die-cut sheets, remove ply dihedral braces W-8 and W-9 and polyhedral braces W-10 (balsa). The two remaining inboard W-2 ribs must now be cut to compensate for the installation of the W-8 and W-9 dihedral braces; use these braces as a thickness guide and trim the ribs as shown on the plans. Finally, root rib W-1 must also be trimmed into two pieces also to fit in front of and behind the dihedral braces. Once this is done, again use W-8 as a guide, by holding it in place, and glue all of the remaining forward rib ends in place to the bottom leading edge sheeting; remove W-8 from the structure. Using W-9 as a guide, glue all remaining rear rib ends in place and remove W-9 from the structure. The remaining outboard W-2 rib must be trimmed in a similar manner since it is intersected by polyhedral brace W-10. Using the same procedure as described, trim this rib into a front and rear piece and glue in place using W-10 as a spacer; remove W-10 from the structure.

D 3. Cut, fit and glue the 1/4" sq. leading edge in place.

D 4. Carefully remove this structure from your work surface. Use a sanding block to lightly sand the outboard edges (the polyhedral break) smooth. Place the structure back on the plans and block up the center 2-1/2". Using the same construction as described earlier, the outer wing panel is now built directly over the plans and directly to the inner panel. Take pains to bevel the trailing edge butt joint for a good fit. Be sure to install W-10 first before the front and rear segments of W-2, followed by W-3, W-4, etc.

D 5. With all of the ribs in place, cut, fit and glue the top spruce spar in place from W-7 to the W-2 at the polyhedral break. From your parts bag, locate the bundle (10 provided) of vertical grain shear webs. Carefully trim one of these to fit precisely between W-3 and W-2 and against the spars and W-10 with the top flush with the top of the spar. Once satisfied, glue this web in place.

D 6. As shown on the plans, the 1/4" sq. leading edge must now be sanded down to match the top contours of the ribs. The judicious use of a razor blade followed by using your sanding block to finish the job is the way to go here. Once you're satisfied you can cut, fit and glue in place the top 1/16" leading edge sheeting (note that this top sheeting is placed slightly forward on the top spar thus creating a bit of a "shelf"). Lastly, cut, fit and glue in place all of the top 1/16" x 3/16" cap strips with the exception of the one which will cover the W-2 ribs at the polyhedral break. Remove the thus far completed left wing panel from your work surface. Use your sanding block to smooth the outboard face of W-7 in preparation for the wingtip. Inspect the bottom polyhedral joint and lightly sand as needed to smooth it out.

D 7. The right wing structure is now built using the same procedures just described.

D 8. In this step, we're going to join the right and left wing halves together. Preparation for this requires that the two inboard ends of the wing halves be sanded smooth and beveled to create a good, straight fit. Do this now. Pin or weight one of the wing halves (let's use the left) flat to your work surface. Next, make sure the rib curve in the bottom leading edge sheeting is supported with a length of trailing edge stock. With everything secure, trial-fit the right wing half in place with it's polyhedral break supported 2-5/8" off of the work surface. The resulting butt joint should be as flush fitting as possible and the leading and trailing edges of both inner panels should be straight; take your time here and ensure that the fit is the best you can produce, with all parts lining-up correctly. Once satisfied, apply a thin, even coat of glue (5-minute epoxy is great here) to the inboard end of the right wing panel and carefully fit it to the pinned down left panel, again making sure the right panel is raised 2-5/8" at the polyhedral break. Carefully wipe off any oozing adhesive. Now fit W-8 dihedral brace in place, trimming if needed for a good fit. Glue W-8 in place. Cut, fit and glue the left panel's spruce spar in place. Rear dihedral brace W-9 can now be glued in place.

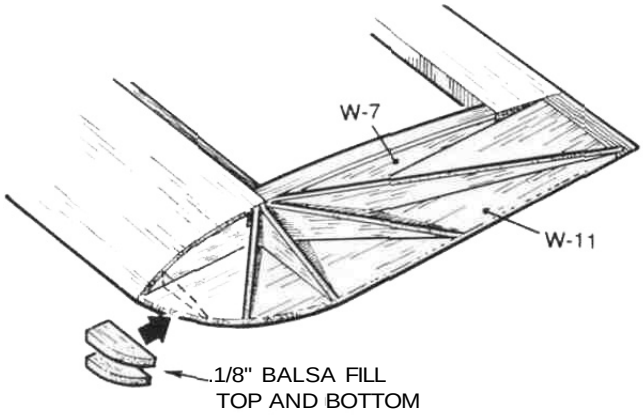
D 9. With the left wing still down flat to your work surface, locate the vertical grain shear webs (1/16" balsa). Cut, fit and glue these in place between the remaining W-2 ribs, **out to the** polyhedral break.

D 10. Remove the joined wing structure from the bench. Pin or weight the right panel in place to the bench and glue the remaining top spruce spar in place followed by the remaining vertical grain shear webs.

D 11. As you did with the tip panels, carefully shave and sand the inner panel's leading edges to conform with the top contours of the wing ribs. Use your sanding block to lightly sand any high points on the panel's top surfaces. Once you're satisfied that the inner panels are ready to sheet, pin or weight one side or the other in place on your work surface. Cut, fit and glue the leading edge sheeting in place (again leaving a bit of a "shelf" at the rear edge of the top spar). Cut, fit and glue the center section sheeting in place using the patterns shown on the plans. Finally, add all of the remaining 1/16" x 3/16" cap strips out to and including the polyhedral break. Repeat this procedure on the opposite wing panel.

D 12. Locate and remove wingtip parts W-11 from their die-cut sheets. Sand their inner edges lightly to render them flat and straight. Note the tip reinforcement option shown on the plans. This addition of a length of 1/8" x3/16" spar stock really serves to "beef-up" an otherwise accident prone area, you might give it serious consideration. Glue the W-11 wingtips in place as shown on the plans ("End View of Wingtip", left panel). Also as shown, cut a few scraps of 1/8" balsa to fill in the

leading edge of the wingtip and glue these in place. From the remaining 1/16" balsa sheet provided in your kit, cut, fit and glue in place the wing tip braces as shown on the plans. You may elect to add these only to the top, which will work. However, on our prototypes we added these braces top and bottom and have yet to break a tip.

