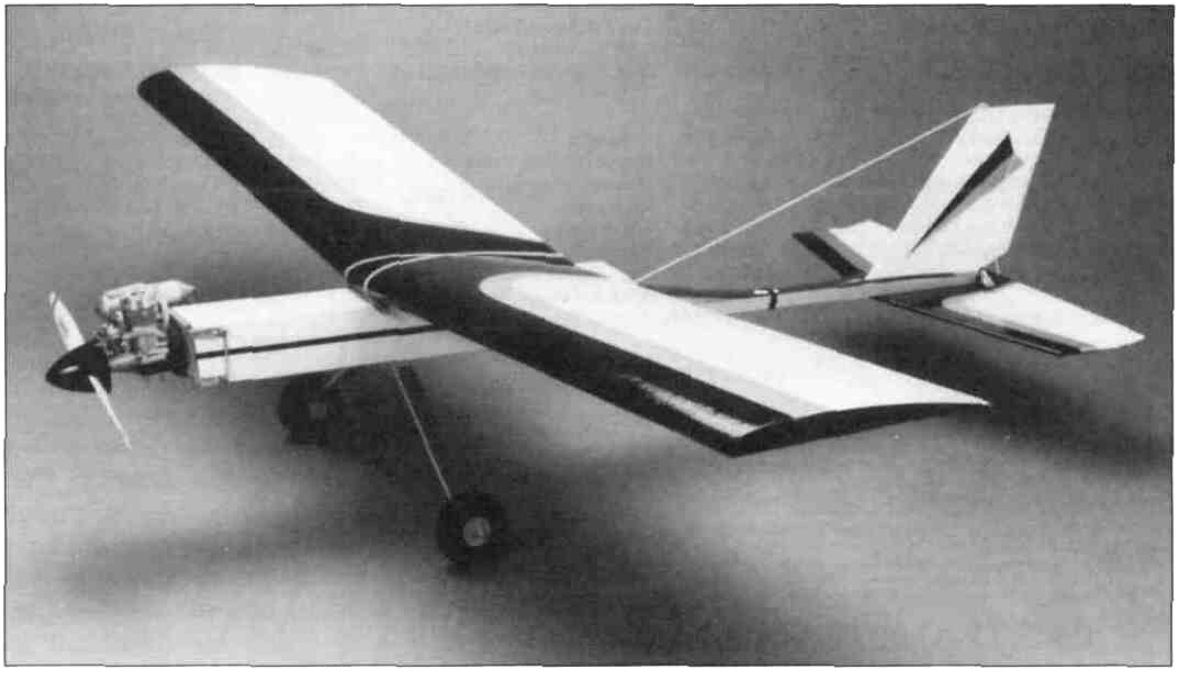
HOBBICO®

Sturdy Birdy II™

INSTRUCTIONMANUAL



WARNING! THIS IS NOT A TOY!

Assembly and operation of this aircraft must be done by or under the direct supervision of a responsible adult. If not handled correctly, this model is capable of inflicting serious bodily harm. It is your responsibility and yours alone to assemble this model correctly, properly install all R/C components and to test and operate it in a safe and responsible manner.

PARTS LIST

Stock #	Description	Qty
	Loose in Box	
Al UM007P	Aluminum Channel	1
ARF1F01	Plastic Fuselage Tube	1
ARF1P01	Instruction Book	1
ARF1R05	1/64 Plywood Fin Doubler	1
ARF1W02	Plastic Wing Protector	1
EM20481	Engine Mount Left	1
EM2048R	Engine Mount Right	1
FWING02L	Molded Foam Wing Left	1
FW1NG02R	Molded Foam Wing Right	1
L-6U	Landing Gear	1
NYLON87CA	Hinge Strip	1
PLTB009	24" White Inner Pushrod	2
PLTB011	24" Grey Outer Pushrod	2
PLTB012	11-3/4" Inner Pushrod	1
PLTB013	11-3/4" Outer Pushrod	1
WIRES16	Threaded Link Rod	5
ARF1A01	**Subpack Stabilizer & Wing Parts**	
ARF1R04	1/4 x 1/2 x 13 Balsa Fin Doubler	1
ARF1S01	1/4 Balsa Stabili/er Front	1
ARF1S02	1/4 Balsa Stabili/er	1
ARF1S03	1/4 Balsa Elevator	1
ARF1W01	1/8 Plywood Wing Joiner	1
ARF1A02	**Subpack Fin & Rudder Parts**	
ARF1R01	1/4 Balsa Fin Front	1
ARF1R02	1/4 Balsa Fin	1
ARF1R03	1/4 Balsa Rudder	1
ARF1A03	**Subpack Small Wood Parts**	
ARF1F03	9mm Plywood Firewall Doubler	1
ARF1F04	1/4 Plywood Firewall	1
ARF1F05	1/4 Ply Landing Gear Supports	2
ARF1F06	Pushrod Holder (3/4 x 1/2 x 1)	1
ARF1S04	1/16 Plywood Stabili/er Doubler	1
DOWEL030	1/4 x3 1/2 Dowel	4
ARF2A04	**Subpack Long Aileron Parts**	
ARF2W03	3/8 Tapered TE	2
ARF2W04	3/8 Tapered Aileron	2
ARF2A05	**Subpack Small Aileron Parts**	
ARF2W05	Grooved Center TE	2
ARF2W06	TE Support	2
ARF2W08	Servo Rails	2
NYLON20	Non threaded Swivel	2
NYLON21	Swivel Clevis	2
WBNT110L	Aileron Torque Rod Left	1
WBNT110R	Aileron Torque Rod Right	1

Stock #	Description	Qty
ARF1MOI	**Subpack Hardware** (Contains the Following)	
NUTS001	4 40 Blind Nut	6
NUTS002	4 40 Hex Nut	2
NUTS010	6 32 Hex Nut	4
NUTS014	8 32 Hex Nut	2
NYLON03	Nylon Control Horn	2
NYLON17	Nylon Clevis	3
NYLON52	5 1/2 Nylon Tie	2
SCRW002	2 56 x 5/8 Bolt	4
SCRW010	#4x5/8 Sheet Metal **Screw**	**4**
SCRW024	#2 x 3/8 Sheet Metal Screw	8
SCRW052	4 40 x 5/8 Bolt	4
SCRW053	8 32 x I/2 Bolt	2
SCRW055	6 32 x 1 1/2 SH Cap Screw	2
SCRW104	4 40 x 1 1/4 Machine Screw	4
WBNT146	Prebent Tailskid	1
WIRES20	1 Threaded Link Rod	3
WSHR002	#4 Lock Washer	2
WSHR004	#6 Flat Washer	4
WSHR005	#4 Flat Washer	4
WSHR010	#8 Lock Washer	2
WSHR011	#8 Flat Washer	1

