CHAPTER V

INSTALLATION OF HARDWARE AND RADIO IN THE OLYMPIC 650 SAILPLANE

The framework of the Oly 650 has now been completed and we are ready to fit it with the hardware and radio. Outfitting is done before covering, because it is easier to do at this stage and the covering doesn't get banged up.

During this description, specific manufacturers' equipment is called out. This equipment has been used and found quite satisfactory by the author. This does not mean, however, that other brands will not work just as well.

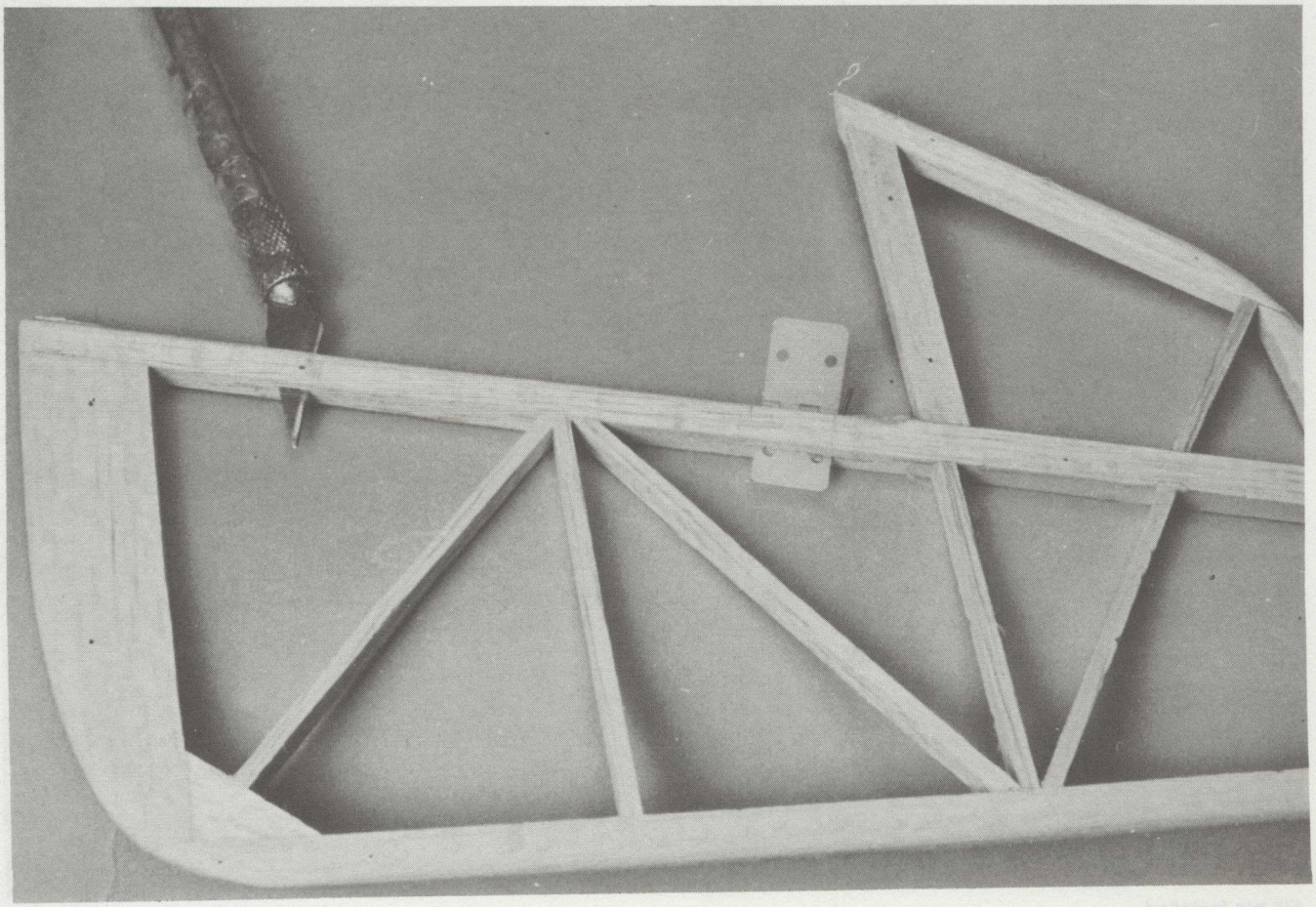
Section 1 — Hinge Installation

Any small hinge can be used. Klett RK2-7 nylon hinges work well and are easily installed. A strip of MonoKote or a strip of Scotch Tape can be used for hinge material. This makes a very simple installation, but is less permanent than hinges.

(a) To install Klett hinges, mark the hinge center-to-center locations on the stab and rudder/fin. Knowing the location is important because we will cut the hinge slots before covering. We must be able to find them again after the surfaces are covered, in order to install the hinges.

(b) Carefully cut a slot, the width of the hinge, at the location marked. Use an X-Acto knife.

Be sure the blade is straight so it does not pop out the side somewhere. Force a hinge into each slot to assure that the slot is clean. Now, put hinges in the slots on the trailing edge of the stab. In final installation, the L-shaped hinge pin end is tucked into the slot with the hinge to prevent its loss. Carefully insert the tabs, one at a time, into the elevator slots. Do the same for the rudder hinges. Seat the hinges on both sides, so there is just a bit of a crack between the surfaces.



Slotting rudder for hinge.

Section 2 — Tail Installation

I strongly recommend the removable tail option. With the tail removed, the Oly 650 will fit in a box that can be carried on an airplane. More important, if a tail member is damaged, repairs are facilitated if removal is easy.

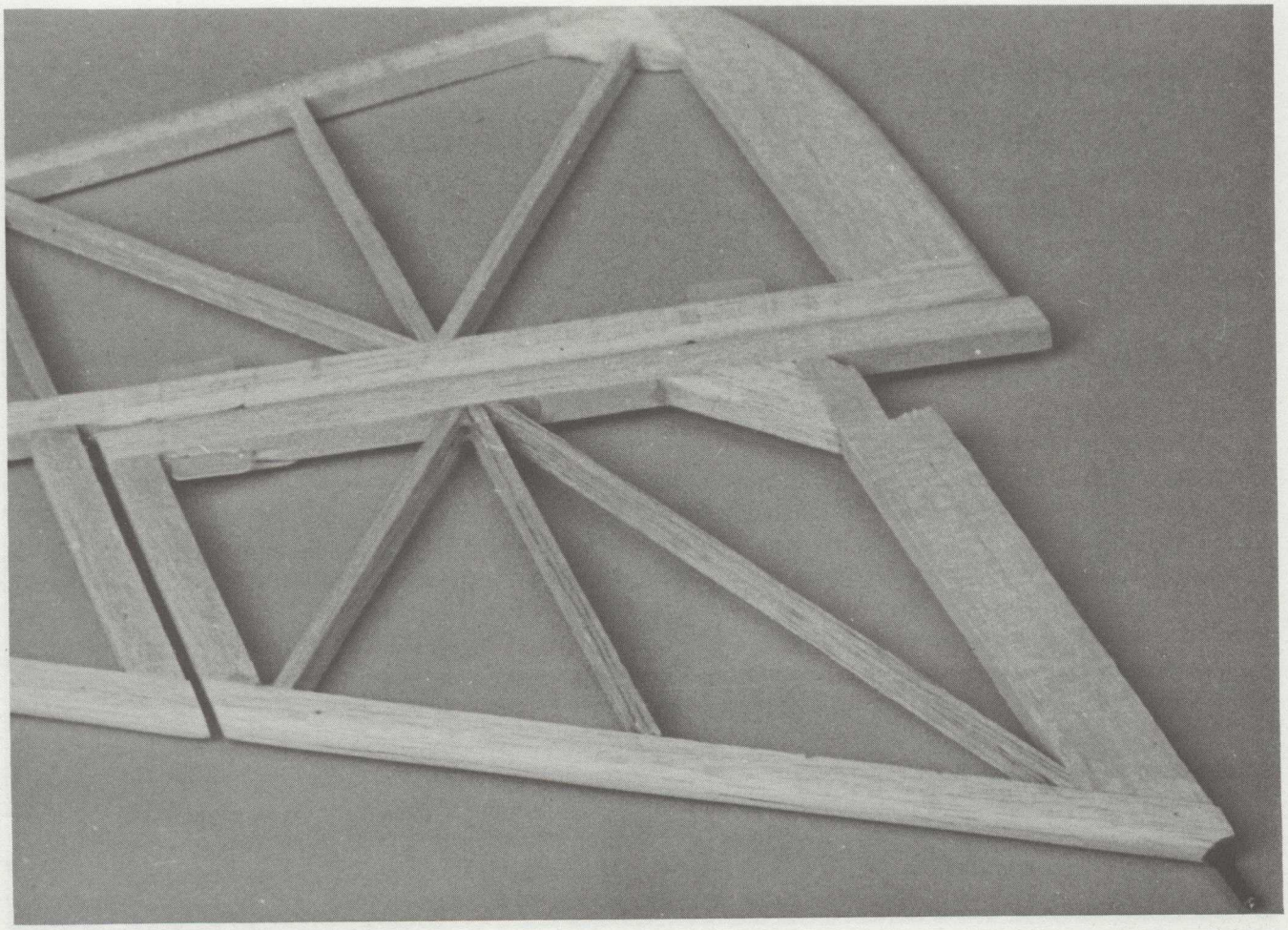
If the tail is to be glued in place, go through the fitting process. Then pin the stab and fin, while the pushrod linkage is fitted. Gluing in place should be done after covering, as it is considerably easier to cover the loose pieces.

(a) Test the stab and fin assembly. When the stab is in place and the fin tailpost snug in the fuselage slot, the elevator connecting dowel should not rub against the tailpost. The front of the stab should just touch the leading edge stop on the fuselage. If there is a gap, glue on another 1/16'' x 1/4'' spruce piece. If the stab does not go far enough forward, sand a bit off the leading edge. The fin root rib may have to be trimmed a bit, or the fin leading edge may have to be sanded a bit, in order for the fin to fit into the slot in the stab.

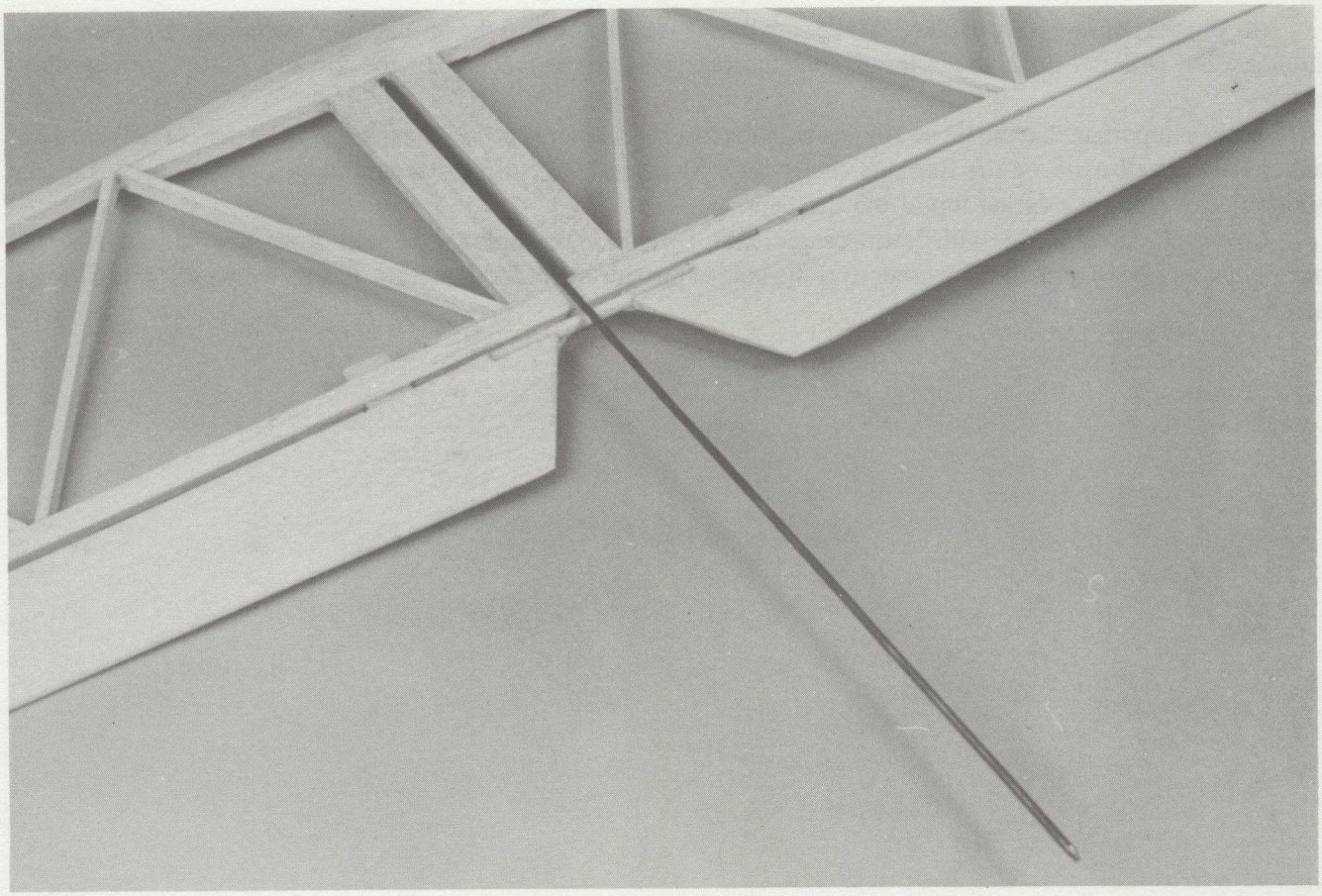
(b) Cut a piece of 1/16'' piano wire 1'' long. Drill a 1/16'' hole into the lower leading edge of the fin, about 3/32'' from the bottom. Use a file to roughen up one end of the 1/16'' wire and epoxy it into the hole in the fin.