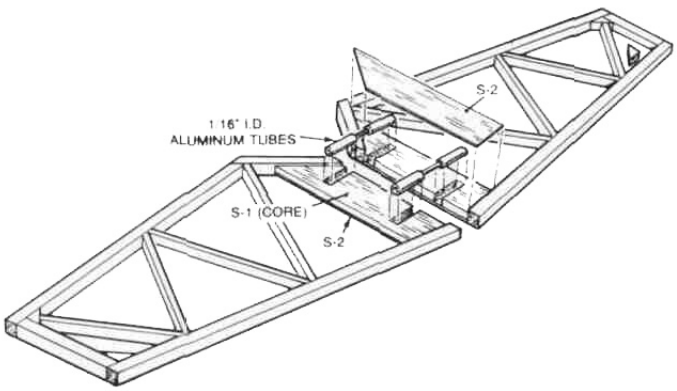


The completed wing structure should now be carefully sanded to final shape including the leading edges. Make every attempt to render the wing as smooth and **as** uniform as possible.

Ply die-cut part F-12, wing bolt reinforcement, can now be glued in place on the wing's center section at the trailing edge, as shown. With the exception of the front and rear fuselage/wing fairings, the wing should now be complete.

STABILIZERS/RUDDER CONSTRUCTION
STABILIZERS

D 1. Remove the four 1/32" S-2's and both of the 3/32" S-1's from their respective die-cut sheets. These are the stab cores (S-1's) and stab core caps (S-2's). From your parts bag, locate the single 3" length of 1/16" I.D. aluminum tubing. Measure and cut-off two, 1-1/4" lengths of this tubing. Use a single edge razor blade and a rolling motion on a hard surface to do this. Save the remaining 1/2" length. Note the cross-grain marks in the S-1 cores, these are the locations for two lengths of aluminum tubing that you just cut. Use a straight edge and a sharp #11 blade to clear-out a 3/32" slot at these marks to allow the nesting of the two pieces of tubing. Take care in cutting these slots to maintain their parallelism.



D 2. Glue two of the S-2 caps to the bottom of each S-1, carefully lining-up their edges one to the other. Use sandpaper to lightly rough-up the two 1-1/4" lengths of aluminum tubing. Place the two S-1/S-2 structures together on your building board with their inboard edges touching and the slots lined up. Glue the two lengths of aluminum tubing in place in the slots being careful to keep glue out of the tube ends. Wipe off any excess glue that may ooze up. Now glue the two remaining S-2 parts to the tops of the S-1's, aligning their edges, weight to keep these flat and allow to dry. If you're using Pacer Slo-Zap, this will be very fast. Cut the two structures apart, at the center, using a sharp razor blade or a fine-toothed X-acto-type saw. Clean-up the ends of the aluminum tubing with your #11 blade. Holding the two structures together, one on top of the other, use your sanding block to sand each of the edges flat.

D 3. Locate the two 1/16" dia. x1-1/2" steel pins from your parts bag. Clean the ends of each of these with a grinder or carbide cut-off wheel and trial-fit them into the aluminum tube nests in each of the stab core assemblies. You should be able to lay this joined assembly directly over the stab plans and they should match accurately. Trim as needed to achieve this. Once satisfied, weight or pin the wire-joined core assemblies in place over your plans (protect the plans with a piece of Monokote backing) and build the balance of each stab half onto each stab core assembly using the 3/16" sq. and 3/32" x3/16" balsa stock provided.

D 4. Once the stab halves are finished, remove them from your work surface and use your sanding block to first sand the top and bottom surfaces of each flat and then to carefully "airfoil" them to the cross-sections shown on the plans. Use care to not sand these structures to thin, we don't want them weak. Set these assemblies aside for now.

RUDDER

D 1. The rudder is built directly over the plans, using the 3/16" sq. and 3/32" x 3/16" balsa stock provided, just **as** the stab halves were.

D 2. Remove the completed rudder from your work surface and use your sanding block to smooth the sides as well as the edges. As shown on the plans, the top, leading edge and bottom of the rudder, on each side, is capped with *1/32"* x V balsa strips, cut from the RC-35-5 die-cut sheet. This renders the rudder the same thickness as the fin.

The final sanding of the rudder and the beveling of its leading edge, for hinging purposes, will be done later in Final Assembly.

FUSELAGE/FIN CONSTRUCTION

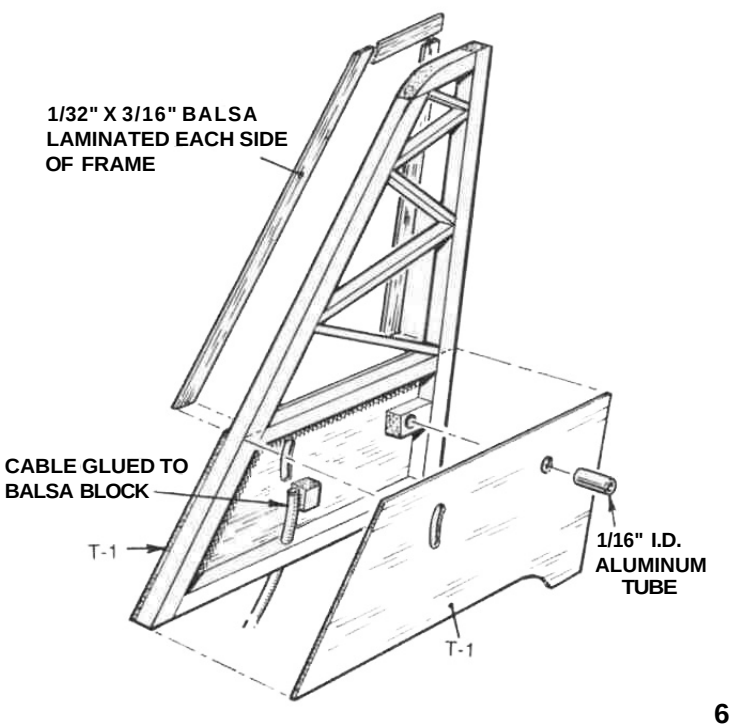
Note that the fuselage and fin, with it's stabilizer drive, are constructed in the following set of instructions, as a finished, single unit.