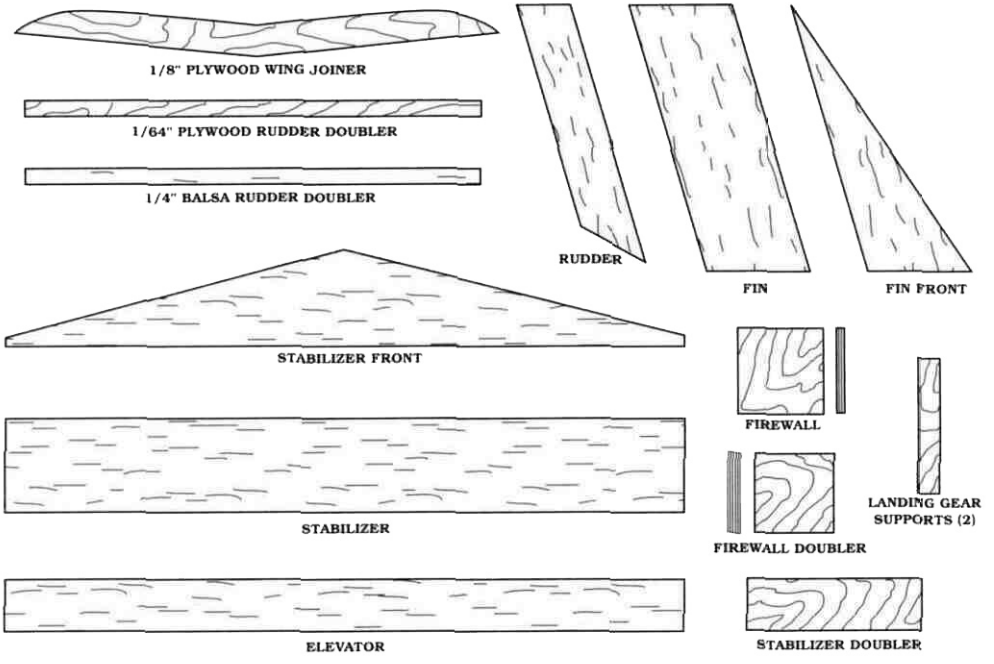


TABLE OF CONTENTS

INTRODUCTION

Congratulations on your purchase of the HOBBICO **STURDY BIRDY II.** THE FIRST REAL **SUPER TRAINER.** You now own the **BEST FLYING** durable trainer available. By following these instructions as you assemble the model, you will have a great flying plane. It will not only teach you how to fly, but will stick by you while you learn, no matter how long that may take!

The first thing you should do after reading this paragraph is check the parts in this kit against the parts list to make sure everything is here.

We strongly recommend that you join the Academy of Model Aeronautics. Being an AMA member entitles you to liability insurance and puts you in touch with your local flying club. It also includes a subscription to MODEL AVIATION magazine, which has a monthly listing of the latest news in model aviation.

Insurance is the most important advantage of the AMA membership. If your model hits someone or something, you are liable for any damage it causes.

You can contact the national Academy of Model Aeronautics, which has more than 2,500 chartered clubs across the country. Through any one of them, instructor training programs and insured newcomer training are available.

Contact the AMA at the address or toll-free phone number below.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Tele. (800) 435-9262
Fax (765) 741-0057
Web Site:
HTTP://WWW.MODELAIRCRAFT.ORG

We also recommend that you join your local flying club. There you will find people who can help you learn to fly and teach you the safe ways of handling your aircraft.

ADDITIONAL ITEMS DESCRIPTION

Here is a description of some of the items you will need to assemble your **STURDY BIRDY II**

GLUES

CA (Cyanoacrylate) glues will be used to glue the wood parts together because they are strong and very fast curing. Do not use CA glues for the wing construction because most CA glues will attack and dissolve the foam wing. They come in different viscosities. Thin CA glue can be used when gluing parts with a good, tight joint. When using thin CA,

assemble the parts first and then add the glue. It will penetrate the joint and cure in a couple of seconds. Thick and medium CAs are applied to the parts **before** they are assembled since the glue will not cure for 20-30 seconds. This longer curing time gives you more time to get the parts assembled accurately before the glue cures. The thicker consistency also helps fill poor fitting joints. CA accelerator spray can be very handy for speeding up the curing process of the thick CAs.

Epoxy is a two-part adhesive that has to be mixed before it will cure. We will use epoxy glue for the wing assembly since it takes a little longer to cure and does not attack the foam. Epoxies come in several different types with many different curing times. You should buy some epoxy with a 30-minute curing time for use here.

ENGINE

The **STURDY BIRDY II** is designed to fly with a standard .20 size 2-stroke engine. The OS .20 FP is a great, inexpensive engine that provides plenty of power. This combination is ideal for the average beginner. A .25 - .30 size engine can be used if you would like snappier performance, especially at higher elevations where the air is thinner. We recommend that you **do not** use an engine larger than a .30 as the additional weight makes the plane more difficult to fly at low speeds. The engine mount provided with the **STURDY BIRDY II** will fit most .20 - .30 engines.

RADIO

The **STURDY BIRDY II** requires 4 channels to fly. The radio system you purchase should have standard size servos so they will fit into the fuselage channel. Mini or micro servos will also work but they will require some modifications to fit properly. **Large servos will not work in the STURDY BIRDY II.**

FUEL TANK

The **STURDY BIRDY III** was designed to hold a 6 oz. square tank. A 4 oz. tank will also work but will give you shorter flight times.

COVERING

Although not absolutely necessary, the "tail feathers" and the wing should both be covered with a "low heat" type iron on covering. EconoKote^ and Black Baron® Film are both good coverings to use on your **STURDY BIRDY II.** The covering will not only make your plane look nicer, but it will also add strength and make it last longer.

CHECK LIST OF ADDITIONAL ITEMS YOU WILL NEED

- D .20 -.30 2-Stroke Engine
- D 4 Channel Radio
- D 4 Standard Size Servos
- D Several 9 X 4 or 9 X 6 Propellers
- D 2-1/2" Wheels (2)
- D 6 oz. Square Fuel Tank
- D Box #64 Rubber Bands
- D Thin CA (Cyanoacrylate) Glue loz.
- D Thick CA (Cyanoacrylate) Glue loz.
- D 30-Minute Epoxy 4oz.
- D Roll of Low Heat Iron-On Covering
- D Foam Rubber for Cushioning Receiver
- D 12" Standard Size Fuel Tubing
- D 3/4" Wide Nylon Reinforced Tape

Questions or Problems?

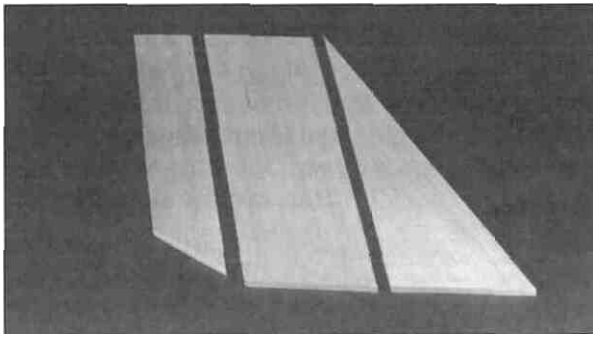
Contact us at:

Hobby Services
Attn: Service Department
1610 Interstate Drive
Champaign, IL 61821-1067
(217) 398-8970

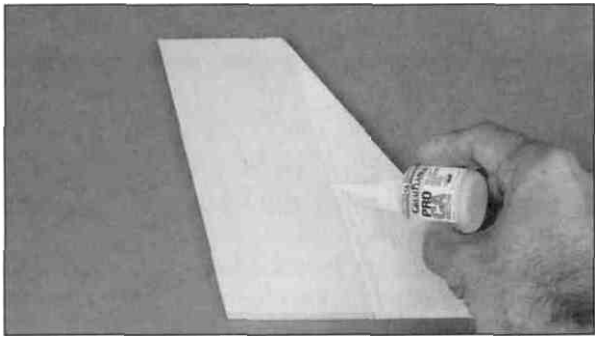
TOOLS & SUPPLIES NEEDED

D Sealing Iron
D Hobby Knife
D Screwdrivers
D Hammer
D Razor Saw
D Pliers
D T-Pins
D Wax paper
D Sanding Block or Bar Sander
D Nylon Reinforced Strapping Tape
D Hand or Electric Drill
D Drill Bits (3/32", 1/8". 3/16", 5/32", 7/32")

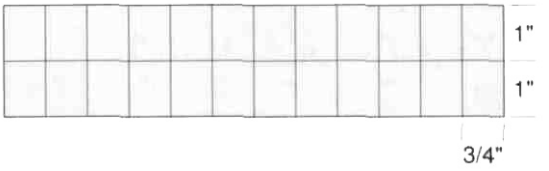
FIN & *RUDDER CONSTRUCTION*



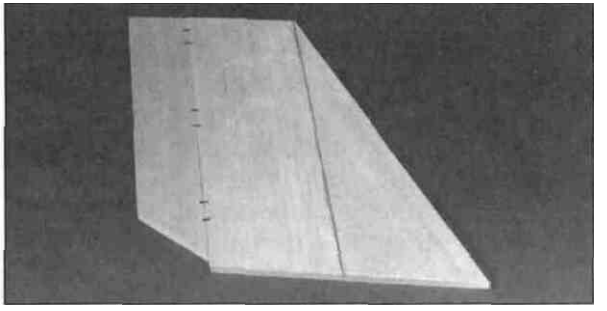
D 1. The fin is made up of the three pieces shown above. Locate these three pieces and lay them out.