Use a sharpened piece of 1/16'' piano wire to drill a matching hole in the stabilizer.

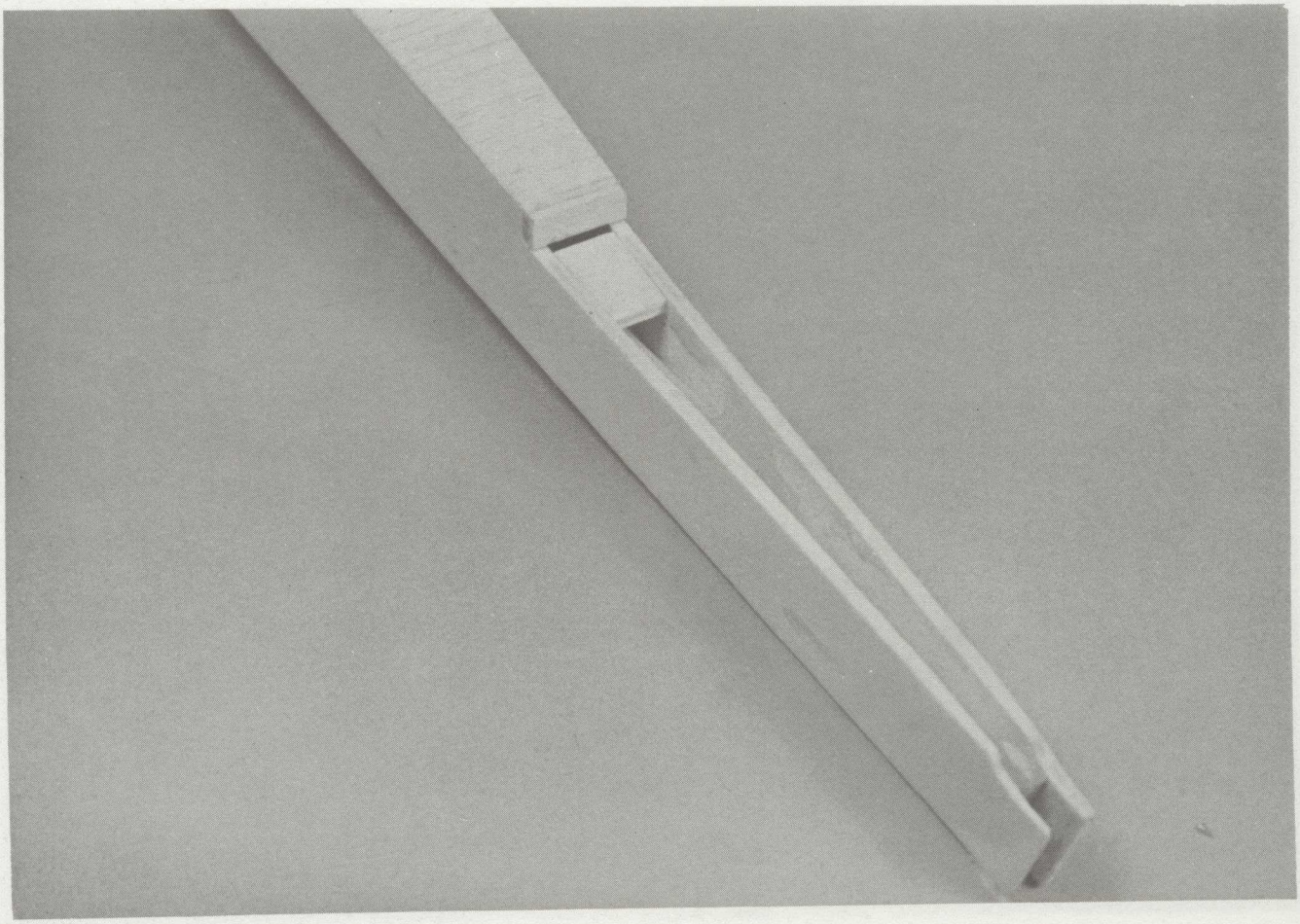
(c) Cut the 1/8'' ply plate to size and epoxy in place.



Fin pin installed.



Drilling fin pin hole in stab.

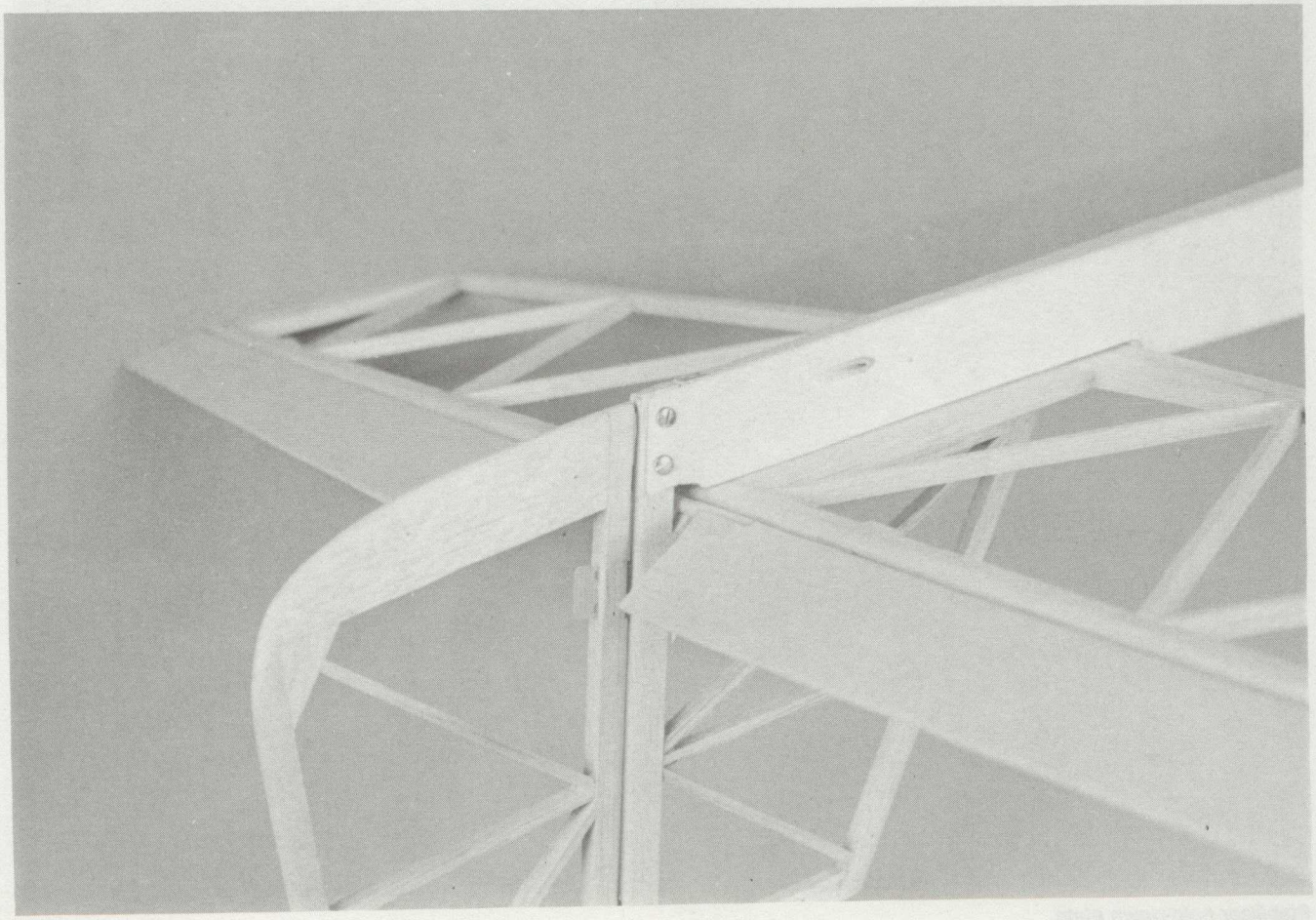


Stabilizer hold-down plate.

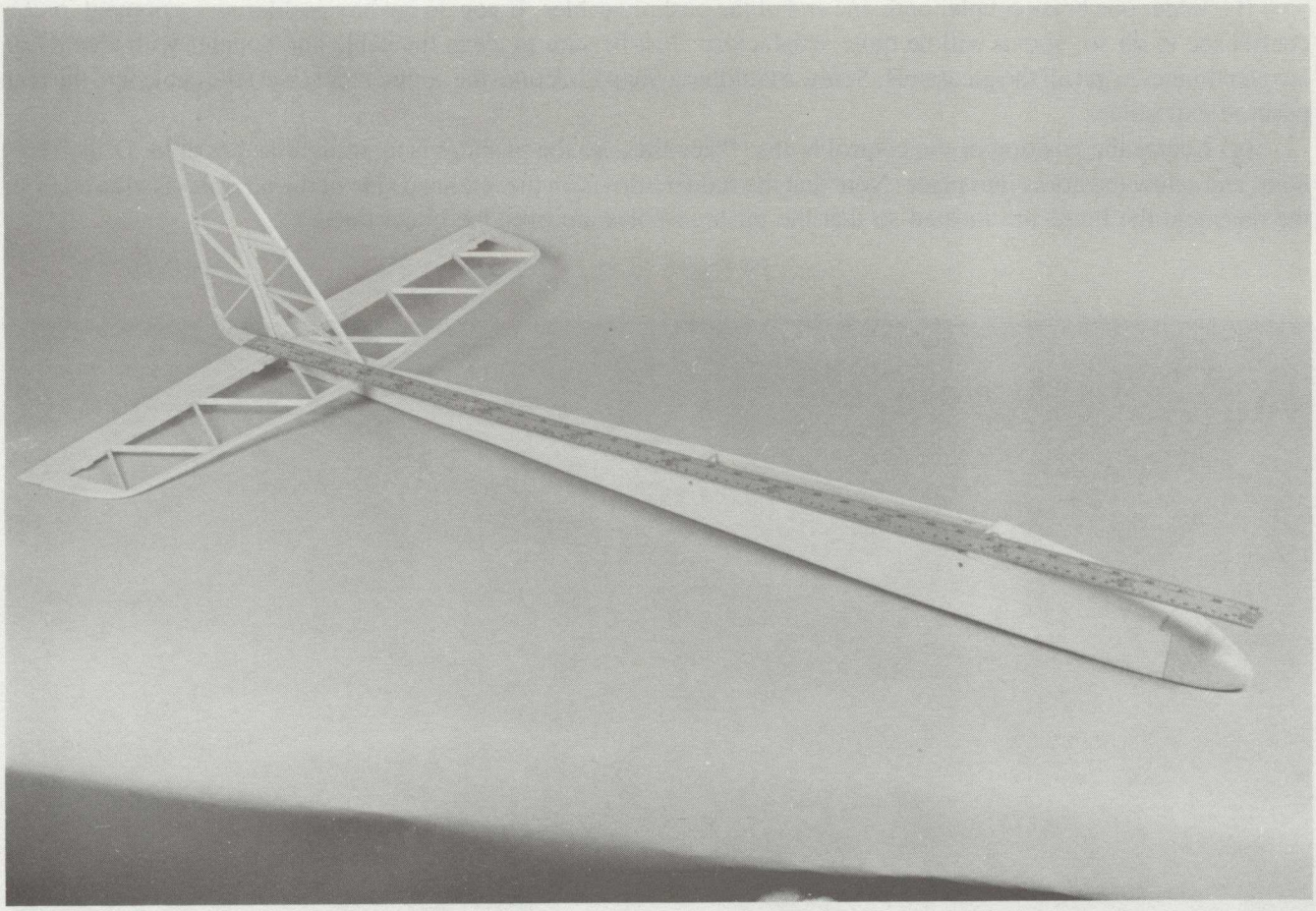
(d) Put the tail assembly in place. Make sure the stab is snug against the fuselage and the tailpost is seated in the fuselage slot. Drill two 3/32'' holes through the fuselage and tailpost as shown on the drawing. Fasten with two 2-56 screws.

(e) It is important that the fin be aligned with the fuselage center line. Measure across the hatch (or bulkhead F3) and make a small mark on the fuselage center line. Measure 3/32'' off-center and make another mark. Lay the straight edge along the fin on top of the fuselage.