D 1. Remove the two fuselage sides from their die-cut sheet. Tape, pin or clamp them together and use a sanding block to lightly sand their edges, thus matching them exactly. Now lay one of the fuselage sides directly over the side view on the plans and accurately mark the location of the F-3 lite-ply former. Also mark the location of the end of the top 1/8" sq. balsa longeron at the leading edge of the fin — this will be at an angle, use a straight edge. Lastly, mark the location of the forward end of the bottom 1/8" sq. longeron, where it butts against the noseblock. Duplicate these marks on the remaining fuselage side — remember that you need a *right* and a *left* fuselage side!

D 2. Glue the two F-2 balsa doublers in place on the inside faces of each fuselage side, matching its top contours to those of the fuselage sides. Glue the top and bottom 1/8" sq. balsa longerons in place after first trimming their ends to fit the marks made earlier. Remove the fuselage sides from your work surface and pin, tape or clamp them together again. Use your sanding block to once again make sure they are identical. While they're together, check the trimmed ends of each longeron to be sure they are matched accurately. Set these aside for now.

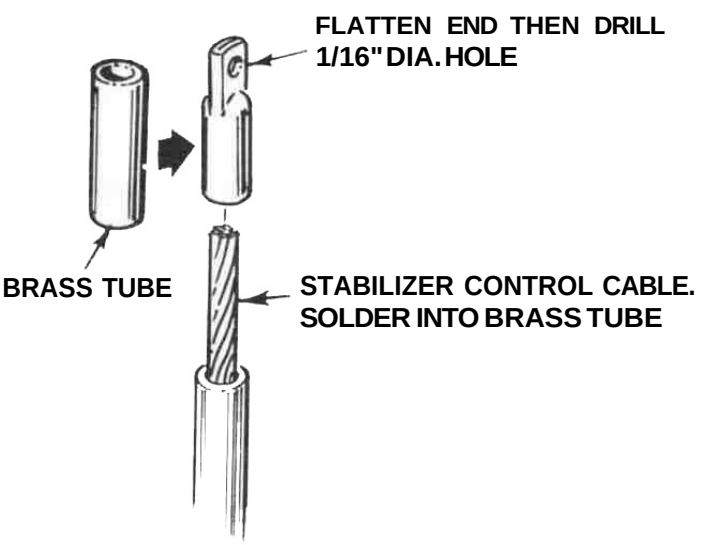
D 3. Using the 3/16" sq. and 3/32" x 3/16" balsa stock provided, build the fin frame directly over the plans. Take your time and ensure that each of the required joints is accurate and well-matched. Remove the frame from your work surface and use a sanding block to lightly smooth out the sides and edges. Remove one of the T-1 fin sheets from its die-cut sheet. This can now be glued in place to the *right* side of the fin frame, as shown on the plans. Do this operation accurately **and** with a minimum amount of glue.

D 4. The *right* side of the fin frame, outer 3/16" edges only, is now capped with 1/32" x *3/16"* strips cut from the open, center area of die-cut sheet #RC-35-5. This carries through the increased thickness of the fin created by the T-1 fin sheet. Note the "+" mark toward the rear of the T-1 fin sheet. Use a 3/32" drill to accurately make a hole at this mark. This hole is referred to as the stab pivot hole. As shown on the plans, glue a short length (about V will do) of *3/16"* balsa stock directly over the 3/32" dia. hole just drilled through T-1.



D 5. Take the *right* fuselage side and pin or weight it in place carefully over the plan. Place the fin assembly on the fuselage side, at the rear to check its fit and trim carefully, if needed. Place a scrap piece of *3/32"* stock underneath the fin frame, above the fuselage side, to bring the fin level. Carefully glue the fin frame assembly to the fuselage side-pin or weight in place and allow to dry.

D 6. From your kit box locate and remove one of the braided metal drive cables and one of the outer cable housing tubes. Use a piece of sandpaper to lightly scuff the outer surface of the plastic tube. As shown on the plans, the stabilizer cable drive tube is going to be glued directly to the right fuselage side and up into the lower fin, directly beneath the oval stab drive hole in T-1. Position the forward end of the stab drive tube just ahead of the F-3 former location and glue it in place to the right fuselage side, just beneath the F-2 doubler and about 1-1/2" back from the F-3 location. (An adhesive such as Pacer's Slo-Zap CA is great for this operation.) Repeat this procedure all the way back to just beneath the fin, noting that the stab drive tube gently arcs down to the fuselage bottom as it is positioned rearward. Before making the bend up to the oval hole in T-1, load the tube with the inner braided cable. Now make the bend up to the hole and hold this assembly in position. Try moving the cable back and forth; it should move easily without binding. Once satisfied, glue the short length of *3/16"* sq. balsa in place as shown to hold the tube and then glue the tube to this block. Use a razor blade to trim off the tube end after removing the cable.