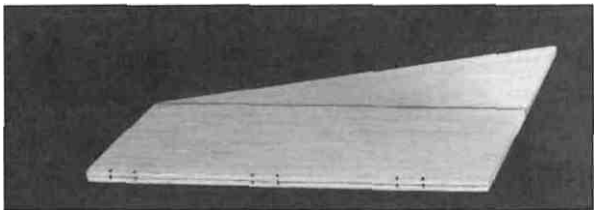
D 2. Glue the front part of the fin to the main part using thin CA. Assemble the two parts and check to make sure they fit properly. Then apply a line of CA along the joint. When the glue has cured, flip the pieces over and add a little glue to the other side.



D 3. As shown in the above sketch, cut 18 hinges from the supplied 2" x 9" composite hinge material. You will need five hinges for the elevator and three for the rudder. Each aileron gets three hinges.



D 4. Lay the rudder in place against the trailing edge of the fin. Using a hinge as a template, mark the hinge locations. They are spaced out so that the outer hinges are approximately 1" from the ends of the rudder and the middle hinge is in the center.



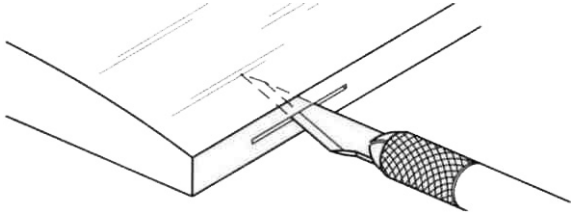
D 5. Draw a line down the middle of the trailing edge of the fin and also down the middle of the leading edge of the rudder. A sheet of wood (or anything) 1/8" thick laid down next to the piece makes it easy to do this. Transfer the hinge locating marks from the side to the edges as shown above

Note: Before proceeding to hinge the rudder. read **completely** through the section on *Installing CA Hinges.* **Do not use any glue until after the tail surfaces are covered.**

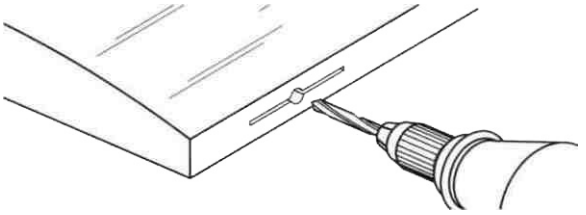
INSTALLING CA HINGES

The hinge material supplied in this kit consists of a 3-layer lamination of mylar and polyester. It is specially made for the purpose of hinging model airplane control surfaces. Properly installed, this type of hinge provides the best combination of strength, durability and ease of installation. We trust even our best show models to these hinges, but **it is essential to install them correctly.** Please read the following instructions and follow them carefully to obtain the best results. These instructions may be used to effectively install **any** of the various brands of CA hinges.

The most common mistake made by modelers when installing this type of hinge is not applying a sufficient amount of glue to fully secure the hinge over its entire surface area; or, the hinge slots are very tight, restricting the flow of CA to the back of the hinges. This results in hinges that are only "tack glued" approximately 1/8" to 1/4" into the hinge slots. The following technique has been developed to help ensure thorough and secure gluing.

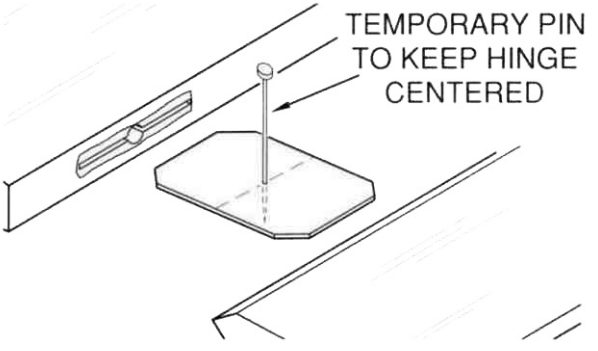


A. Cut the hinge slot using a #11 blade in a standard #1 knife handle. The slots should be about 3/4" deep. The CA hinges provided have a thickness that fits this type of slot very well. Cut off the corners of the hinge at a 45 degree angle and trial fit the hinge into the slot. If the hinge does not slide in easily, work the knife blade back and forth in the slot a few times to provide more clearance (it is really the **back edge** of the blade that does the work here in widening the slot).



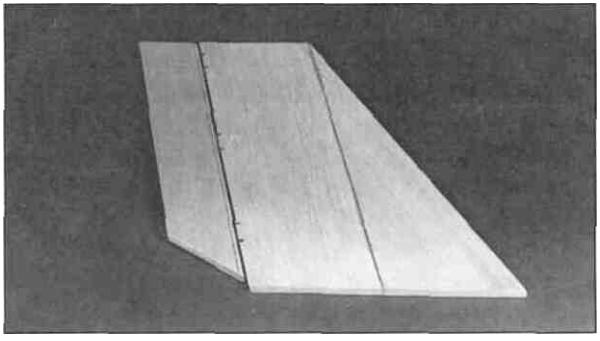
CAUTION: Do not drill this hole when hinging a foam wing, as this hole would allow too much CA to penetrate and cause damage to the foam.

B. Drill a 3/32" **hole,** 1/2" **deep. in the center of the hinge slot.** If you use a Dremel MultiPro for this task, it will result in a cleaner hole than if you use a slower speed power or hand drill. Drilling the hole will twist some of the wood fibers into the slot, making it difficult to insert the hinge, so you should reinsert the knife blade, working it back and forth a few times to clean out the slot.



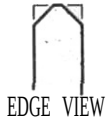
C. Insert the hinges and install the control surface. Verify the left-right positioning of the control surface and close up the hinge gap to 1/32" or less. It is best to leave a very slight hinge gap, rather than closing it up tight, to help prevent the CA from wicking along the hinge line. If you have cut your hinge slots too deep, the hinges may slide in too far. leaving only a small portion of the hinge in the control surface. To avoid this, you may **insert a small**

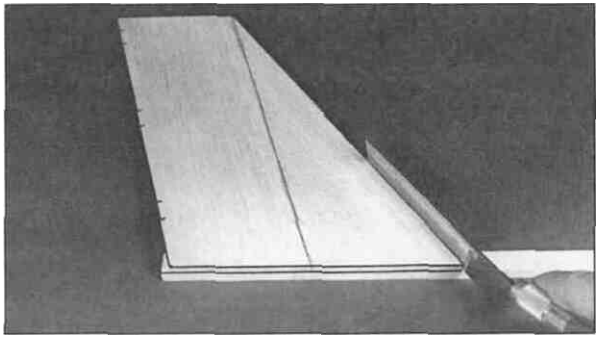
pin through the center of each hinge, before installing. This pin will keep the hinge centered while installing the control surface.
Note: When hinging the ailerons, which use torque rods, use a toothpick to force epoxy down the hole drilled for the torque rod. In the case of the rudder, be sure not to let glue get into the bearing tube.