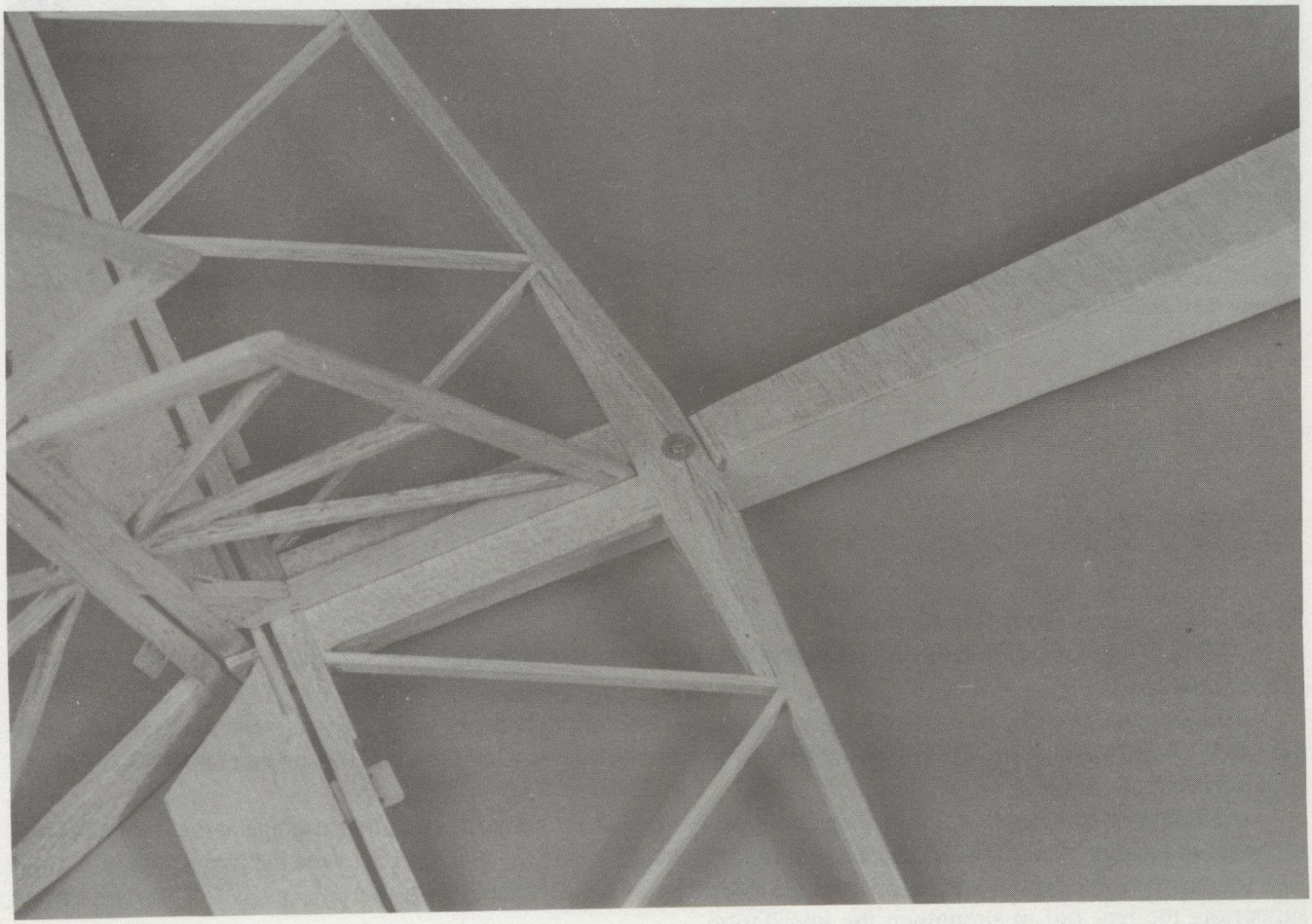
Line up the straight edge with the off-center mark. Drill the 1/16'' hole for the hold-down screw through the stab and ply plate. Epoxy a small #2 washer over the hole to provide a seat for the screw. Fasten with a #2 x 1/2'' wood screw.



Fin attachment.



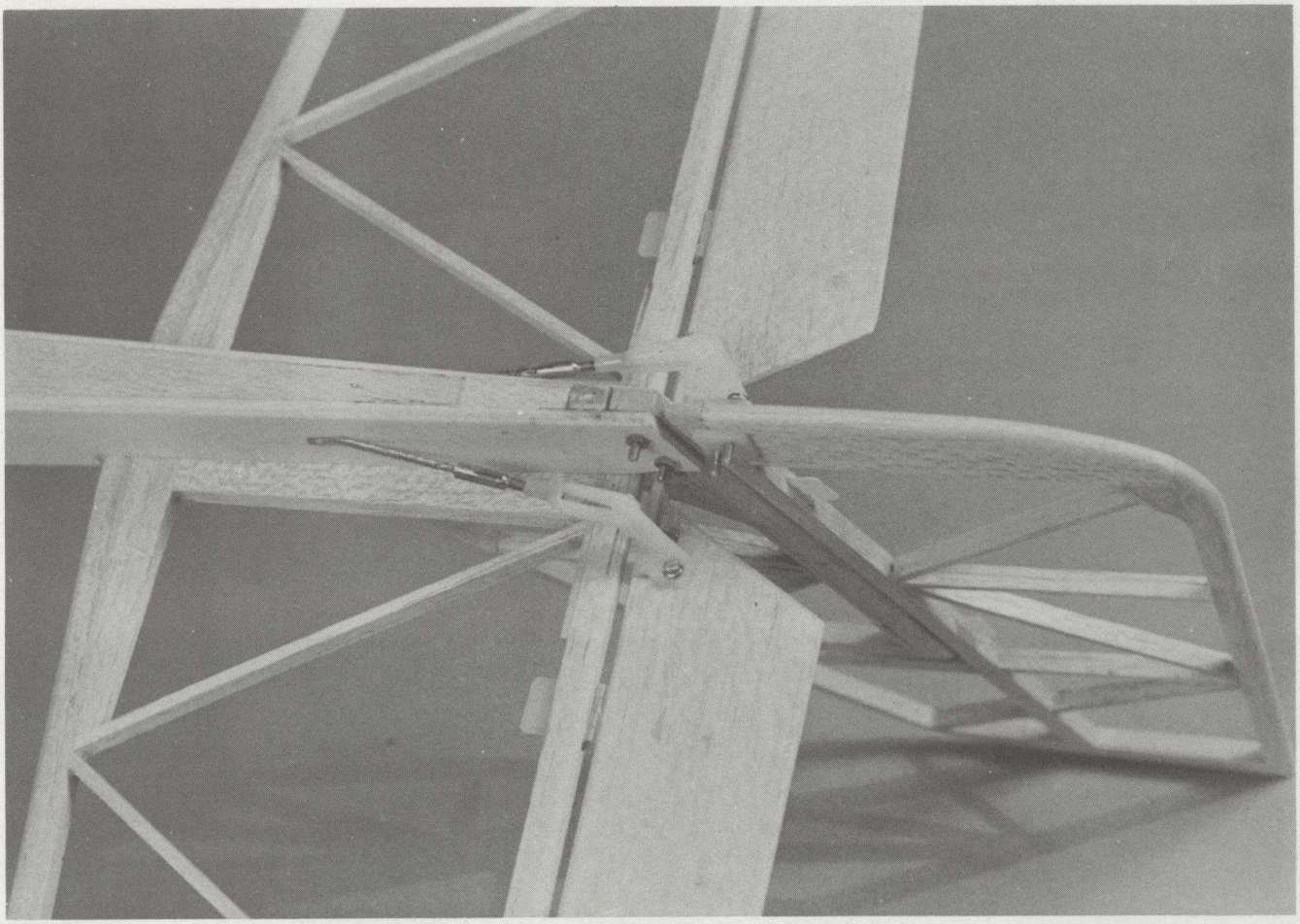
Fin alignment.



Stabilizer hold-down screw.

(f) Solder one brass coupler onto one end of the pushrod cables. If you do not have soldering equipment, or the confidence to do so, epoxy will be quite satisfactory. Just be sure to clean the cable and coupler with alcohol or lacquer thinner to get all the grease off. Screw a Goldberg Snap Link onto the coupler and insert the cable into the rear pushrod exit holes.

(g) Locate the position of the control horns. Place them so the pushrod is as straight as possible. Drill 1/16'' holes and screw the horns into place. Note that the rudder horn is on the left hand side of the aircraft (as viewed from the rear) and the horns are located so that the pushrod holes are over the hinge line.



Control horn installation.

Section 3 — Servo Mounting Airtronics XL Series Radio

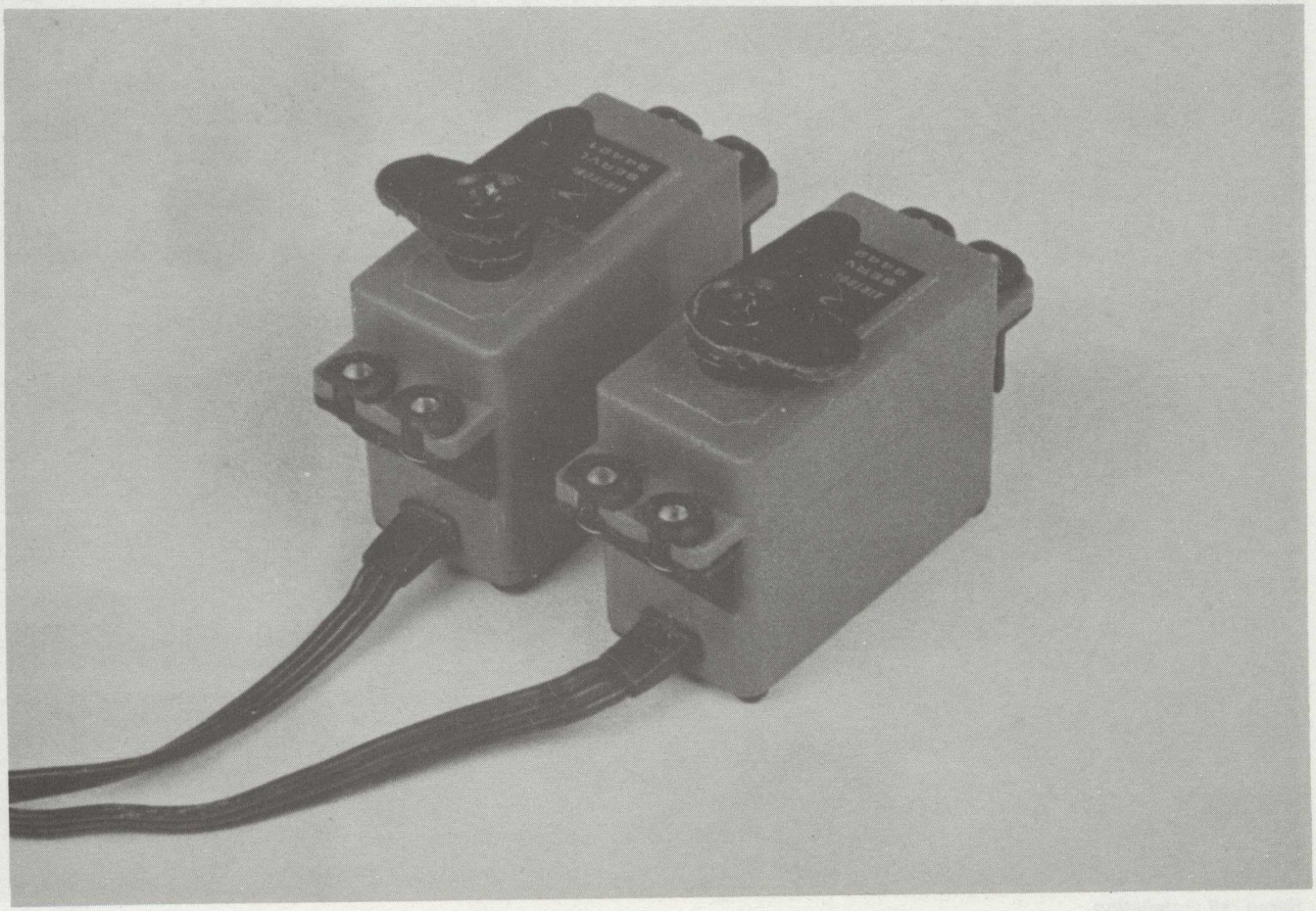
Although these instructions relate specifically to the Airtronics radio, they are applicable to most any type, with minor variations.

(a) Since the servo arms are a bit long for convenient mounting in the Oly 650, we will trim the four post servo arms to fit. Saw two adjacent arms off at the hub. Trim one right and one left arm, leaving the inner hole only. Be sure to make a right and left.

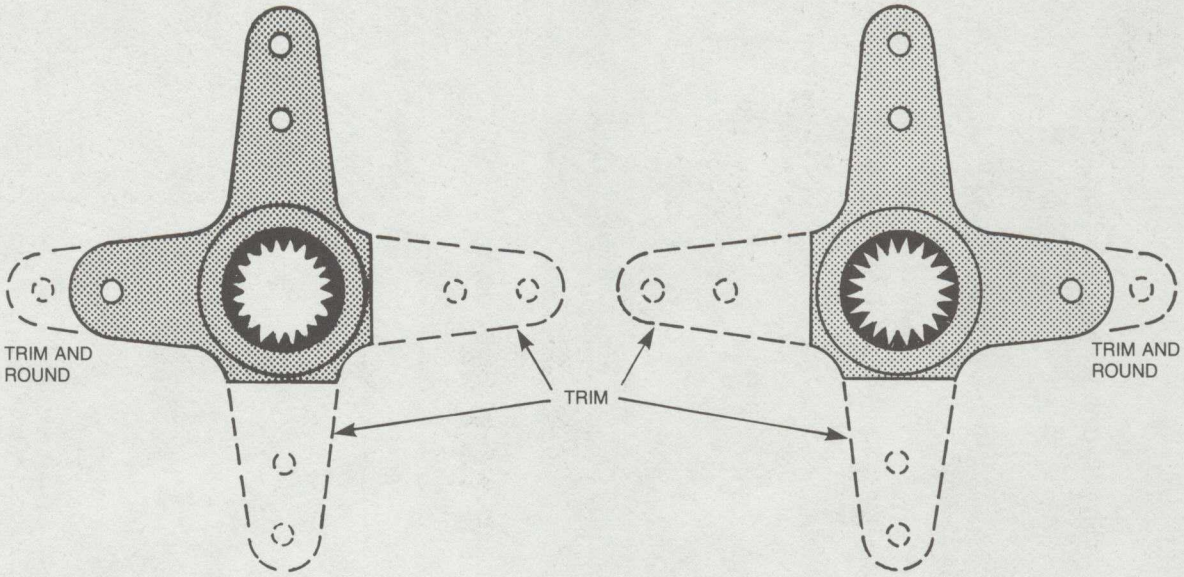
(b) Trim two pieces of 1/4'' square spruce for servo rails, to exactly fit across the fuselage at the front and back of the servo location. The forward rail fits against bulkhead F3, and the separation between the two is 1-9/16''. Both are mounted with the top 1'' above the fuselage floor. Epoxy both in place, with short pieces of 1/4'' square spruce supporting the rear rail to strengthen the installation.