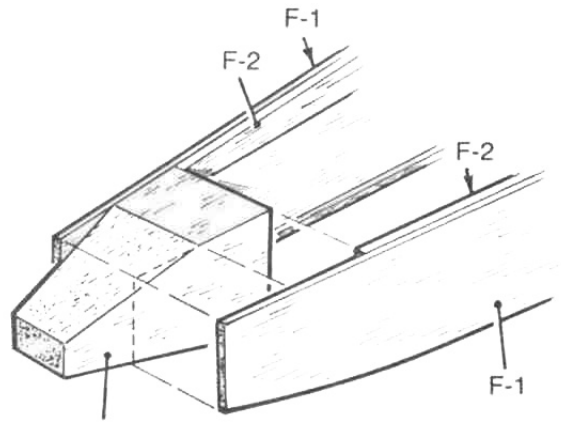
D 7. As shown on the plans, the stab drive fitting itself is nothing more than a short length of 1/16" I-D. brass tubing (1-1/2" provided) which has about 1/8" of it's length flattened in a vise. This "flat" is then drilled with a 1/16" dia. hole. The other end of this tube is trimmed in length to leave only about 1/8" left that is still "tube". This fitting is then soldered to the end of the stab drive cable. Do all of this now. Handy Hint: Insert one of the 1/16" dia. M.W. stabilizer pins provided, into this piece of tubing, almost to the end and then flatten the tubing in a vise. The music wire pin will keep the tubing round.

D 8. Now install the rudder drive tubing on the *left* fuselage side. As shown, this tubing exits the lower rear of the fuselage side through a heavily angled hole that must be drilled. A sharpened piece of tubing will work well for this step. Like the elevator tubing, the rudder housing tube is glued in place along the fuselage side at 1-1/2" intervals. Use a razor blade and then your sanding block to smooth the area of tubing exit on the outside of the fuselage. Don't worry about the stab and rudder tubing that is loose up front, we'll nail these down **later.**

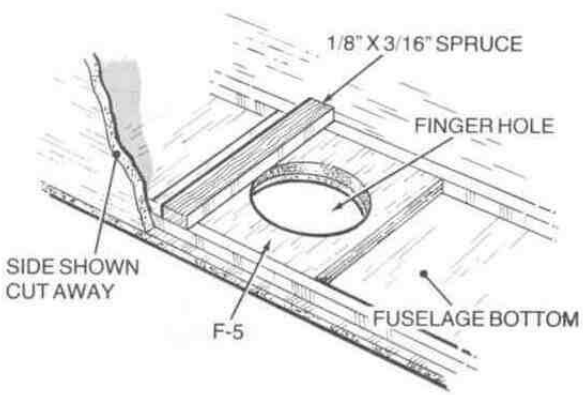
D 9. Now glue the remaining T-1 fin side in place on the left side of the fin, with the stab drive cable and fitting in place. Glue 1/32"3/16""caps on the left side of the fin frame, just as you did on the right. Use your sanding block to smooth this structure. Now trial-fit the left fuselage side to the right, paying particular attention to the fit of the fin. This should be accurate and close-fitting. Once satisfied, the left fuselage side can be glued in place to the fin and right side—the glue joints should be at the top and bottom longerons 1/2" ahead of the fin's leading edge back to and including the left T-1 fin side. Accurately match the fuselage sides, weight and/or pin this structure to your work surface and allow to dry.

D 10. Ply fuselage former F-3 should now be trial-fitted in place (just move the loose ends of the rudder and stab tubes out of the way). Make sure this former fits well, trim if necessary. Take one of the servos that you plan to use and hold it in place on the inside of the fuselage, about where it will be mounted. Note the location for the two drive tubes on F-3 (these should be lined-up with the servo's output arm. Remove F-3 and either drill a hole or slot the former to accept the two tubes. You now can glue F-3 in position at the marks made earlier on each of the fuselage sides. We suggest using something like 5-minute epoxy for this operation since you may need a moment or two for positioning. We also suggest that you accurately position the entire structure over top view on the plans and use weights or pins to ensure that the whole thing is kept straight!

D 11. Trial-fit the balsa nose block in place and pinch the fuselage sides together as if you were gluing it in place. How does it fit? Everything square as it ought to be? When viewing the structure head-on, is it straight? If the answer is no to any of these questions, take the time now to trim the ends of the longerons and/or the F-2 doublers to correct the problem. Once satisfied, glue the nose block in place and clamp or tape the fuselage sides together at the nose until dry. When it is, use your sanding block again to smooth out the fuselage/nose block fit, top and bottom.

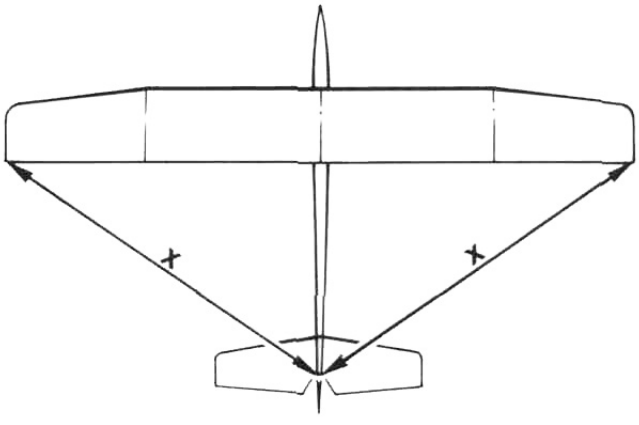


D 12. Locate the 1/8" ply wing-bolt plate from your parts bag. Trial-fit this part in place at the location shown on the plans (beneath the wing's trailing edge). Trim if needed. Once satisified, glue this plate in place against each fuselage side and up against the bottom of the F-2 doublers. Locate and remove the die-cut F-5 fingerhole reinforcement piece. Trial-fit F-5 in place flush with the bottom fuselage longerons and directly beneath the 1/8" ply bolt plate just installed. Once satisfied with the fit, glue F-5 in place, between the bottom longerons and flush with the fuselage sides. Now cut a 1-3/8" length of 1/16" x *3/16"* spruce spar stock. As shown on the plans, this part is now glued in place on top of F-5, between the fuselage sides, at the forward edge of the fingerhole cut-out. This part serves to reinforce F-5 against undue wear during repeated hand-launches. Lastly, cut and glue the 1/8" x 3/16" balsa cross brace in place. As shown on the plans, this brace fits between the bottom fuselage longerons, just behind the receiver location. Use your sanding block to now lightly smooth the fuselage bottom prior to sheeting.