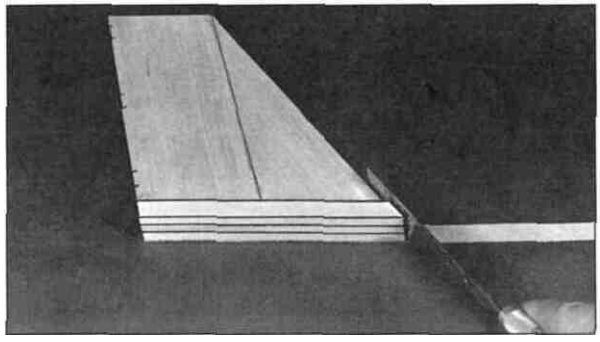
D 6. Trial fit the fin and rudder together using the hinges to check for proper alignment. **Do Not** glue the hinges in place yet! Sand the rudder and/or fin so they match each other at the top.

D 7. Remove the hinges from the rudder and bevel the leading edge with your sanding block as shown in the sketch. This is to allow the rudder to swing either direction once the hinges are glued in place.

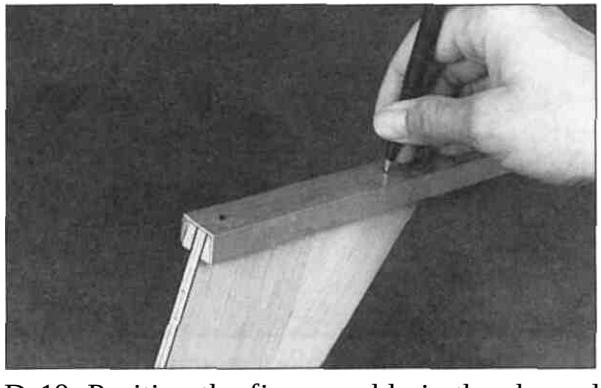




D 8. Add the 1/4" x 1/2" balsa doubler to each side of the fin as shown in the photo above. Use a razor saw to cut the excess off at the leading and trailing edges.

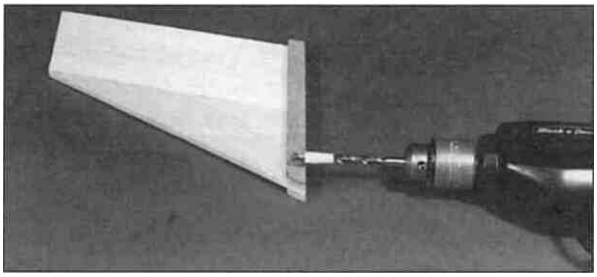


D 9. Check the fit of the fin assembly into the aluminum channel. It will most likely be a little loose and we want a nice, tight fit. Add a strip of the 1/64" plywood doubler to **ONE** side of the fin. Glue it to the balsa doubler. Check the fit again and if it is still a little loose, add a plywood doubler to the other side. If necessary, you can sand the plywood slightly to help the assembly fit. Also, you can have the covering material continue down over the doublers if you need the additional thickness.

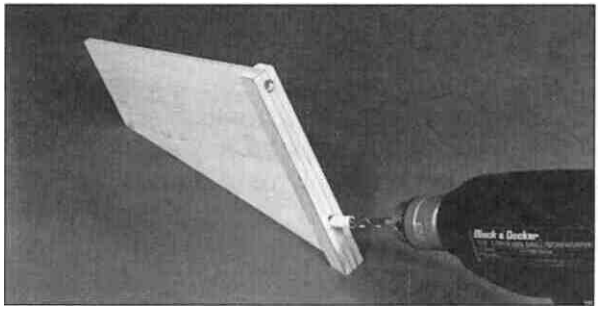


D 10. Position the fin assembly in the channel with the trailing edge of the fin even with the end of the channel. Press it in place. Mark the location of the stabilizer bolt holes on the bottom of the fin and then remove the fin from the channel.

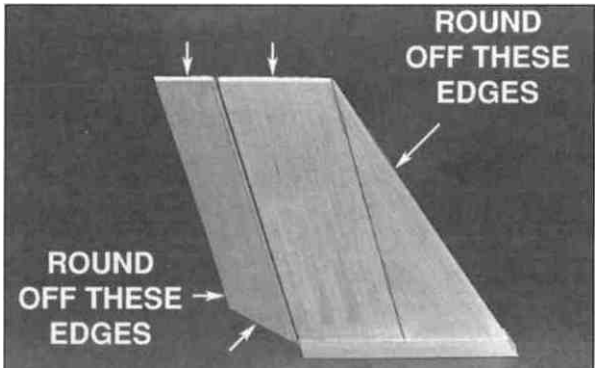
STABILIZER & ELEVATOR CONSTRUCTION



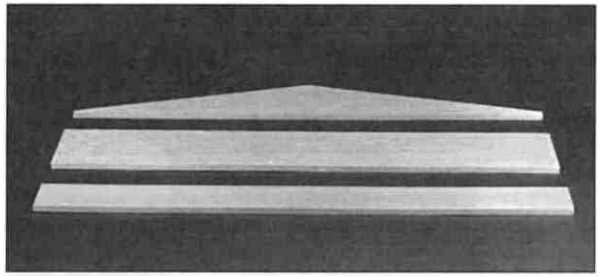
D 11. Wrap a piece of masking tape around a 7/32" drill bit about 1/2" from the end of the bit.



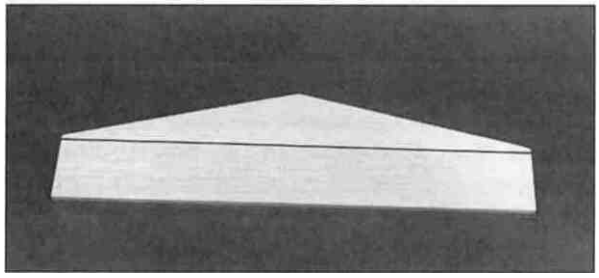
D 12. Drill two holes in the bottom of the fin assembly to make a space for the stabilizer bolts. Be careful not to drill any deeper than the masking tape or you may drill through the side of the fin.



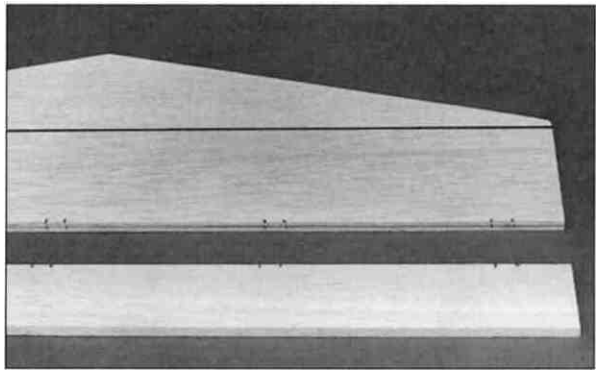
D 13. Use a sanding block to round the edges of the fin/rudder assembly as shown above. Give the sides a quick sanding with some fine sandpaper to get them ready for the covering. This completes the basic assembly of the fin and rudder. The hinges and control horn will be installed after everything is covered.



D 14. The stabilizer and elevator are assembled from these three main pieces. Locate these and let's get started.

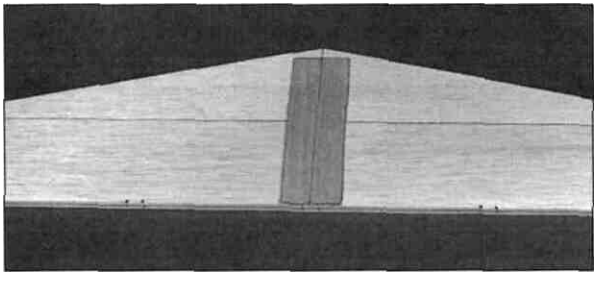


D 15. Glue the front of the stabilizer to the back using thin CA just as you did for the fin in step #2.