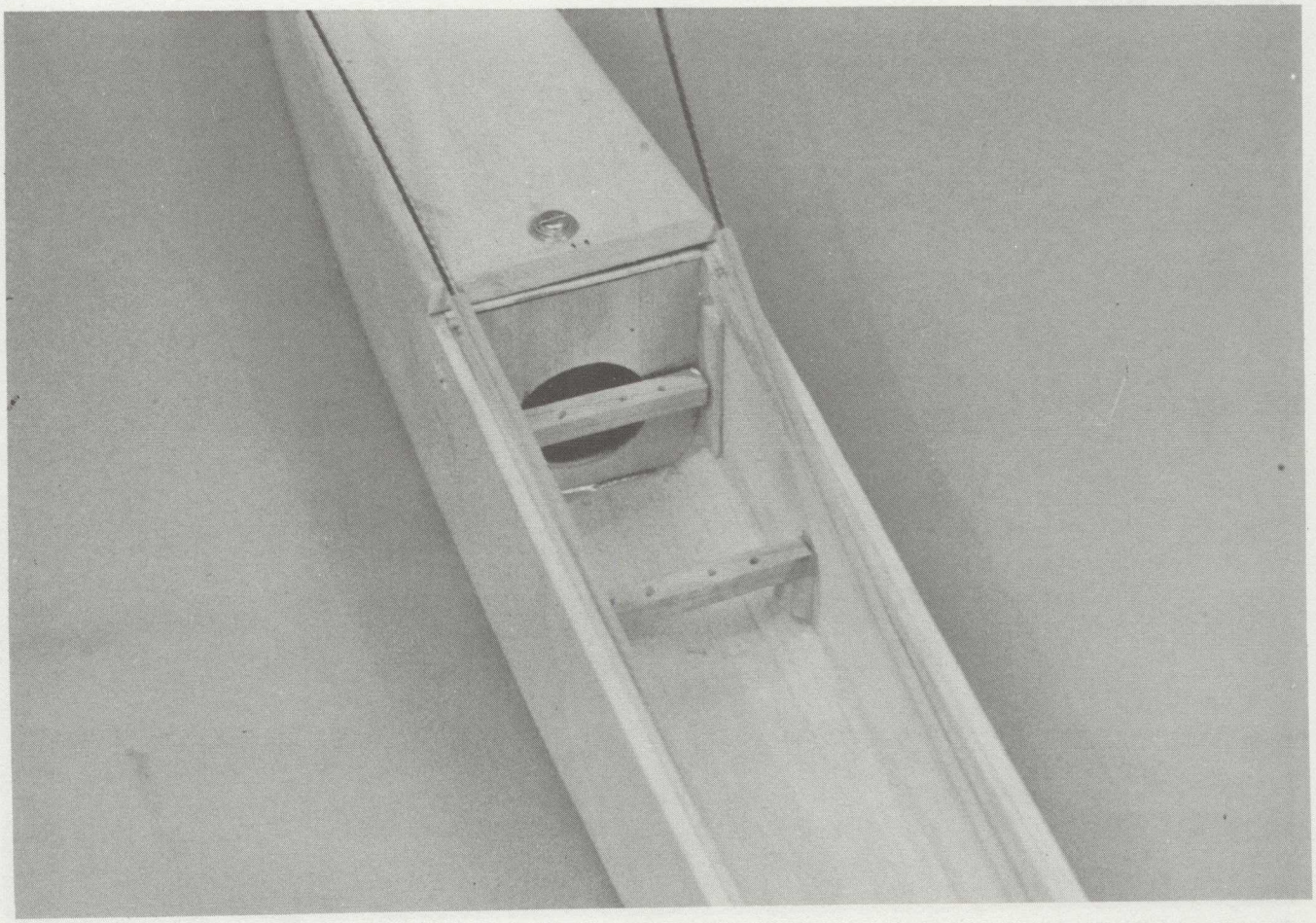
Airtronics XL Series radio.



Servo arm modifications.



SERVO ARM TRIMMING PATTERN

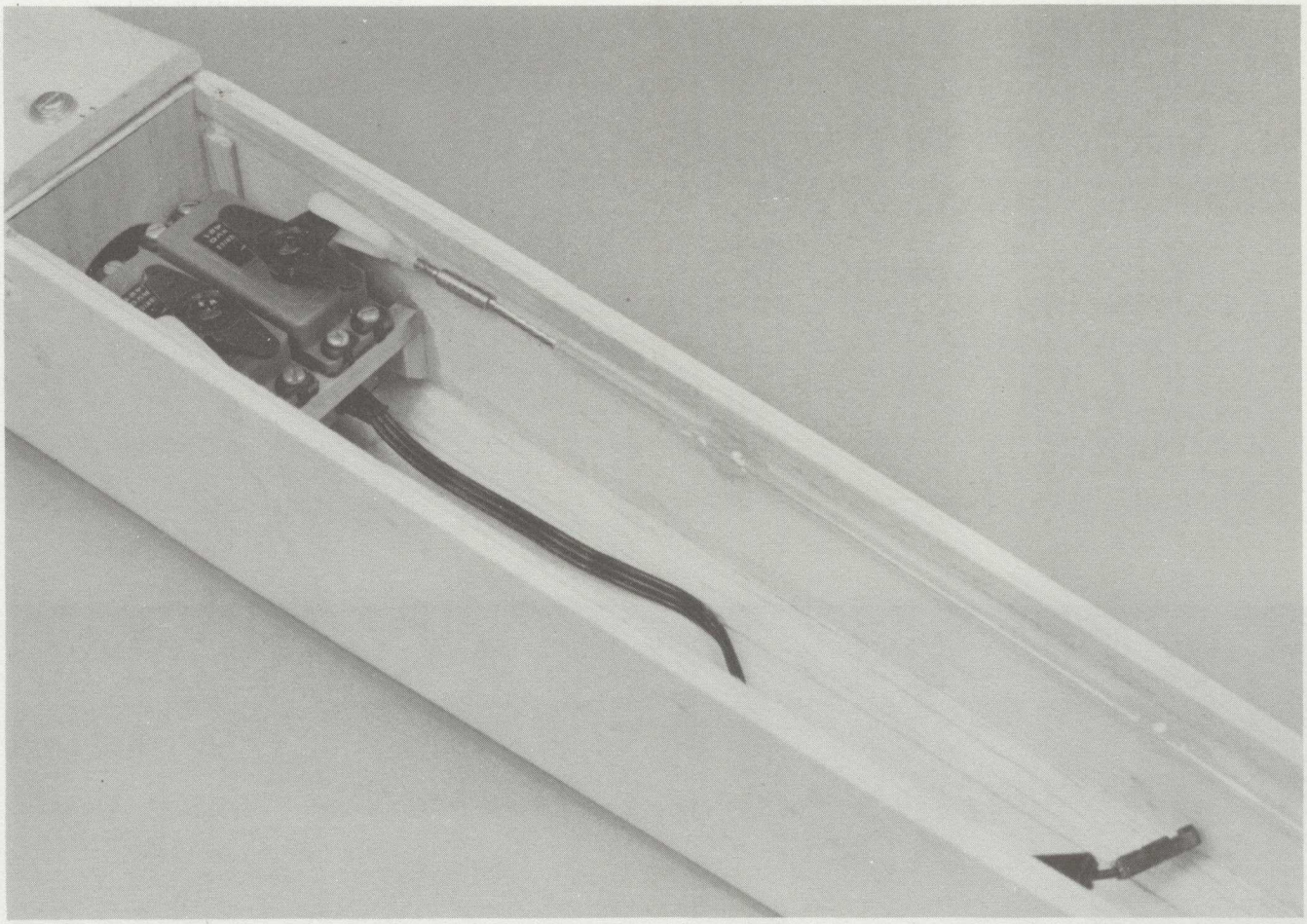


Servo rail installation.

(c) Place the servos on the rails and mark the location of the eight mounting screw holes. Carefully drill the holes with a 1/16'' drill. Screw the servos in place.

The Airtronics radio has servo reversing capability at the transmitter, so it doesn't matter which servo goes where. With radios not having this capability, care must be taken that servo rotation is proper for a given transmitter command.

(d) Install a Goldberg Snap Link on each pushrod coupler, and snap it on the servo arm.



Servo mounting and Snap Link installation.

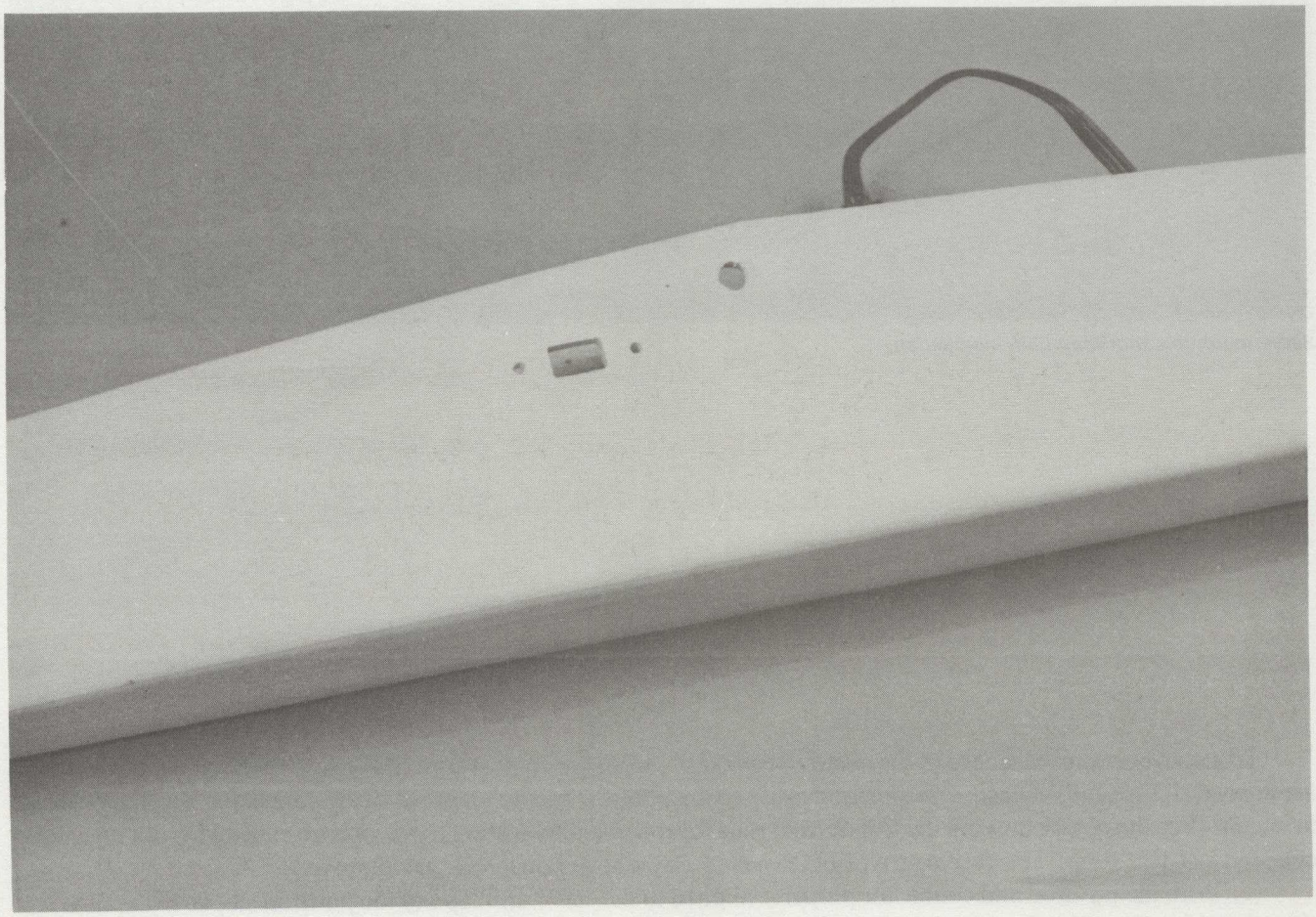
Trim the outer plastic sleeve of the pushrod back to 2'' from the control arm. Make sure both rudder and elevator are in neutral. Carefully measure the pushrod cable so it will be the proper length to fit the connector. Cut the pushrod to length. (See the note following the Bill of Materials for recomended cutting tools for wire cable.) Do not install the connector at this time. The fuselage will be easier to cover if the pushrods are removed.

(e) With the pushrod and connector properly aligned to the servo arm, epoxy the pushrod sleeve to the fuselage side about 1'' from the front end, and again halfway back to bulkhead F4.

Section 4 — Switch Mounting

The switch is mounted in the receiver compartment. It can either be on the right or left hand side of the airplane. If it will be natural for you to launch the airplane with the right hand, the switch should go on the left side. That way, you can easily make a last minute check to see if the receiver is turned on.

(a) Remove the escutcheon plate from the switch and hold it on the fuselage side as high and as far back as it will go without the switch interfering with the 1/16'' x 1/4'' strips on the inside. The switch may be mounted either horizontal or vertical, whichever pleases. Mark the rectangle and the mounting holes. Drill a 3/16'' hole in the rectangle and 1/16'' mounting holes. Enlarge the 3/16'' hole to the rectangle size with an X-Acto knife, or small file.