D 13. Remove ply die-cut part F-6 from its sheet. This is the forward, bottom fuselage sheet which is meant to fit from the cross brace just installed, forward to the noseblock. Clean-up its edges with a sanding block. F-6 can now be glued in place using weights or tape to hold it (note that its rear edge is glued halfway across the width of the cross brace; use a scrap piece of balsa to clean out any oozing glue from beneath this edge). Using the 1/16" x 3" balsa sheet stock provided, finish sheeting the fuselage bottom from the rear edge of F-6, aft to the end of the fuselage - as shown this sheeting is applied cross grained. Once the sheeting is in place and dry, use your sanding block to smooth all of the edges (balsa sheeting and F-6) flush with the fuselage sides. Now clear out the finger hole described by F-5, using sandpaper to smooth the edges. The last thing you may wish to do on the bottom of the fuselage is to drill a hole, back toward the leading edge of the fin location, to provide an exit for your antenna. On our prototypes we angled this hole forward and lined it with a short length of plastic tubing.

D 14. Now trial fit your wing to the fuselage. Make sure the wing is centered and that the leading edge is up against F-3. Holding these two structures together, observe the fit between the bottom of the wing and the wing saddle area. It may be necessary to slightly bevel the tops of the fuselage sides and F-2 doublers to get a snug fit; do this now. Once you're satisfied with the wing/fuselage fit, you're ready make the hold-down system. Again place the wing on the fuselage and use weights to hold it firmly in position. Make sure that the wing is squarely in position on the fuselage by taking wingtip-to-tailpost measurements as shown in the diagram ("X" should equal "X"). Locate the *3/16"* dia. dowel from the parts bag. A 3/16" dia. hole must now be drilled through F-3 (see mark) and into the wing's center W-1 ribs, to a depth of 1-7/16", measured from the front face of F-3. Measure this depth on **your** drill bit and note it with a strip of tape. Once the hole is drilled, remove the wing from the fuselage and trial-fit the 3/16" dia. dowel in place. Use sandpaper to *slightly* round the front edge of the dowel. Now glue the dowel in place in the wing (clean-off any oozing glue). Once dry, again fit the wing to the fuselage and use weights to hold it in place, as before. The rear nylon bolt hold down system is now made. Start by drilling a hole, with a #29 drill bit, through the wing's trailing edge and through the 1/8" ply wing bolt plate at a slightly forward angle (see plans). Remove the wing from the fuselage. Enlarge the hole in the wing's trailing edge to allow the 8-32 nylon bolt to slip through to the head. Now using either an #8-32 tap or an 8-32 bolt (metal), tap the threads into the hole made in the ply wing bolt plate. Once the threads have been cut we suggest giving them a very thin coat of instant CA glue and again running the tap through them. This toughens the threads in the plywood. Re-fit the wing to the fuselage and bolt it in place to again check the fit. Note that about 7/8" of the length of the nylon bolt (1-1/2" supplied) can be trimmed off. Remove the wing from the fuselage.



DISTANCES "X" and "X"
MUST BE EQUAL

D 15. Use a flat sanding block and light sandpaper to carefully sand the top of the fuselage, from F-3 forward across the top of the noseblock. Use care here as we want the forward hatch to fit nicely. From your parts, locate and remove the 3/8" x 2" x 10" length of balsa. Again using your sanding block, bevel-sand one end of this block to fit perfectly against the forward face of F-3 when held in place on top of the fuselage. As shown on the plans, the forward end of the radio hatch is now cut at the angle shown. Once the bevel cut has been made, use the sanding block to lightly clean-up each end of the cut, set aside the hatch part for a moment. On the remaining length of block, measure about 1-3/4" forward from the bevel cut and cut this piece off. This piece then becomes the forward "lip" for the radio hatch. Use tape to hold the radio hatch in place to the top of the fuselage, against F-3. Apply a small amount of glue to the bottom of the forward block and glue it in place to the top of the fuselage and noseblock, matching the bevel on the front of the radio hatch block, thus ensuring a nice fit between these two blocks. Untape and remove the radio hatch block. Locate and remove the ply F-4 hatch "lip" from its die-cut sheet. F-4 can now be glued to the forward, bottom surface of the hatch block with *3/16"* of its forward end protruding, thus providing a fit beneath the forward block just installed and preventing shifting from side-to-side. As shown on the plans, the rear face of the radio hatch block will need a slight amount of routing out to allow the wing's hold-down dowel to clear; do this now. Once satisfied use a couple drops of glue to *lightly* tack-glue the radio hatch in place for shaping.

D 16. Remember that V length of 1/16" I.D. aluminum tubing that you were asked to save back when you built your stabs? Locate it now, we're going to use it. With a 3/32" drill bit, finish the hole through the fin (the stab pivot hole). Cut a 1/4" length of aluminum

tubing, clean each end with a #11 blade and carefully insert it into the stab pivot hole just cleared out, do not glue Now assemble the wing to the fuselage followed by attaching the stabilizer halves to the fin, just press in place for now What we're going to check for now is alignment We want to view the airplane head-on at a bit of a distance Place it on a table, facing you, and back off a few paces, sighting directly at the front Is the wing sitting properly on the fuselage? Are the stabs tilted in relationship to the wing/fuselage or do they look "right"? If everything seems to line-up, we can proceed to finish sheeting the top, rear of the fuselage If it doesn't, we need to know which way to twist the fin to make everything line-up properly because once the top rear sheeting is installed, it "locks" the fuselage firmly in place thus making any such corrections extremely difficult, if not impossible.