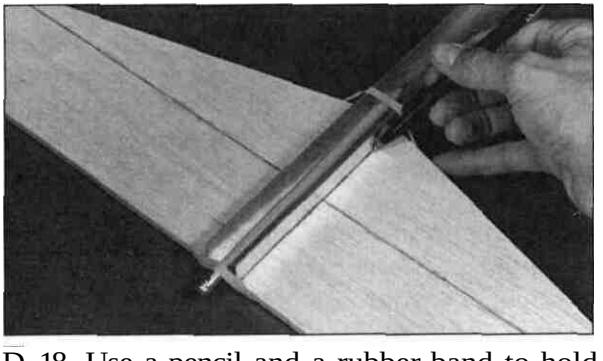


D 16. Mark the hinge locations using the same technique you used in step #4. There are five hinges used here. The outer hinges are

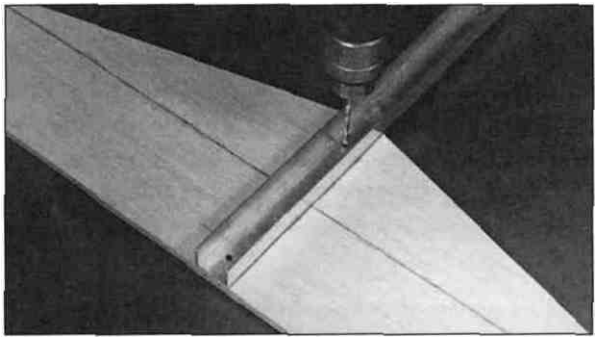
approximately 1" from the edge. The middle hinge is in the center and the other two hinges are centered between the outer hinges and the middle hinge. These hinge locations are not critical, but proper placement makes it easier to find the slots after the parts are covered. Cut the slots for the hinges and test fit the stabilizer and the elevator together to check for proper alignment between the two parts.



D 17. Use some thick CA to glue the 1/16" plywood doubler in place on the stabilizer. **This side is now the bottom of the stabilizer.** Use a ruler to get this piece centered as close as possible. Use a drafting triangle or carpenter's square to draw a line perpendicular to the stabilizer trailing edge and through the center of the stabilizer to the point where the leading edges meet.



D 18. Use a pencil and a rubber band to hold the stabilizer in place as shown in the photo. Sight down the bottom of the channel and line the stabilizer up with the channel (using the line you just drew). When you are satisfied with the alignment, draw a line down both sides of the channel on the top of the stabilizer.

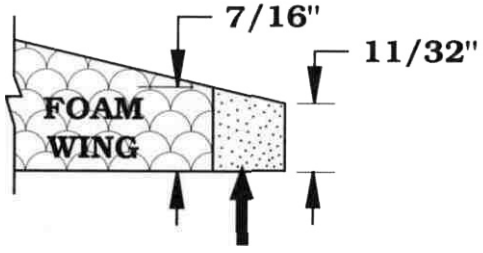


D 19. Remove the pencil and rubber band. With the stabilizer centered over the lines, drill two 1/8" holes through the stabilizer using the holes in the channel as a guide. The trailing edge of the stabilizer should be slightly past the end of the channel.

D 20. Use a sanding block with some fine sandpaper to round off the leading edges, trailing edge and the tips as you did for the fin and rudder. Also sand the top and bottom surfaces smooth. This completes the basic assembly of the stabilizer and elevator. The control horn and the hinges will be installed after the tail is covered.

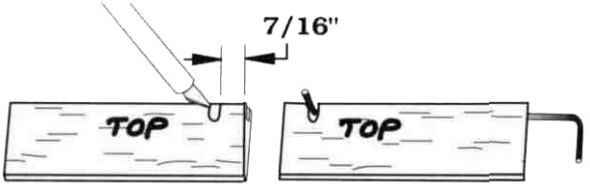
WING ASSEMBLY

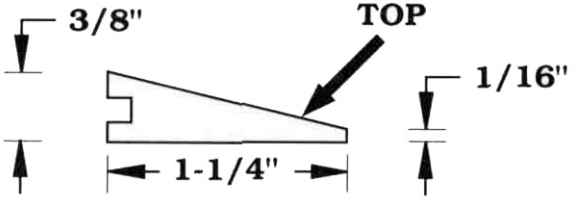
INSTALL THE AILERONS



Balsa SUB TE 26-1/2" Long

D 1. Locate the two balsa 15/32" x 3/8 x 26-1/2" Sub Trailing Edge pieces (Sub TE). Trial fit the Sub TE against the trailing edge of each wing half. The Sub TE should be oriented as shown in the sketch with the 90-degree corners along the bottom of the wing. Epoxy the Sub TE to the trailing edge of each wing half. Pins or tape can be used to help hold the Sub TE in place while the glue cures.

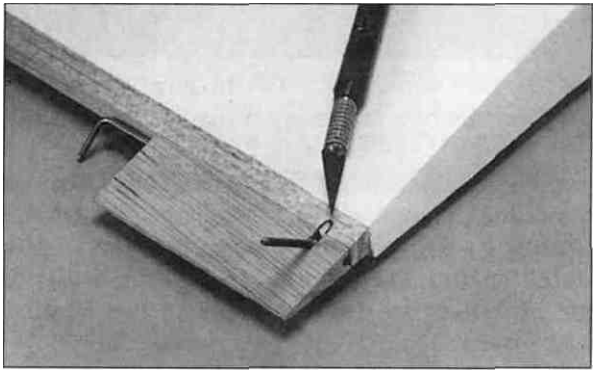




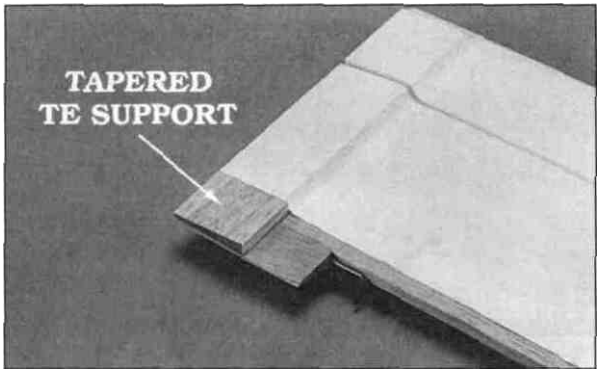
Balsa CENTER TE 3-7/8 " Long

D 2. Locate the two balsa 3/8" x 1-1/4" x 3-7/8" tapered center trailing edge pieces. Use the sketch to help you determine which side is the top and mark the top side of each piece. Make another mark 7/16" from the "inboard" end of each piece. Notch each piece to make a slot for the torque rod.

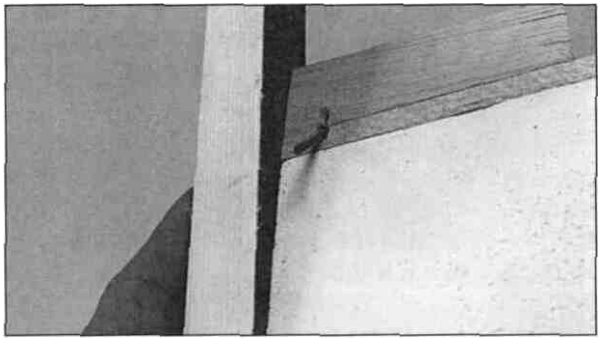
Note: The threaded portion of each torque rod should stick out the top of each wing. Also there will be a "right" and a "left" center trailing edge piece so don't make two exactly alike.



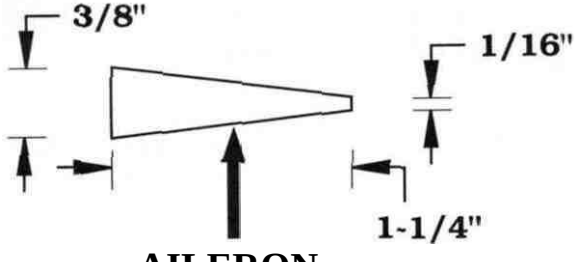
D 3. Use 150-220 grit sandpaper to roughen the outer surface of the torque rod bearing. Slide the bearing toward the threaded end of the torque rod and put a small amount of petroleum jelly around the ends of the bearing tube to prevent epoxy from seeping in. Spread some epoxy in the slot and on the leading edge of the center trailing edge pieces. Do not apply any epoxy within 1/4" of the notch or you may glue the torque rod. Insert the torque rods into the slots with the threaded portions sticking out through the notches. Position the center trailing edges against the wing sub trailing edge. Align the center trailing edges and pin or tape them in place while the glue cures.