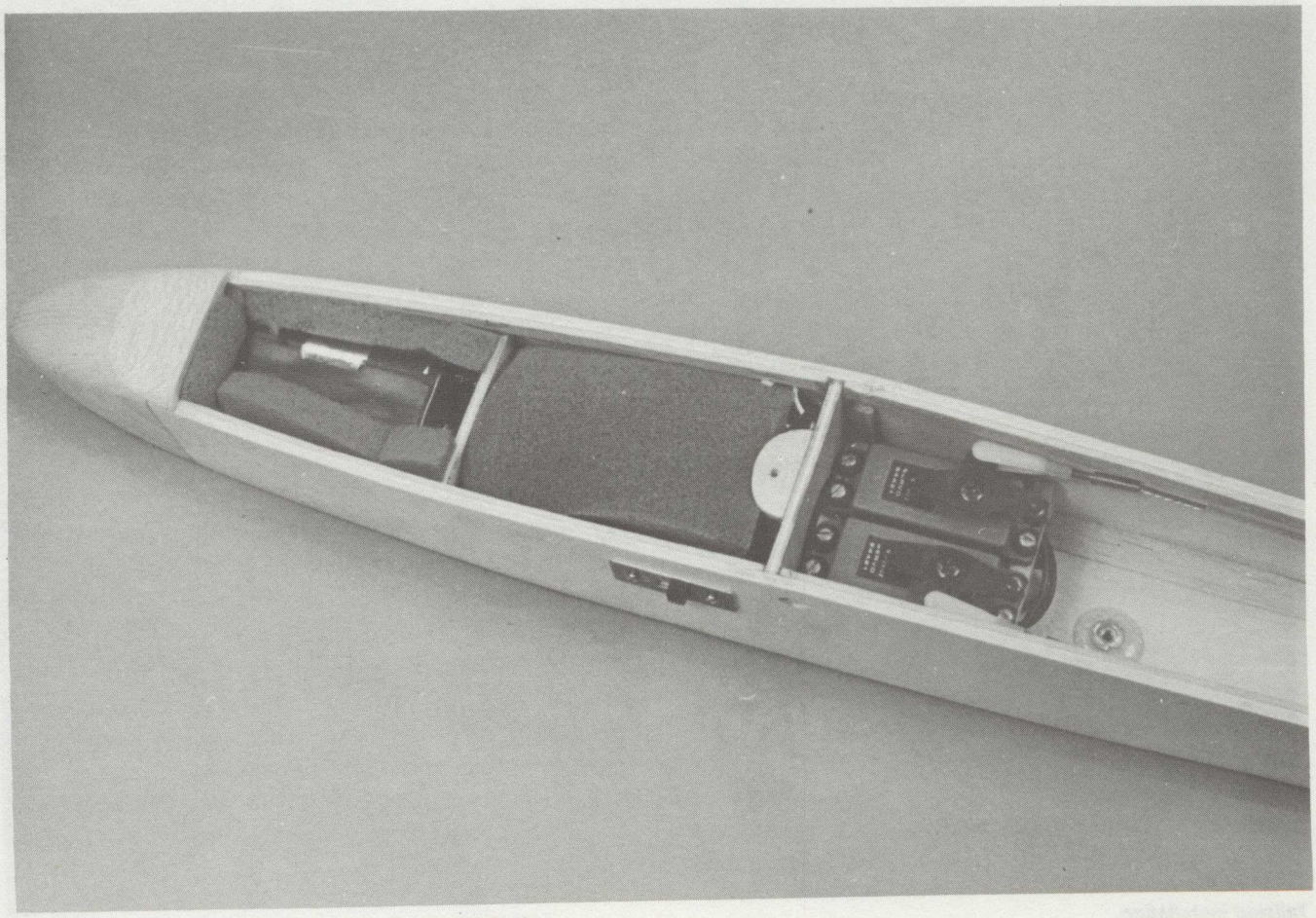
Switch mounting holes.

Section 5 — Receiver Mounting

(a) Drill a 1/16'' hole near the top of the receiver compartment to exit the antenna. Both the receiver and battery pack should be wrapped in foam rubber as a protection against damage from hard landings. 3/8'' thick foam rubber is ideal as it makes a neat installation.

Section 6 — Tow Hook Installation

(a) Drill a 5/32'' hole in the fuselage bottom, at the location shown on the drawing. Put epoxy around the hole and tap the tow hook blind nut in place on the inside of the fuselage bottom. Cover the edges with epoxy, making sure not to get any in the screw hole. Screw the tow hook in a couple of times in case any epoxy is in the threads. Leave the tow hook out until the fuselage is covered.



Receiver mounting and tow hook blind nut installation.

Section 7 — Tailskid Installation

(a) Drill two 1/8'' holes at the fuselage location shown on the drawing. Do not install the tailskid until the fuselage is covered.

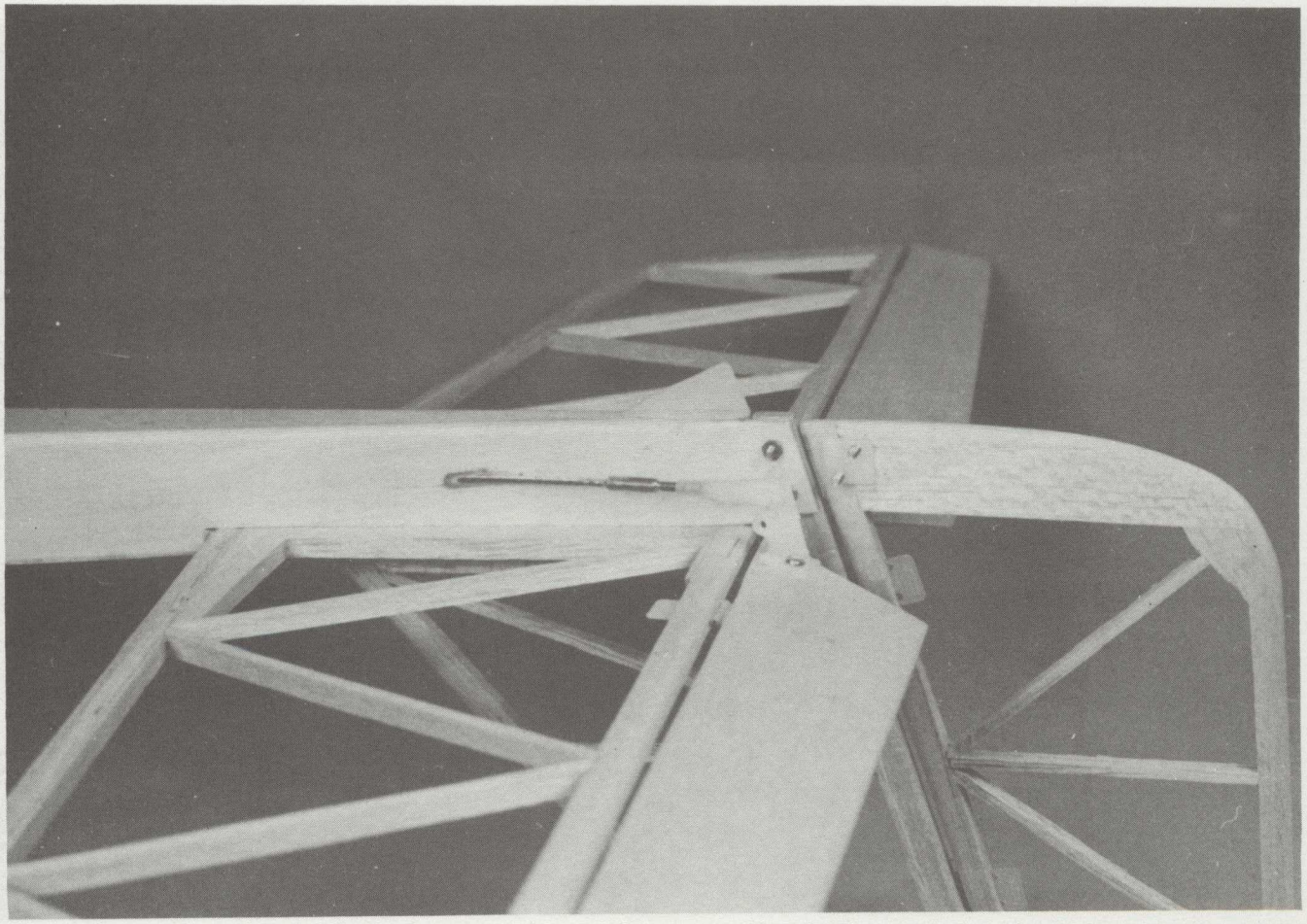
Section 8 — Control Surface Check

Plug the servos and switch into the receiver and the battery pack into the switch harness. Turn on the radio and check to see that the rudder and elevator travel in the proper direction. Stand in back of the fuselage. Move the rudder lever on the transmitter to the left. The rear of the rudder should move to the left. Similarly right stick movement should give right rudder. Move the elevator lever up (toward the top of the transmitter), the rear of the elevator should move down. Move the elevator stick down and the rear of the elevator should move up.

If movement was incorrect, servo direction must be changed with the reversing switch in the transmitter (if it has them — check the instructions), or the pushrod clevis moved to the other side of the servo wheel (or servo arm).

Section 9 — Disassembly

Now, completely disassemble the Oly 650, including removal of the hinges, preparatory to covering.



Tailskid installation.

CHAPTER VI

COVERING THE OLY 650

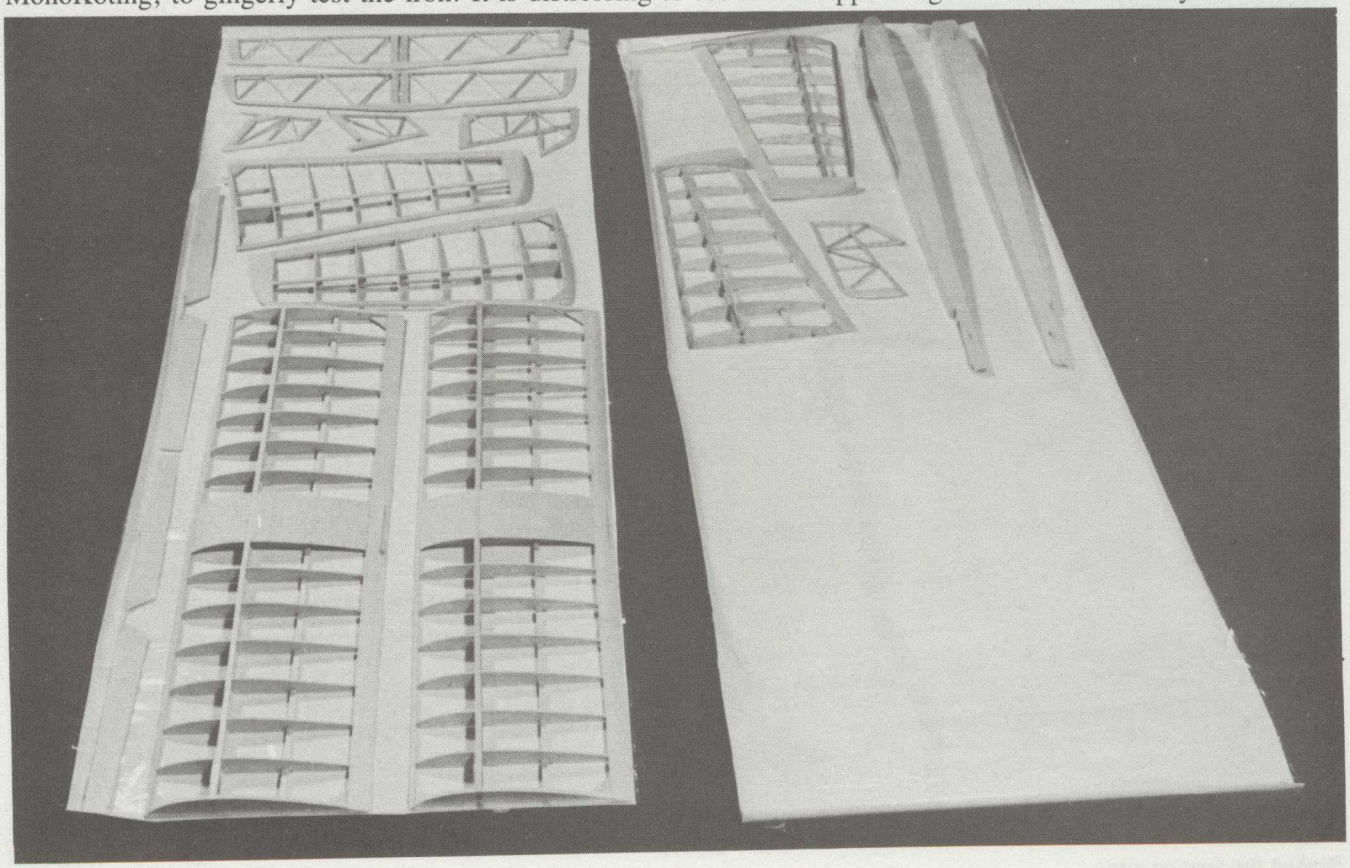
The advent of self-adhesive, heat shrink, plastic films has brought professional looking finishes within the grasp of the average modeler. They are quick and easy to apply, and the beauty is they require no further finishing.

Although there are several heat-shrink coverings available, including some fabric based types, one stands head and shoulders above the rest for sailplanes. Top Flite Super MonoKote is nearly universally accepted as the superior glider covering material. Unfortunately, it is also expensive. MonoKote is strong and resilient. Lower priced coverings have a lower melting point; are thinner and have a lower tensile strength. Fabric based coverings, while extremely tough, seem to lack resiliency; the ability to give and spring back. Fabric materials are nearly puncture and tear proof. In fact, upon impact, the covering remains intact and the relatively light glider internal structure shatters; you wind up with a bag of balsa splinters. If this sounds like the author is a vassal of Top Flite — not so. All the MonoKote you see in the photos was bought at my friendly hobby shop. There are other applications where the other coverings are superior but, for gliders, I like Super MonoKote, full stop.

Before starting, carefully read the instruction sheet that comes with the MonoKote. A regular iron will do a very good job in the application of MonoKote. Downstream, when you really get into glider construction full bore, you may want to invest in a sealing iron and hot air blower. For now, however, it is an unwarranted expense. The ideal iron is a travel iron. These are light and easy to handle. Lacking one a large steam iron will work just fine.

Section 1 — Setting The Iron Temperature Control

We must first find the correct temperature to set the control on the iron. It must be set high enough to do a good job, but below the melting point of the material. On my travel iron this setting is between ''Wool'' and ''Cotton.'' Set your iron control in this area and let the temperature stabilize. Trim about a 1/2'' test piece from the end of one of the MonoKote rolls. Remove the backing material and iron it onto a piece of scrap sheet balsa. At proper heat it should iron smoothly onto the wood, and peel off with little difficulty. If it does not really iron down flat and stick well, the iron is too cool. If it curls up, or actually melts, it is too hot. If the material does melt, clean it off the iron right away by rubbing the iron on a soft cloth. When things look right, mark the temperature setting with a piece of tape, or carefully note its position so it can be repeated in the future. It is advisable, when starting a session of MonoKoting, to gingerly test the iron. It is distressing to see a hole appear right in the middle of your work.