If the alignment appears to be OK, remove the stab halves, leave the wing in place and carefully cut and glue the 1/16" balsa sheet (applied crossgrain, as shown) top, rear decking in place back to the leading edge of the fin However, if some alignment is needed by having to pull the top of the fin left or right, now is the time to do it, before applying the top, rear sheeting This is how it's done Set the assembled airplane on a large, flat table Place weights (magazines, lead, whatever) on top of the wing center section, thus holding it firmly in place. Again sighting directly at the front of the model, determine which way the fin has to be tilted Pull off a long length of masking tape and stick it to the top of the fin Pull against the tape until the fin is in the right position and stick the other end to the table, thus preventing the fin from shifting Once satisified that it is *now* properly aligned, cut, fit and glue the top, rear sheeting in place as earlier described Let the sheeting dry before removing the masking tape from the fin and you'll find that the fin is now properly aligned Disassemble the wing and stabilizer halves from the fuselage Use your sanding block to now sand the top, rear sheeting and the forward radio hatch and nose block piece flush with the fuselage sides You can also now sand the top forward hatch and nose-block contours to shape as shown on the plans, no need to round corners yet.

D 17. From your parts bag, locate the 1/4" shaped fin/fuselage fairing Use your sanding block to adjust the angles if needed and glue in place As shown, this is now trimmed to fair the fin leading edge into the top, rear of the fuselage

Finally, push the 1/4" length of aluminum tubing that's in the rear pivot hole about halfway out, apply just a bit of adhesive to its outer surface (5-minute epoxy or slow cure CA) and push it back in place in the fin.

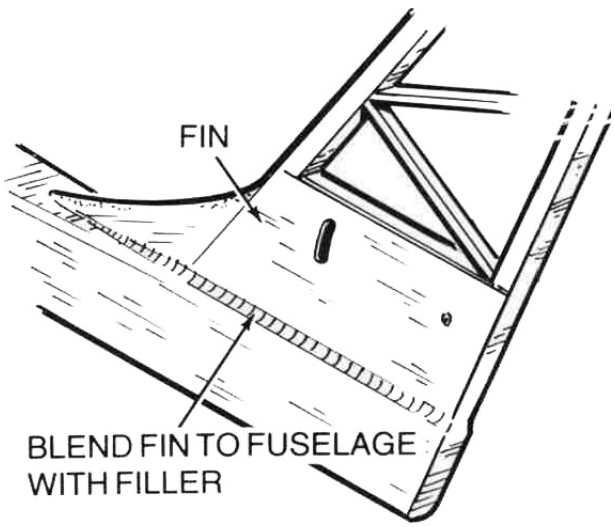
With the exception or contouring and final sanding, your fuselage should be complete

FINAL ASSEMBLY

Its often been said that the difference between a good model and a great one is sandpaper and the willingness and ability to use it This is the point in construction that can literally make or break the performance and the look of your model Since the WRISTOCRAT is an obvious candidate for use of Monokote™, you would do well to keep in mind that the surface preparation of the wood will dictate the finished, covered look of your model When we reference the use of "filler" in the following text, we have found that some of the best products to use are those such as "MicroFill" or Model Magic Filler or something similar These products dry quickly, are very light and Monokote goes over them nicely. Look for these at your local retailer

Let's start with the fuselage since the other components should, by now, be sanded and about ready to use

D 1. Note the lower left corner of Cross Section C-C on the plans This demonstrates about the correct amount of radius that can be and should be sanded into the fuselage bottom As this sanding radius moves aft, toward the fin post and the fuselage diminishes in width, the result will be pleasant looking oval shape Next, sand the radio hatch and nose block sections to a nice, rounded look right down to the nose Using a rougher grit of paper at first, followed by something like #220 will do the job nicely The last section to tackle is the top, rear of the fuselage, back to and including the fin fairing and fin leading edge Take every effort needed to sand this structure to the point that it looks *and* feels like one piece You will note that where the T-1 fin sides meet the fuselage sides, there is a disparity in wood thickness, resulting in a kind of "lip" On our prototypes, we handled this by sticking a length of masking tape, lengthwise, about *3/16"* above this joint, on T-1 Then we carefully sanded down the fuselage side(s) to as close to T-1 as possible (the masking tape was there to protect T-1 in case we got too close) Then with the tape still in place, we used filler to "fair-in" this joint, feathering the material carefully When the filler was dry, the tape was removed and we used very light sandpaper to finish feathering the joint.



Use your sanding block to sand the trailing edge of the fin flat and straight.

The last step in preparing the fuselage for covering is to sand the fin/rudder combination together, as a single unit Start by using masking tape to accurately position the rudder to the fin — tape on the sides only Now use your sanding block to accurately match the side view shape of the rudder to the fin/fuselage Once that's done, remove one of the pieces of tape from one side only and lay the structure down on a flat surface — taped side down Use your sanding block to now sand the rudder's cross-section shape into the fin/fuselage, but only about halfway Add another piece of tape to the now sanded side, flip the structure over, remove the tape and repeat the sanding operation After a couple of passes on each side, you should be about where you want to be, a fin with a true leading edge and a rudderwith a true trailing edge and everything inbetween accurately matched The leading edge of the rudder can now be beveled as shown on the plans, thus facilitating left and right movement when hinged with Monokote

Once this is done, locate and remove the 1/32" ply rudder horn from its die-cut sheet Onceagaintape the rudder to the fin, right side only Use a sharp #11 blade to now cut a 1/32" wide slot in the rudder's leading edge, at the bottom, on a plane corresponding to the rudder tube's exit point on the fuselage Once the slot is made to your satisfaction, trial-fit the horn in place and trim as needed to get a proper fit Do not glue the horn in place until after model is covered