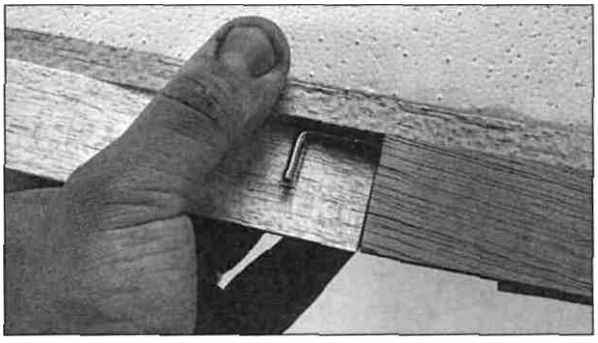
D 4. Epoxy the two 11/32" x 2" x 1-5/8" Tapered TE Supports to the inboard bottom of each center trailing edge as shown in the photo.



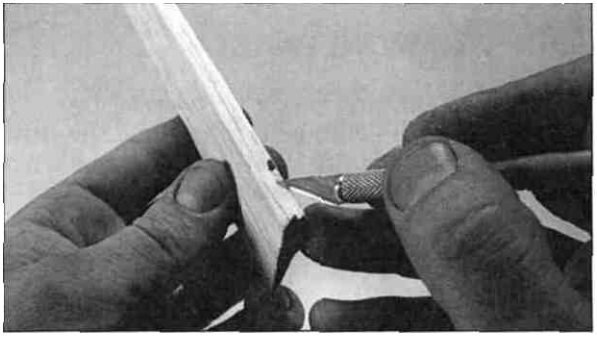
D 5. Use a sanding block with 150-grit sandpaper to sand the inner ends of the sub trailing edge. center trailing edge and the tapered trailing edge to match the angle of the foam wing end. Be careful not to change the angle of the foam wing.



AILERON
22-1/2" Long
ARF2W04



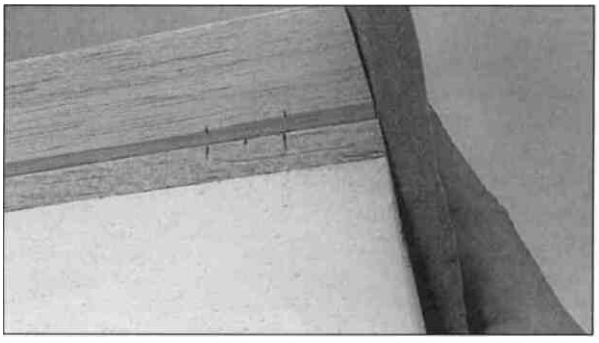
D 6. Hold the 3/8" x 1-1/4" x 22-1/4" Ailerons in place against the sub trailing edge and under the torque rods. Mark the location where the torque rods will enter the ailerons. Drill a 3/32" hole in each aileron to accept the torque rods.



D 7. Cut a groove in the leading edge of the aileron to allow clearance for the torque rods. Trial fit the ailerons in place and cut as necessary until they fit.

D 8. Draw an accurate centerline along the leading edge of the aileron and cut three hinge slots in each aileron. The hinge slots should be approximately 1-1/2", 10" and 18" from the wing tip. Place the ailerons against the sub trailing edge and mark the hinge locations on the wing. Draw a center line down the sub trailing edge and cut the hinge slots to match the ailerons.

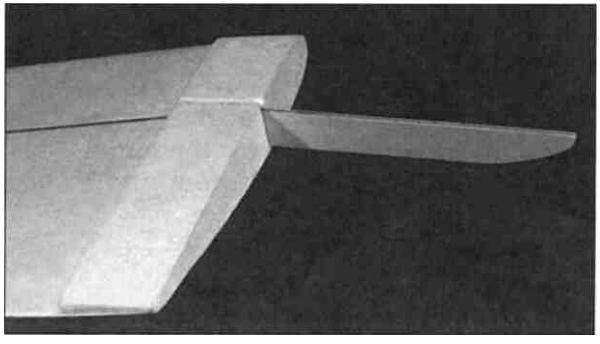
D 9. Using a sanding block, sand the leading edge of each aileron to a "V" shape.



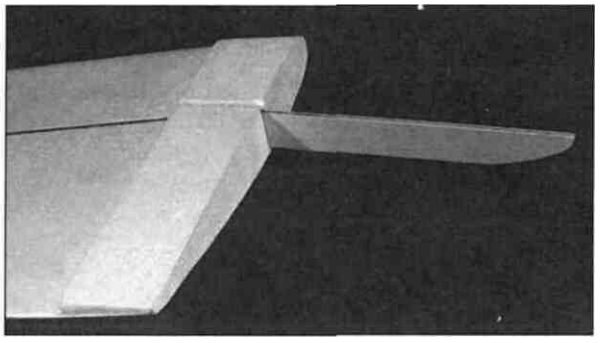
D 10. Insert the hinges into the slots and trial fit the ailerons in place on the wing. Do not glue the hinges until after you have covered the wing. Sand the outboard edge of the sub trailing edges and the ailerons to match the foam wing tips.

JOIN THE WING PANELS

D 1. Use a sanding block with some fine grit sandpaper (240 - 320 grit) to remove the little nubs and any mold lines left on the wing from the molding process.



D 2. Test fit the 1/8" plywood dihedral joiner in the slots in the wing to make sure it fits nicely. Mix up about 1/2 oz. of epoxy and spread it throughout the slot in one wing panel. With the wing panel upside down, insert the joiner in place and squeeze out all the excess epoxy so that the joiner is flush with the bottom of the wing (which is facing up). Try to use enough epoxy so that the slot is completely full and level with the surface of the wing.



D 3. Lay some wax paper down on the work surface and mix up one ounce of epoxy. Spread the epoxy throughout the slot and on the root (middle end) of the other wing panel. Slide the two wing panels together and line them up as close as possible. Use several T-pins and masking tape to help hold them in alignment. Flip the wing assembly over so that the bottom of the wings are facing up and make sure that the joiner is seated properly in the slot. Wipe off any excess epoxy before it starts to cure. It is important that the wings are joined with both panels being accurately aligned with each other.

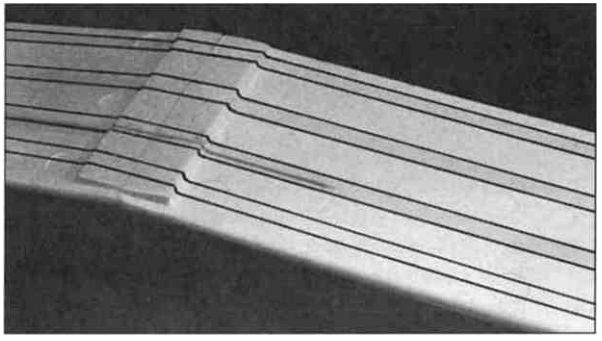
D 4. Allow the epoxy from the last step to fully cure.

THE NEXT STEP IS CRITICAL FOR PROPER STRENGTH OF THE WING! IF THIS TAPE IS NOT APPLIED, THE WING MAY FAIL!

Note: The tape used in this step is 3/4" wide nylon filament reinforcing tape. This is self-adhesive tape with nylon filaments running the length of the tape. It is also referred to as "nylon filament strapping tape," or "nylon reinforced packaging tape." You can obtain it at any store that sells stationery and packaging materials or at most hardware stores. Be sure to use 3/4" **wide** tape. Narrower tape will not provide the wing with

proper reinforcement. Make sure the tape is applied with no wrinkles and that the strips are straight and parallel from wingtip to wingtip. If this tape is not applied, if it is applied incorrectly or if a different type of tape is applied, **we cannot be responsible for any wing failure that may occur.**

D 5. Place the wing upside down on the edge of a table so that only 1/2 of the wing (from one wing tip to the center joint) is resting on the table. Starting at the wing tip that is resting on the table, lay a strip of nylon-reinforced strapping tape down so that it crosses over the center joint directly over the wing joiner.