Layout of parts on MonoKote sheets.

Section 2 — Covering

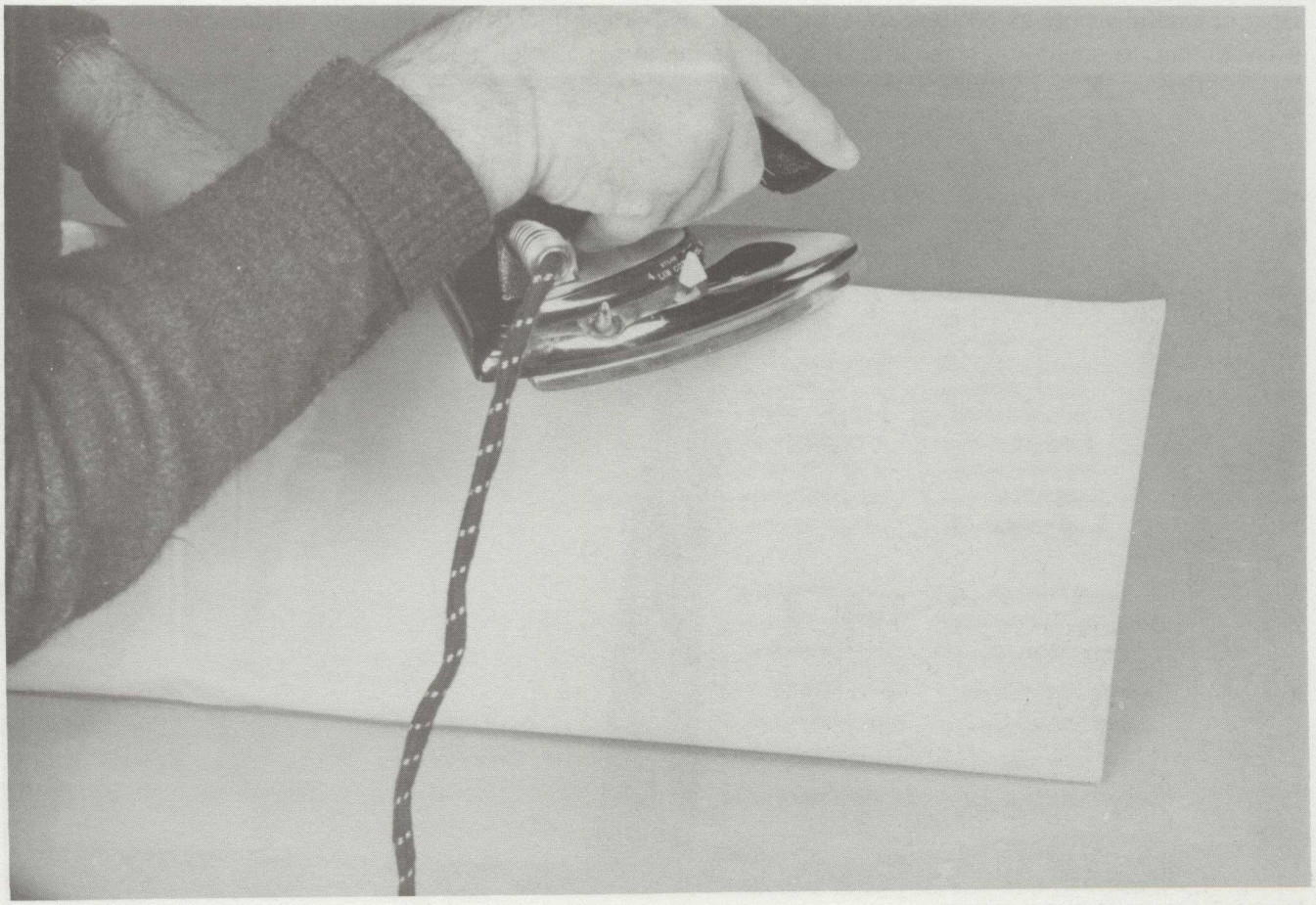
(a) The preceding photo shows the parts (the two sets of parts represent the covering of both sides) laid out on the two sheets of MonoKote. You will note there is material to spare. If this is your first covering job it might be well to spread out a bit and leave a bigger margin around the parts than the photo shows. By the way, MonoKote has a transparent backing. This is left on until you are ready to stick it down. Do all marking on this side. Start with the wing center section. Note the way it is oriented on the MonoKote sheet as shown in the photo. Incidentally, MonoKote does not have anything like grain. You can cut the piece out in any direction and it will shrink the same. Lay the wing on the backing side of the MonoKote leaving about 1/2'' all round. Mark the cutting line with a felt pen. Do the same for the top of the wing, noting that the top takes a wider piece due to its curvature. Cut to size using the straightedge and X-Acto knife, or use scissors.

(b) Remove the backing from the bottom piece. Turn the wing center section on edge, leading edge up. Position the covering with the 1/2'' margins and using the hot iron, tack the far end of the MonoKote to the leading edge.

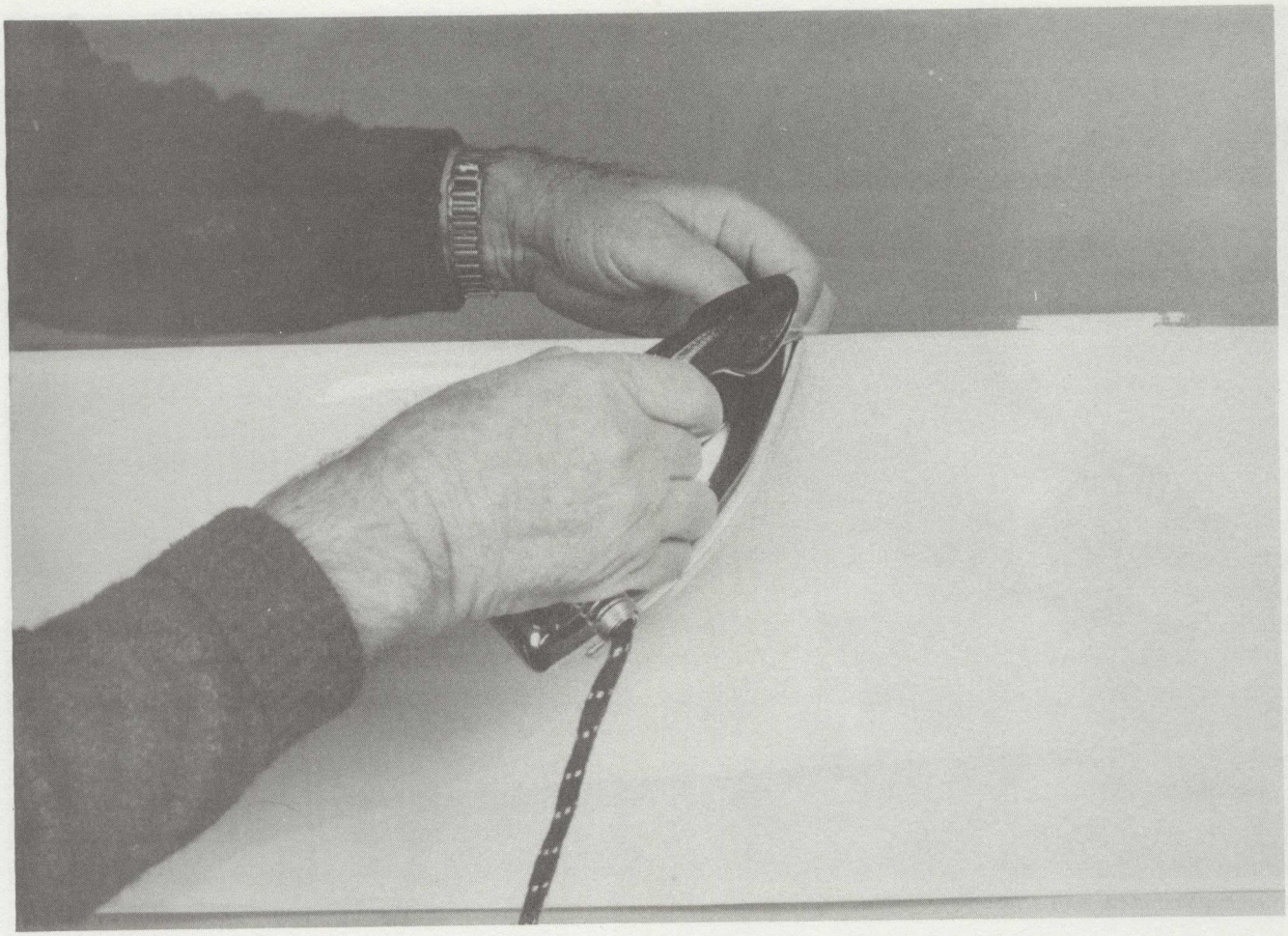
Now, pull the MonoKote tight along the leading edge and run the iron along, sealing it to the entire length of the leading edge. Lay the wing flat, bottom side up. Pull the sheet tight across the center and tack it to the center of the trailing edge. Working outward on one side, while pulling the sheet taut as you go, seal it to the trailing edge.

Repeat the last step for the other side. The MonoKote sheet does not have to be very tight; do not be overly concerned for wrinkles. These will disappear when shrunk. The less wrinkles, however, the easier the job of shrinking. Now, seal the covering to the end ribs. Slowly run the iron all around to make sure all edges are stuck down.

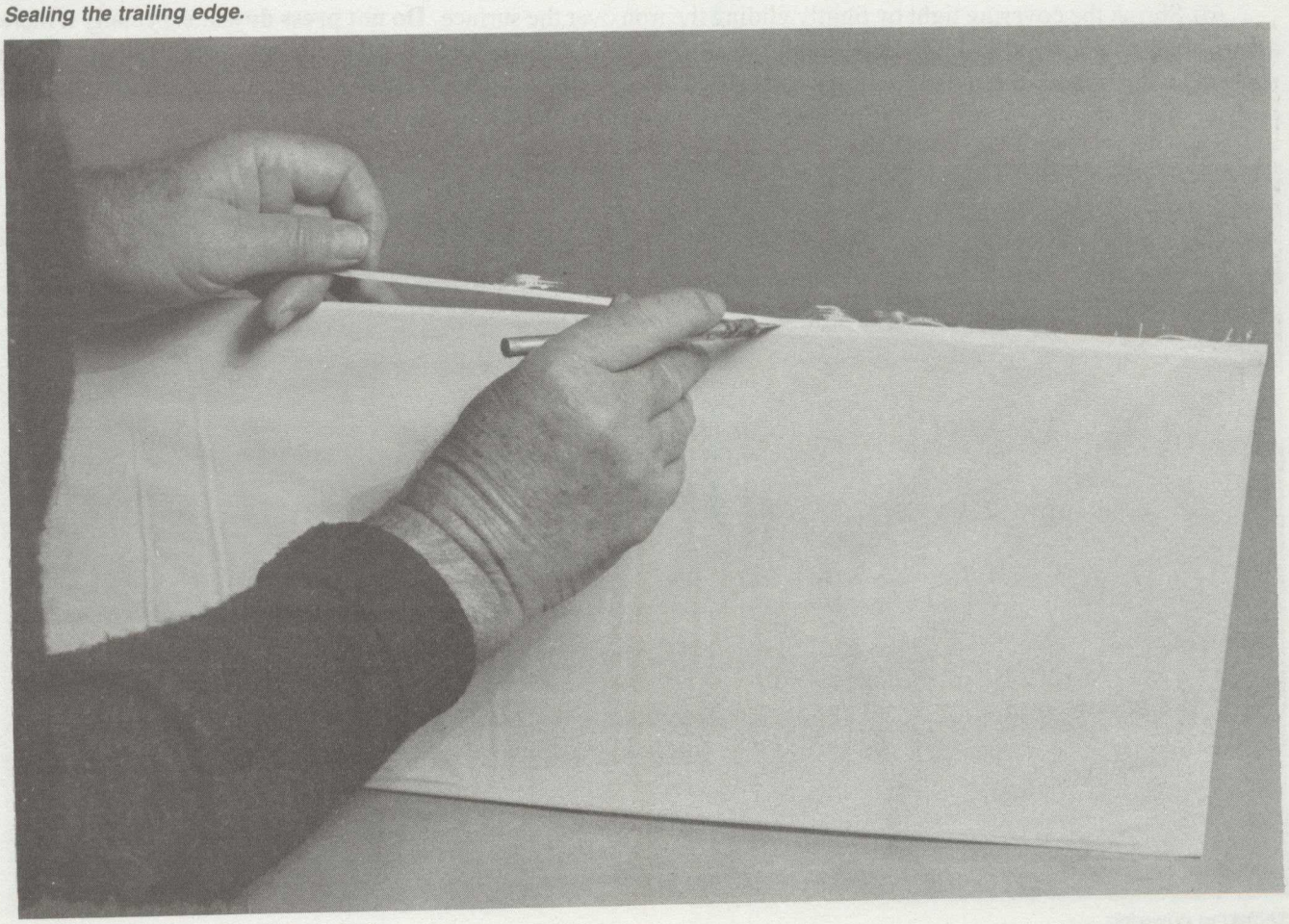
(c) Trim off the excess MonoKote all around. Use either the X-Acto knife, or scissors. If you have a sharp pair of scissors, a very neat job can be done without using scissor action. Just start the cut and hold the scissors in a fixed position. Push them forward, holding the bottom blade against the framework. This makes a very quick, nice straight cut. Seal the edges all around with the iron.