D 2. Assemble the wing to the fuselage and cinch it down with the wing bolt In this step we want to rough cut and fit the forward and rear wing/fuselage fairings to the wings center section The remaining length of radio hatch block balsa will be used for this First either carve or use a Dremel tool to route out the bottom mating surface of each of these blocks, cut and fit, cut and fit, etc , until you have an acceptable fit Bevel the rear block to match the fuselage (viewed from the side) and then use your #11 blade to carve out a space for F12 when the block is held in place Also, the head of the bolt will indent the bottom of this block and therefore give you the location to drill a 1/4" dia hole to allow the bolt head to seat against F12 Once you're satisfied with how the two blocks fit to the wing and to the fuselage, concentrate on the top view The forward block should be sanded to a sort of half-round shape, carrying through the shape of the hatch block The rear block gently curves in to the center line of the wing to a point about 2" to 2-1/2" from the trailing edge Glue the blocks in place to the top of the wing while the wing is still attached to the fuselage Protect the wing sheeting around the edges of these blocks with strips of masking tape and sand the blocks to a final shape Use filler to fillet the blocks to the wing, lightly sand and you're finished Remove the wing from the fuselage

D 3. Use a sharp razor blade to now remove the finished radio hatch block With the battery/servo compartment now open, this isthetime to install your servo mounting rails Note on the plans that we've used the remainder of the 1/8" x 3/16" spruce spar stock for these You may wish to use ply In stall these rails in the approximate positions shown on the plans, with the servo's output arms lined-up with the rudder and elevator tube ends protruding through F3 Once satisfied, remove your servos

D 4. The last suggestion that we'll make to you before you start covering is that you take a few minutes to "ventilate" the various structures, wing, tin (above T-1's), stab halves and the rudder Ven tilatmg these components allows the heated air (formed when covering) to escape the various sealed compartments (between rib bays, etc) rather than expanding and "ballooning" the covering

For the wing, we use a 3/32" dia drill bit, hand-held, to drill one hole through each rib, in the center, just behind the spar location DothisfromW 7, at the tip, all the way through the inner most W2 rib, beneath the center section sheeting Using the same bit, drill a hole through the bottom sheeting, just behind the spars on each side of the W-1's.

Use a 1/16" dia drill bit, again hand-held, to now do the same thing to the fin(and also through the 3/16" sq brace between the tops of the T1's), rudder and stab halves On the rudder drill a small exit holeon the very bottom, behind the horn location On the stab halves, drill the exit holes through the rear diagonal 3/16" sq piece

D 5. Final check entire airplane for any flaws or problems If you find any, fix them now

D 6. Since the stabilizer halves slip in place using two 1/16" dia steel pins, there is a need to be able to retain them This can be done a couple of ways The first is to simply allow the pins to rust by leaving them outdoors for a night or two This makes them a press-fit into the stab half tubes Another way is to use a low-tack adhesive to coat the wires (something like 3-M #77 spray cement is good), thus making them a bit "sticky" In any event, don't permanently glue these in place since eventually the need will arise for disassembling the stab halves from the fin

COVERING

Realistically, your **Wristocrat** can be covered with a single six foot roll of Monokote™ You may wish to use a contrasting color for the radio hatch block, as we did, to create a "canopy".

The only area of possible concern is that of covering the stab halves and rudder These, by necessity, are thin structures and it's conceivable that in shrinking the Monokote, some warpage could occur To prevent this, we've come up with a nifty little method that you might want to try.

Cover these structures just as you normally would; bottom first, followed by the tops (in the case of the stab halves). But *do* not shrink the covering yet. Make sure all of the outer framework of these pieces is adhered to with the Monokote. Next, cut a couple of 7" - 9" lengths of straight, stiff spruce stock; something like 1/8"x1/4" will do nicely. Using three office-type paper clamps, mount and clamp one length of spruce on each side of the trailing edge of the piece you're working on. The spruce won't hurt the structure and the clamps ensure that the trailing edge will retain it's shape. Now use your Top Flite heat gun or iron to shrink the covering *equally* on both sides (be sure the vent holes are cleared out). Let the structure cool and then remove the clamps and spruce. You should find that everything did indeed stay straight.

Lastly, clear out all of the required holes; rudder drive tube, rudder horn slot, stab drive and pivot holes, etc. Note that we've not indicated any kind of hold down method for the radio hatch block. On our prototypes this was not necessary because of the closeness of the fit after covering. If yours does not fit that well, a little piece of tape is all that's needed.

In the interest of aerodynamic efficiency, light weight and simplicity, we strongly suggest that you hinge your rudder (and flaps, if you have them) with Monokote as shown in the drawings provided.