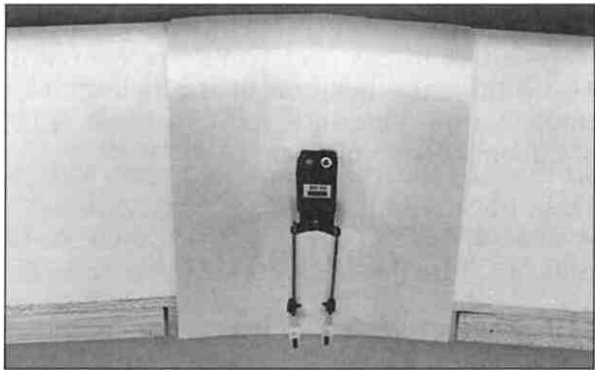
Press the tape firmly onto the wing and down into the fillet (where the bottom of the wing meets the mounting platform) and then flip the wing around and continue the strip of tape out to the other wing tip. Apply two more strips of tape between this strip and the trailing edge of the wing. The fourth strip should be added between the first strip and the leading edge of the wing. The previous photo shows where the strips should be located. Try to get this tape stuck down as tightly as possible because it adds a tremendous amount of strength to the wing when properly applied. Make sure you do not change the washout (twist) or dihedral (V-shape) of the wing when applying the tape strips. If you are planning on doing some aerobatics or combat with your STURDY BIRDY II, you should **also** put three strips of tape on the **top** surface of the wing.

INSTALL THE WING PROTECTOR

D 1. Use a sharp hobby knife or a Dremel® Tool with a tapered cutting bit to trim out the servo and torque rod cut-outs in the Plastic Wing Protector. There are scribe lines on the bottom surface of the protector to help guide you. Trial fit the aileron servo in place and trim as necessary to make it fit properly. Use scissors or your hobby knife to trim the outside edges of the wing protector along the remaining scribe lines.

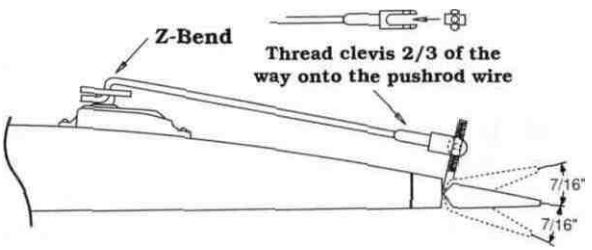
D 2. Place the wing protector on the center of the wing so the torque rods fit through their holes. Draw a line on the wing around the servo cutout. Remove the protector and carve out a hole in the foam wing to fit your servo. Carve out an extra 1/4" square groove in front and behind the servo cut-out for the servo rails. Drill a 1/2" diameter hole for the servo wires down through the front edge of the servo cutout. Be careful not to cut the plywood wing joiner when performing these operations.

D 3. Glue the 3/16"x l/4"x 1-1/4" Basswood Servo Rails in place along the front and back edges of the servo cut-out. Put the aileron servo in place and mark on the plastic protector where the servo mounting screws should be. Drill 1/1 6" diameter holes on the marks you just made and mount the servo using the screws provided with your radio.



D 4. Trial fit the wing protector assembly on the wing and enlarge the cutouts in the foam

wing if necessary to make the protector lie flat against the wing. When satisfied with the fit, remove the servo. Use coarse sandpaper to roughen the bottom of the wing protector so the glue will hold better. Use epoxy to glue the protector in place.



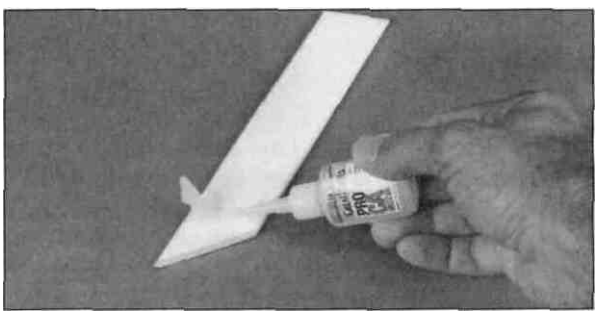
D 5. Trial fit the ailerons for this step. Mount the aileron servo with the screws provided in the radio system and assemble the pushrods as shown in the sketch above. Attach the pushrods to the torque rods by screwing the Aileron Clevis Connector onto the threaded portion of the torque rod. Use a pair of needle nose pliers to make the Z-bends and attach them to the servo horn. Turn on your radio. plug in your aileron servo and adjust the centering of the servo horn until it is centered and the right aileron moves up when you move the transmitter stick to the right. Adjust the nylon clevis until each aileron is in a neutral position when the transmitter sticks and trims are centered. Also adjust the position of the nylon clevis connector on the torque rod to achieve 7/16" of up and down movement.

COVERING

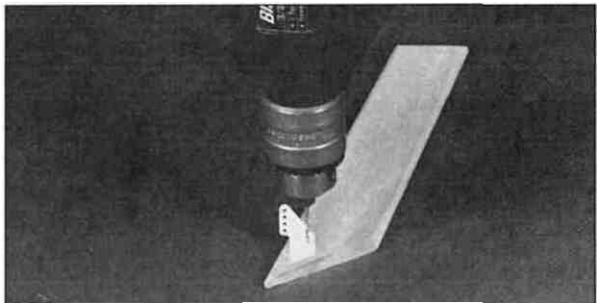
D 1. The tail surfaces (fin, rudder, stabilizer and elevator) should be covered with one of the iron-on coverings to help protect them from becoming fuel soaked and ruined. If you are also going to cover the wing, which will help it look nicer longer (and add a small amount of strength), you can save a little money by buying only one roll of low temperature covering (EconoKote, Black Baron Film, etc.) and using it for both the wing and the tail surfaces. Otherwise you can use any type of covering for the tail surfaces, but remember to use a low heat covering for the wing. A few stripes or your AMA number can really add to the looks of your STURDY BIRDY II.

D 2. Follow the instructions that come with the covering and cover the tail surfaces at this time. It is a good idea to cover the bottom surfaces first to get familiar with the covering since these surfaces will normally not be seen. When covering the wing, cover right over the tape and plastic wing protector. Try to use as little heat as possible.

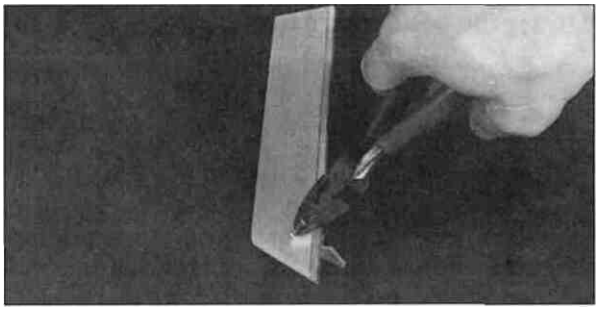
ATTACHING THE CONTROL HORNS



D 1. Position the nylon control horn on the left side of the rudder about 1" up from the bottom with the four holes lined up with the leading edge. Use a drop of **Thin** CA to tack glue the horn in place.



D 2. Drill two 3/32" holes through the **rudder** using the control horn as a guide.



D 3. Secure the horn to the rudder with two 2-56 x 5/8" machine screws. The screws should thread into the nylon "nut plate" on the opposite side of the rudder. Although not necessary, you may use some wire cutters or an abrasive cutoff wheel to cut the screws off even with the plate.