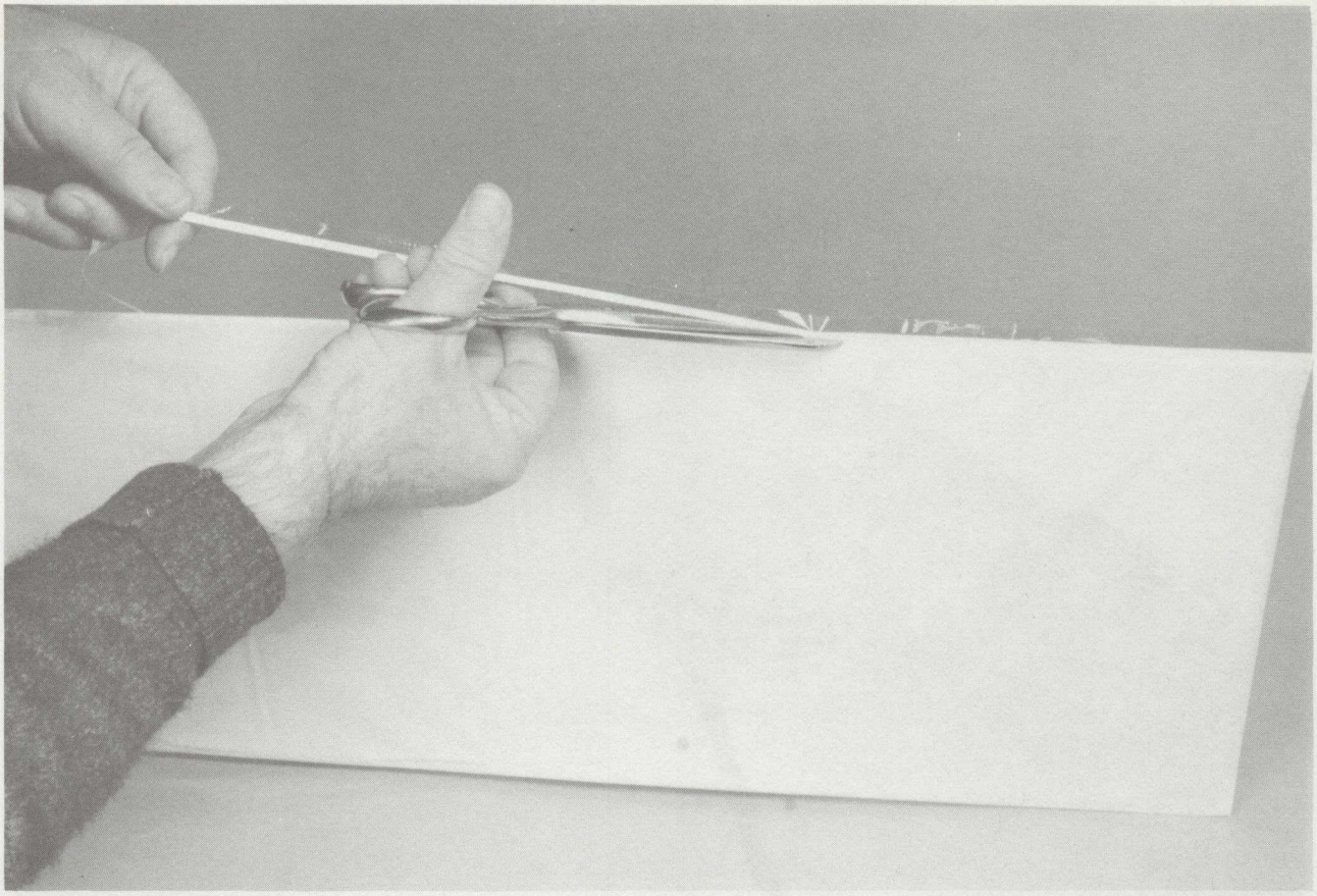
Sealing the leading edge.



Sealing the trailing edge.

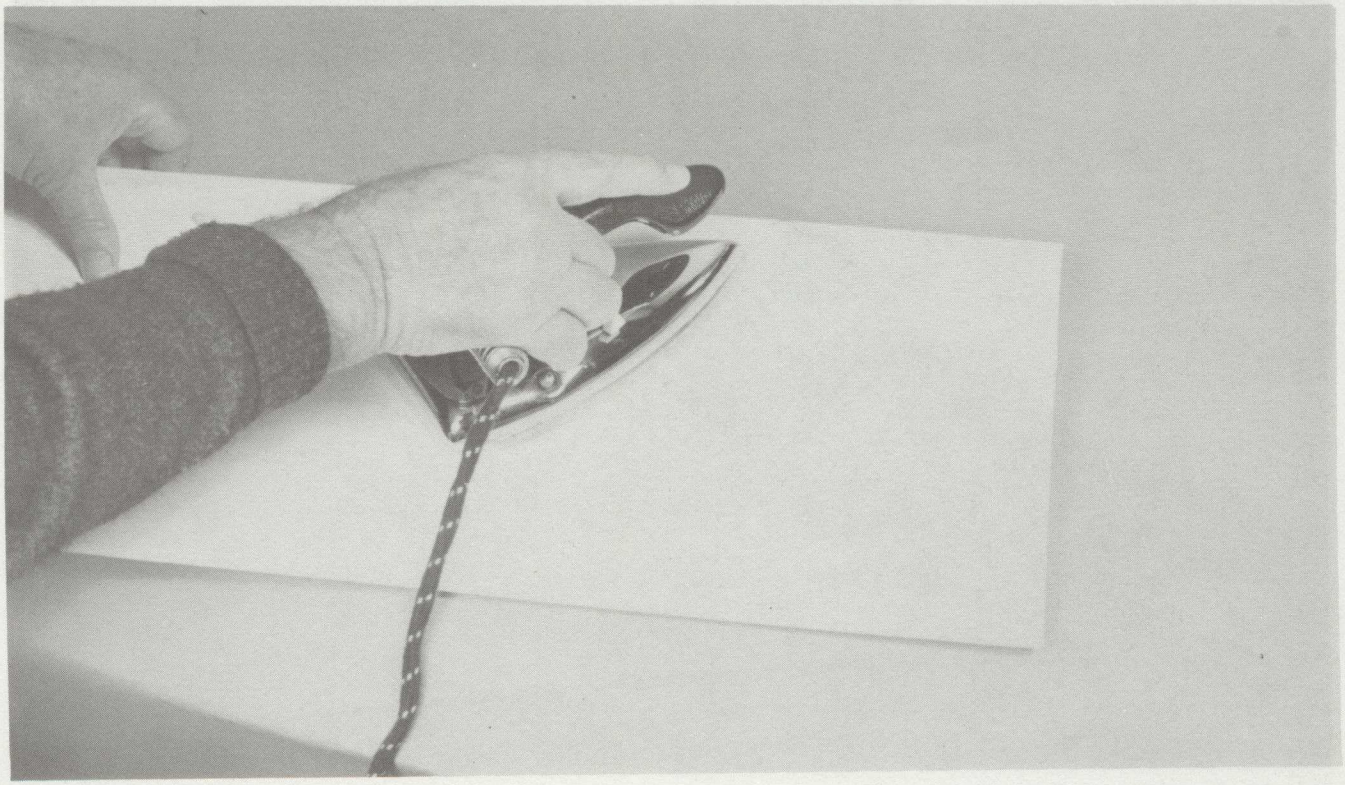


Trimming MonoKote with X-Acto knife.



Trimming MonoKote with scissors.

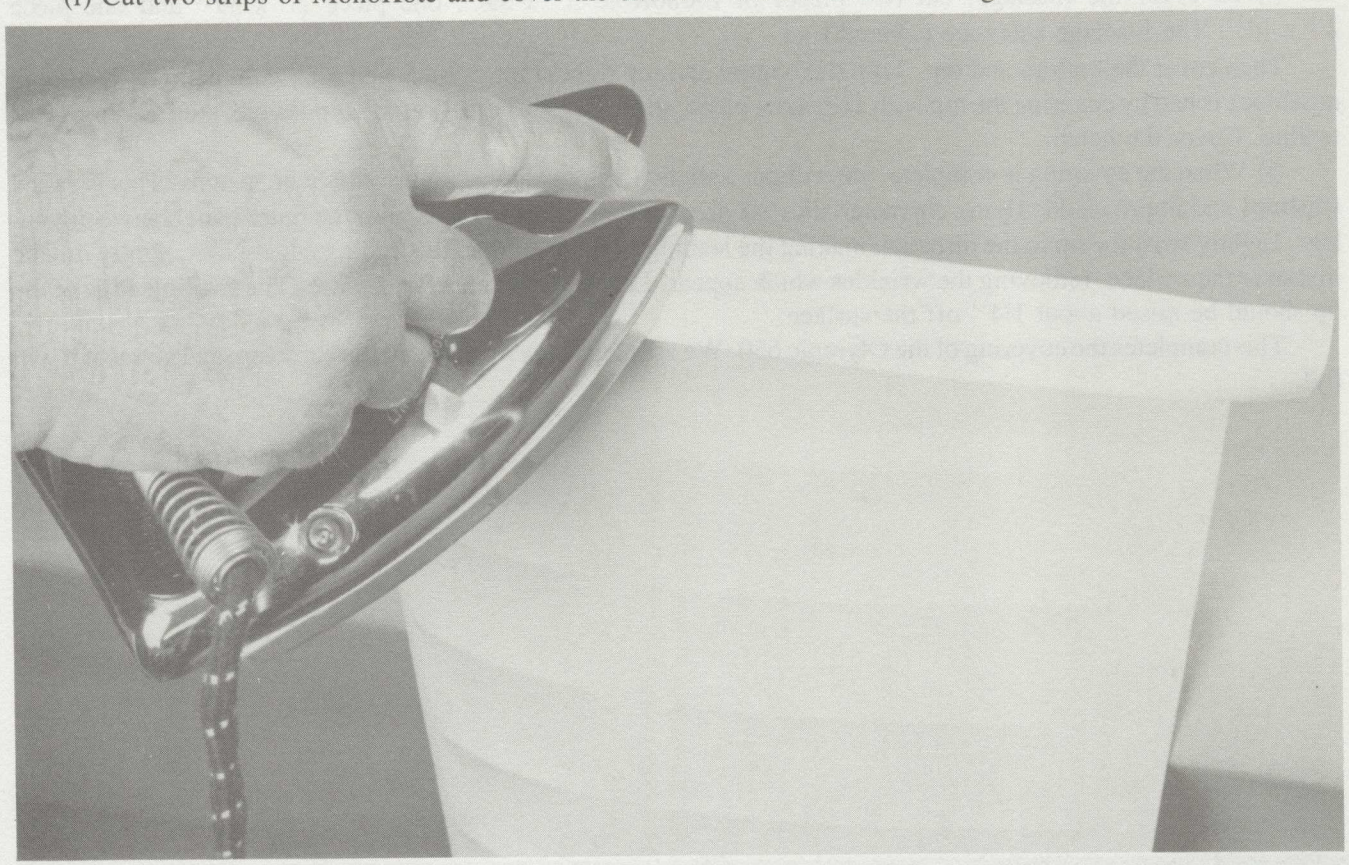
(d) Shrink the covering tight by lightly gliding the iron over the surface. **Do not press down**, especially if there are wrinkles over a wood surface. Here, lightly touch the tops of the wrinkles with the iron and work them out. If you mash them down, they are sometimes hard to remove. In any case, don't get paranoid over the whole thing. You will probably have to mash down a few wrinkles here and there; you will be the only one to notice them.



Shrinking covering.

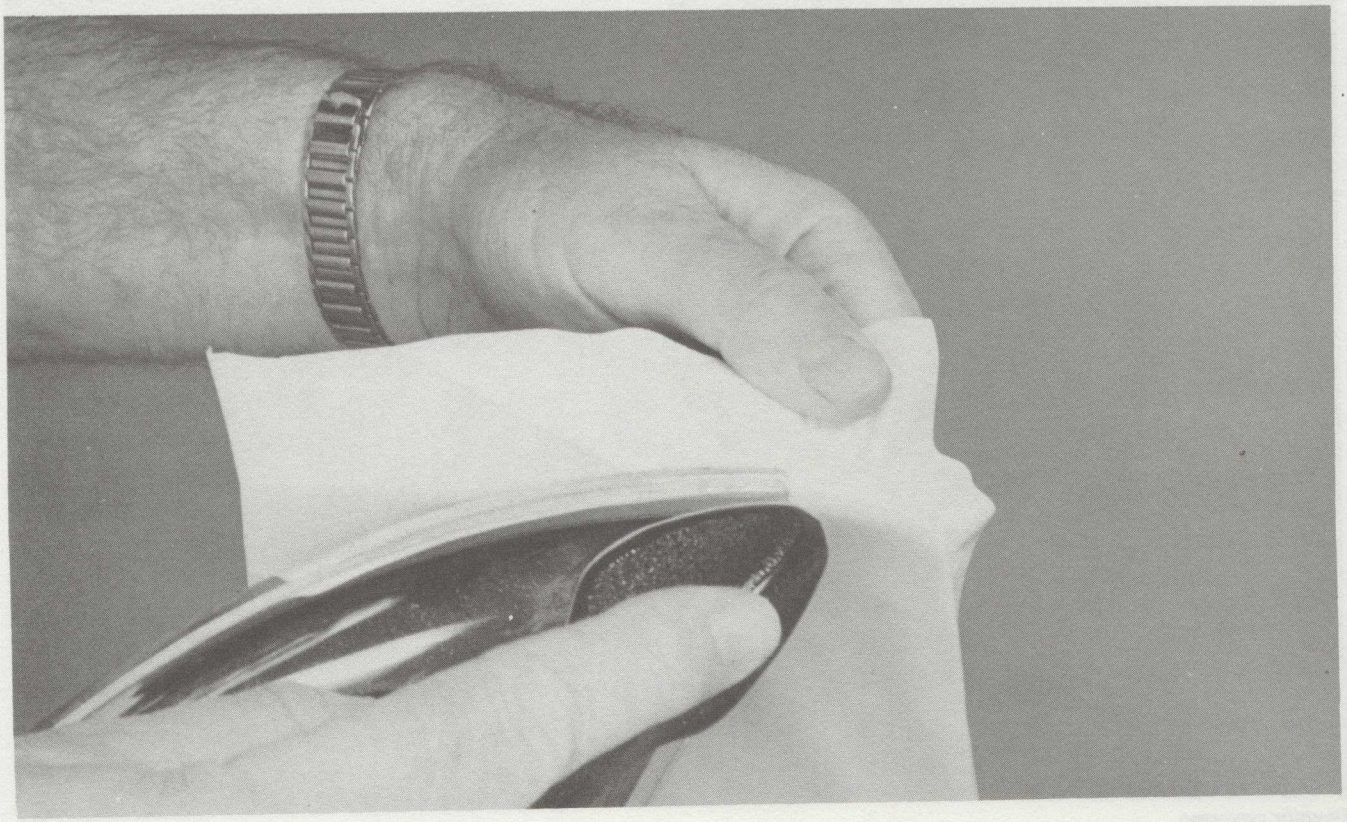
(e) Similarly, cover the top of the wing. Trim the MonoKote a little long all around the edges and wrap it over the leading and trailing edges, overlapping the bottom covering by 1/4'' or so. If you snip the overhang on the end ribs in a few places, you can stick it to the end of the rib without wrinkles.