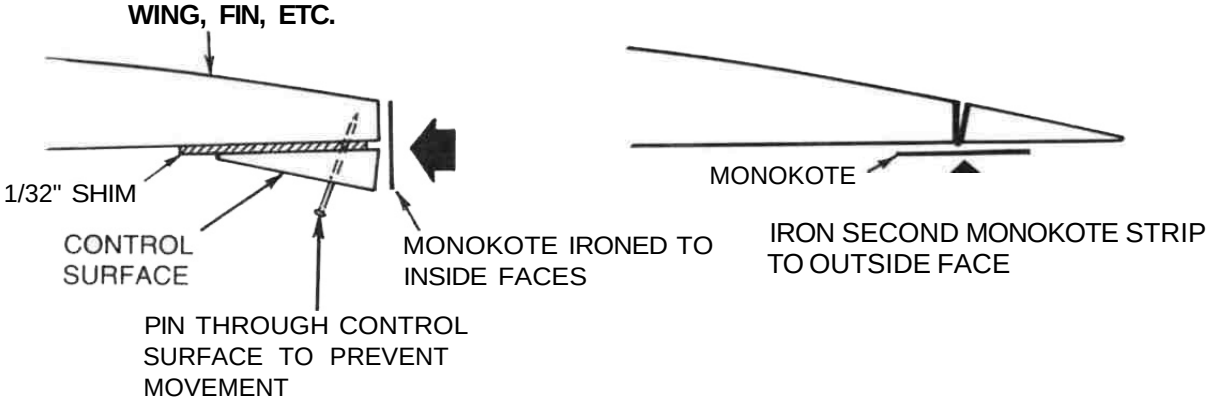
RADIO INSTALLATION

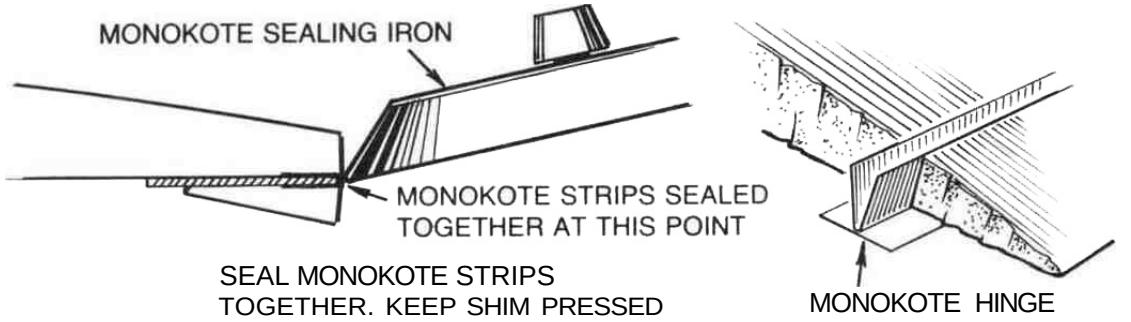
Before installing your servos, make sure that they run in the right directions. If you have servo reversing capability, this is a simple task. Install the servos in the fuselage on the rails provided earlier.

From your parts bag, locate the 1-1/2" length of .038 I.D. brass tubing. This material will be cut up to provide solder connections between the drive cables and the soft wire paper clip connectors. We recommend the use of a good quality flux and solder when performing the required solder joints; Harris's Stay-Clean Flux and silver solder are great products for this operation.

Drill a 1/32" dia. hole through the rudder horn to accept the paper clip drive wire. Cut off about 1/4" of the brass tubing connector material and clean out each of it with your #11 blade to accept the cable and paper clip ends. Cut off the required length of paper clip wire (see plans) to make the connection to the rudder horn and bend one end into a "Z" bend. Slip the brass connector halfway onto the drive cable end and the paper clip wire into the other end of this connector. Sweat solder the three pieces together, using a minimum of solder. Slip the opposite end of this drive cable into the rudder tube and feed it's length through the fuselage and into the servo compartment — don't cut off the excess cable yet. Attach the rudder horn to the "Z" bend and carefully glue the horn into the slot previously provided.

INSTALLING MONOKOTE HINGES





The connections made at the servo ends of the stabilizer and rudder drive cables are done in the same manner as described above. However, the paper clip connectors are to be bent with a "V" bend as shown, thus providing some centering adjustments for flight trim.

Install the receiver next. A thin layer of foam on the floor, behind F-3 is all we used. To get the antenna through the fuselage and out the hole that we previously drilled for this purpose, we "fished" a length of heavy thread through the antenna exit hole and into the receiver area. We then used a bit if CA glue to attach the end of the antenna to the end of the thread and pulled the thread back out of the antenna hole, along with the antenna.

The battery pack should now be installed, as shown, in the nose and held in place with pieces of foam. We did not use on/off switches in our prototypes, rather we just plug the battery pack connector into the receiver whenever we want to fly. With everything in place, turn the system on and test for correct movement and centering — adjust as needed.

The "CG" (Center of Gravity) shown on the plans is exactly where we've been flying our prototypes and it's a good place to start. Balance your model at this point, adding bits of lead in the nose as needed to achieve the right CG point. Interestingly, our prototypes, using the SR 300 Mah battery packs, did not require any lead at all to arrive at the CG shown.

You now want to set the stabilizers, at neutral, in the correct relationship to the wing. This is easy to do and should be done now. Assemble the airplane. Using a flat table, place one of the inner wing panels flat on the table with the fuselage hanging off the edge and right next to it. Use a couple of magazines to hold the wing panel flat. Now go back to the stab half that is overhanging the table top and use a ruler to measure the distance from leading edge of the stab to the surface of the table.

Moving back to the trailing edge of the stabilizer, take the same measurement. The correct or neutral setting for the stabilizer, under these conditions, is arrived at when these two measurements are identical. Open or close the "V" bend at the servo to achieve this correct relationship.

The last thing to address here is the amount of movement that should be provided to the rudder and stabilizers. On the plans we show 1" of movement in each direction for the rudder. This is a good place to start. Adjustment can be made later depending on your flying style. The stabilizer should be set to move about 3/16" each way from neutral, or 3/8" total, measured at the leading edges(s). Again, these surface throws can be altered later if need be.

Assuming your radio system is fully charged, head for the field!

FLYING

Start this flight trimming session with a few gentle hand tosses, into the wind. Trim the controls as needed to achieve a long, flat glide. Despite the **Wristocrat's** diminuitive size, appearance and weight, you'll find that the glide is quite aggressive. Once you're satisfied with the glide, start throwing the model a bit harder on each try until you are comfortable with really pitching it hard. The trick here is a good, hard throw resulting in a high climb that you "top off" at the end with a bit of down elevator. From this point on your Wrlstocrat should be in "cruise mode", looking for thermals.

Anything that disturbs the flight path, wing up or a tail bobble, should be considered as potential lift and you should try a few circles to determine the "core" of this activity. You'll find that the **Wristocrat** can circle tightly in these light lift conditions and that if anything is there, you're going to get a piece of it! As mentioned earlier, a good place to hunt thermals are those areas with dark, contrasting surfaces; dirt baseball diamonds, basketball courts, etc....

We sincerely hope that your Wristocrat is as much fun as ours have been and that you'll share that fun with that special child in your life by helping them into the air with their own **Wristocrat II.**

INDEX

Product Support
(Do Not Remove From Department)