(f) Cut two strips of MonoKote and cover the end ribs. Trim and seal the edges.



Covering end ribs.

(g) In the same manner, cover the outer wing panels. Note Step 6 in the MonoKote instructions when doing the wing tips.



Covering tips.

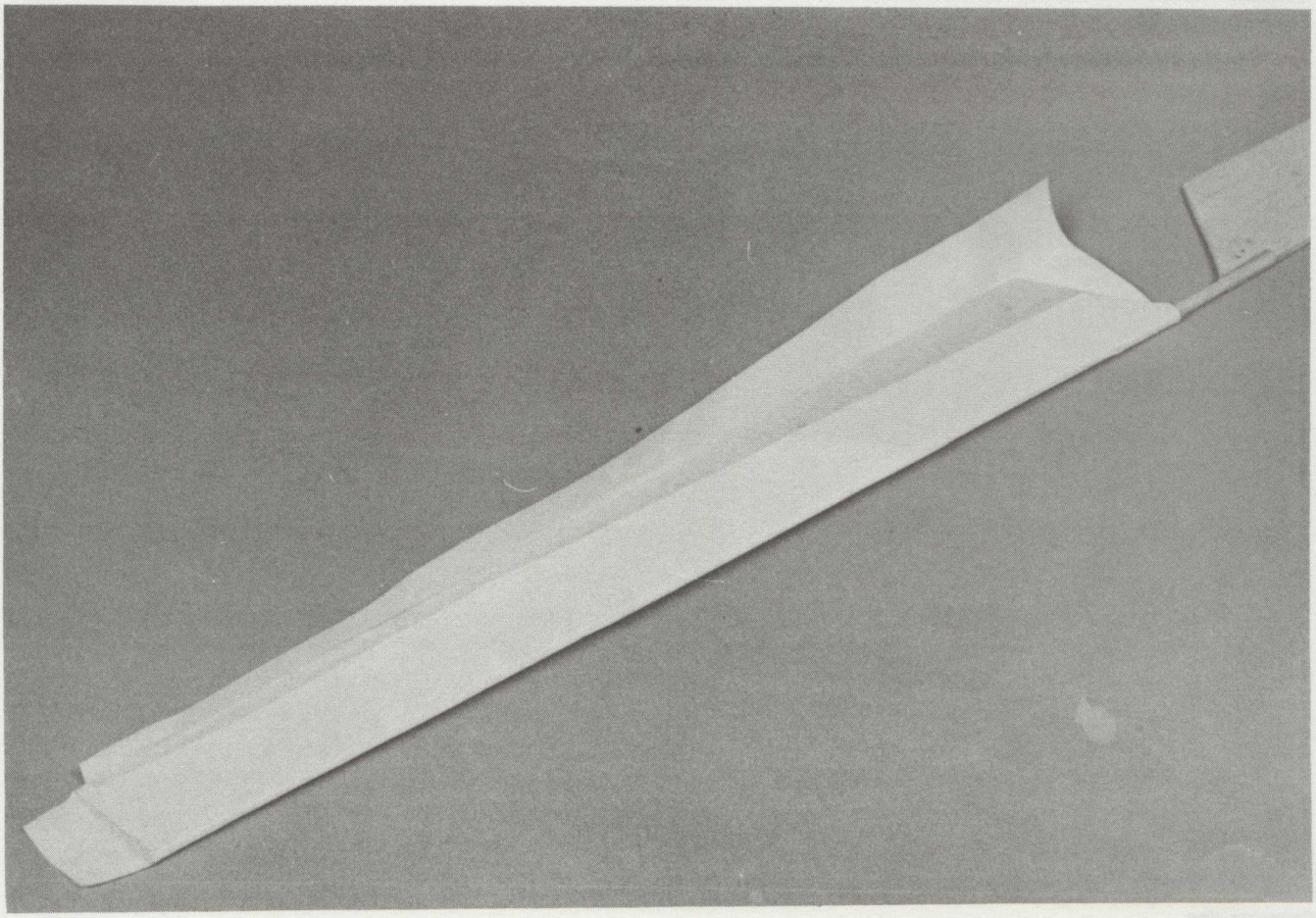
(h) When covering the tail pieces, use the technique detailed in the MonoKote instructions to stretch the material around the tips of the stab and rudder. Each elevator half can be covered with one piece of MonoKote by wrapping it around and joining it on the bottom.

(i) To cover the fuselage, cut two pieces of MonoKote 3'' x 39'', one piece 2'' x 39'' and one piece 2'' x 14''. The fuselage sides are covered first.

Then cover the bottom and top. Trim the bottom and top right at the corner, and seal with the iron. A smooth noseblock is had by covering the top with a separate piece, stretching it carefully as far as possible; then trimming and sealing. Cover the hatch.

(j) When the covering is complete, we will put a slight downward twist in the outer wing panels. This is called **washout** and improves the flying characteristics, as described in Chapter IX. Clamp the outer panel between your legs. Lightly twist the tip in the direction making the leading edge lower than the trailing edge. Now, lightly run the iron over the surface, removing the wrinkles which appear. Lay the panel on a flat surface. The **trailing edge** of the tip should be raised about 1/4'' off the surface.

This completes the covering of the Olympic 650. We are now ready to re-install the hardware and go see if it will fly!



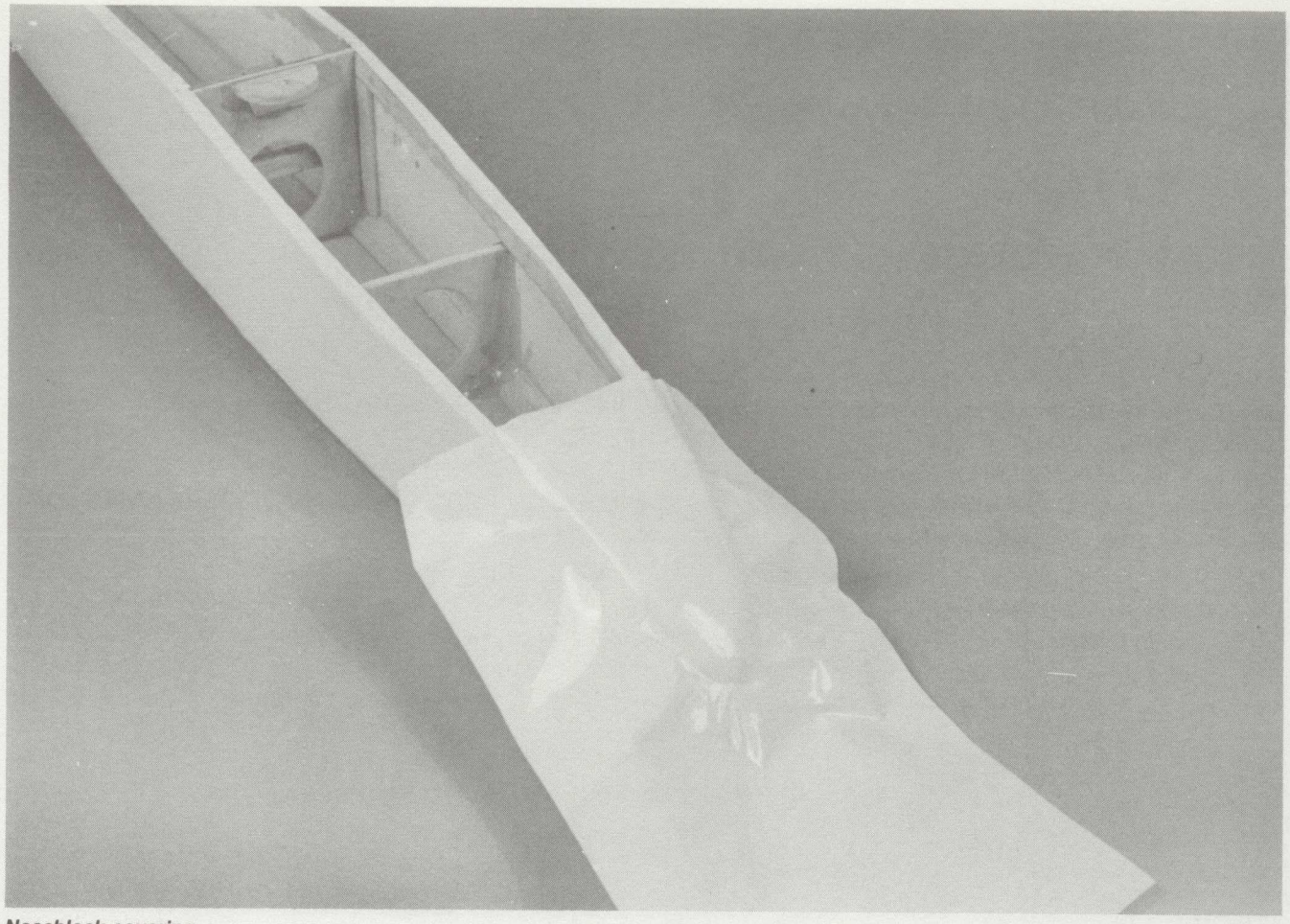
Elevator covering.



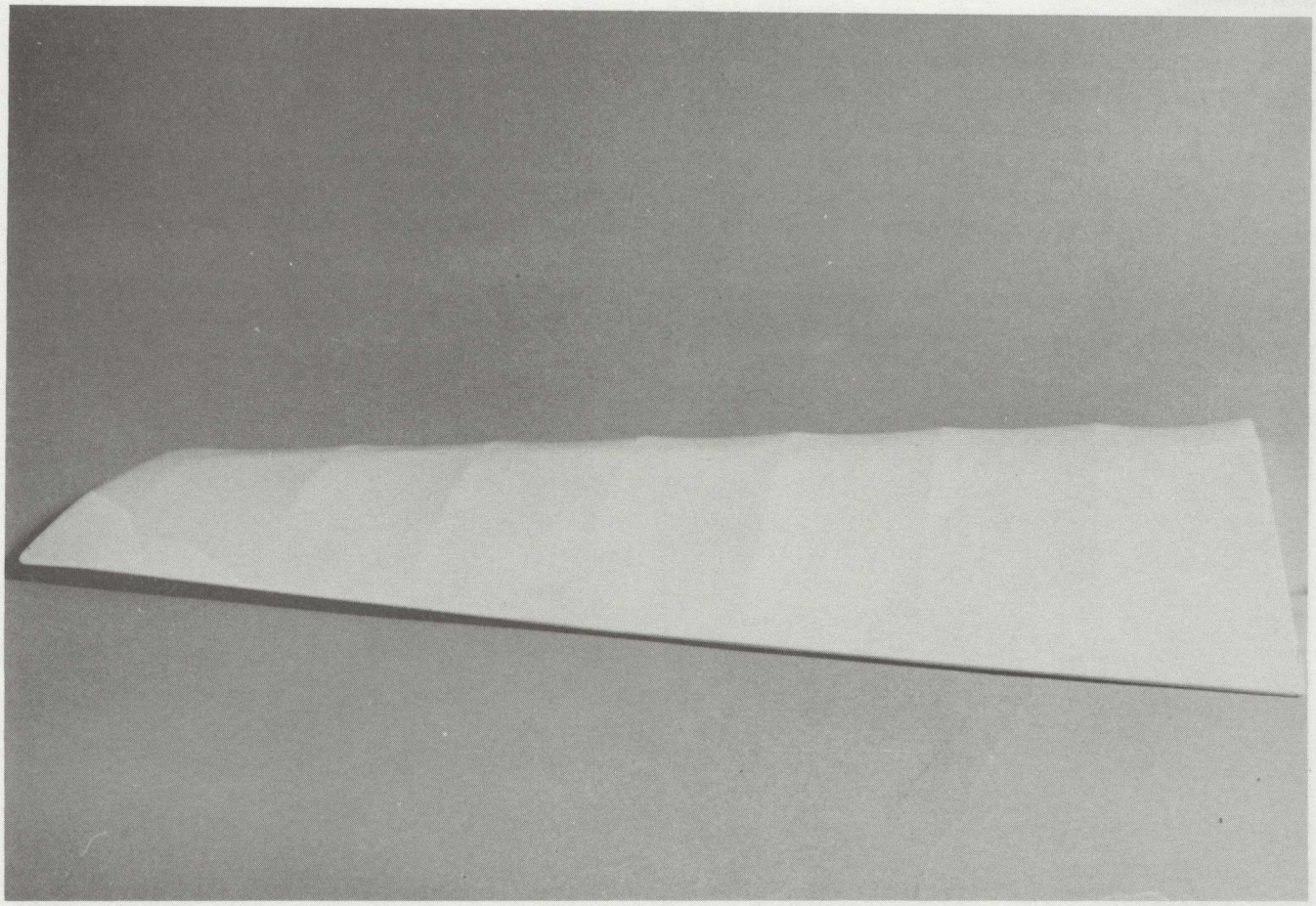
Side covering.



Bottom covering.



Noseblock covering.



Tip wash-out.