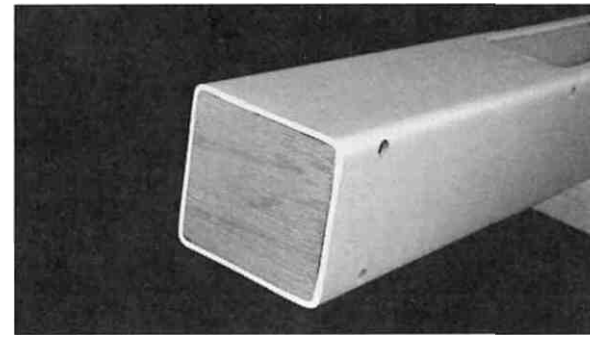
D 4. The other control horn should be installed on the top surface of the elevator about 1" to the right of the centerline. Follow the same procedure for installing this control horn.

INSTALLING *THE HINGES*

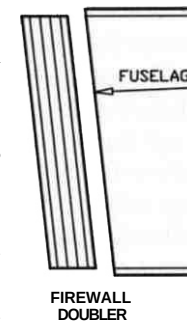
D 1. After covering the tail surfaces and the wing, the hinges can be installed. Use your hobby knife to find the slots you cut earlier and make slits in the covering so you can push the hinges into place and trial fit the pieces together again. (Refer to the CA hinge section on page 6.)

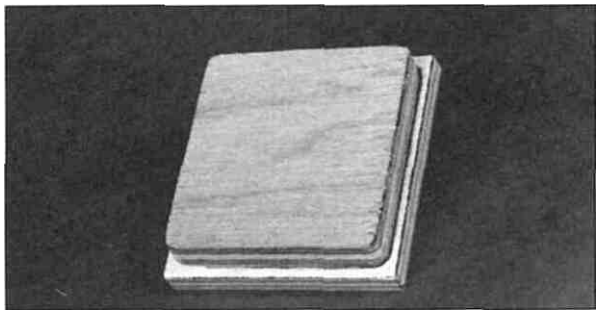
D 2. The control surfaces will take some abuse in the learning-to-fly process, so you must securely glue the hinges in place. Use four to six drops of CA on each side of the hinge to secure them. Try to get the surfaces as close together as possible, but work the control surfaces back and forth while the glue is curing to make sure they work freely without binding. Also, be careful not to glue the two surfaces together.

FUSELAGE CONSTRUCTION

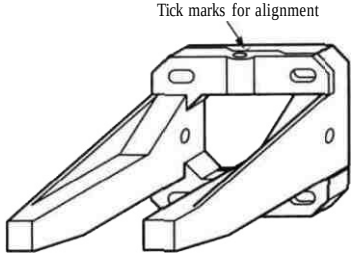


D 1. Locate the 3/8" plywood firewall doubler and round off the corners with a sanding block. Test fit the doubler into the front of the plastic fuselage tube as shown above. The firewall doubler should fit into the fuselage with a snug but not tight fit. The front of the fuselage is cut at a slight angle so the firewall and thus the engine will point down slightly. Because of this angle the top and bottom edges of the firewall doubler are also cut at a slight angle. Make sure you install the firewall doubler so all of its sides match up nicely with the sides of the fuselage as shown in the sketch.

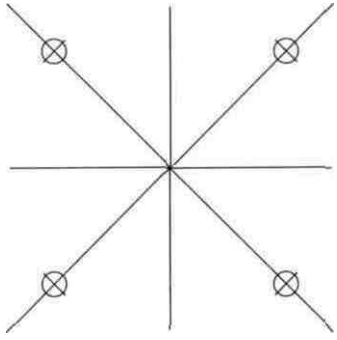




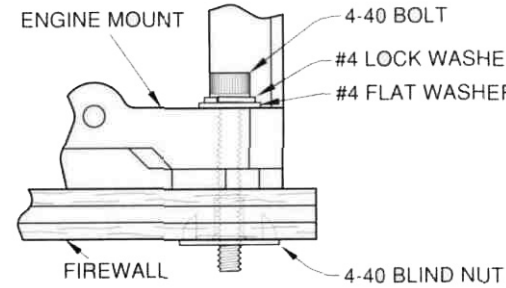
D 2. The 3/8" plywood firewall doubler is now glued to the 1/4" plywood firewall front. Use either **Thick** CA or epoxy and make sure that the **front** of the **firewall doubler** is centered on the **back** of the **firewall.** Wipe away all excess glue that squeezes out.



D 3. Cut or break the "spreader bar" off each mount half. **Carefully** trim any extra plastic off each mount half left by the spreader bar. The surfaces where the spreader bars were attached need to be very smooth to allow the mount halves to fit together. Also trim the flashing off any other rough edges. Snap the two mount halves together as shown in the sketch.

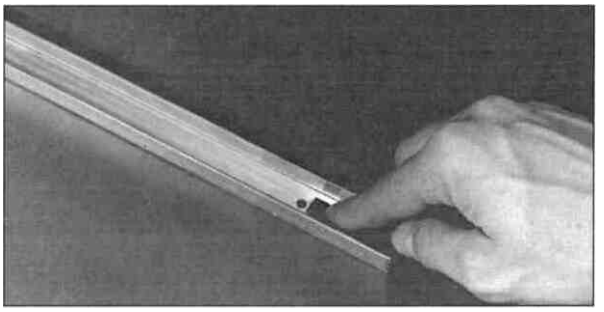


Determine where the mount should be installed on the firewall. Use the template in the left column to make it easy to locate the mounting holes. Photocopy or cut out the template and tape it in place on the firewall. Poke a T-pin though the template to accurately mark the bolt locations on the firewall. Drill a 1/8" diameter hole at the four pin holes and install the mount using 4-40 bolts, #4 flat washers and 4-40 blind nuts. The length of the bolts will be determined by the thickness of the firewall. A 1/4" firewall will usually require 7/8" long bolts. Do not tighten the bolts all the way yet.

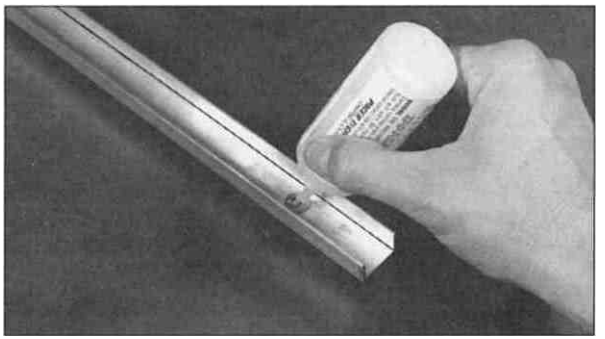


Slide the mount halves apart until the engine mounting lugs will sit flat on the beams. Adjust the mount until the firewall centerline (or offset line) is centered between the "tick" marks on the mount. Tighten the 4-40 bolts to hold the mount halves in position. Determine how far forward the engine should be positioned on the beams and mark where to drill the mounting holes. Remove the engine and drill a 3/32" hole at each mark. Put a drop of oil in each hole and install the engine using the #4 x 5/8" screws provided. If you prefer to use 4-40 machine screws (not included) to install your engine, just tap the holes you drilled with a 4-40 tap.

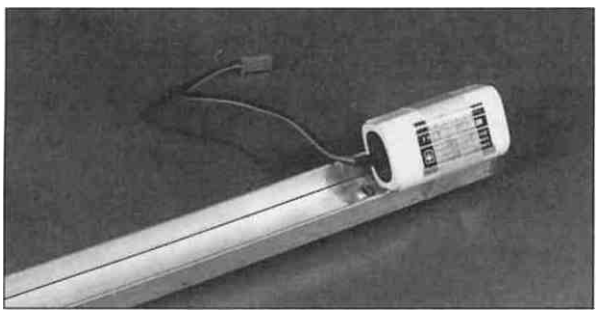
With the engine installed on the mount, mark the location for the throttle pushrod and fuel lines. Remove the engine and mount. Drill a 3/16" hole in the firewall for the throttle and two 7/32" holes for the fuel and vent lines.



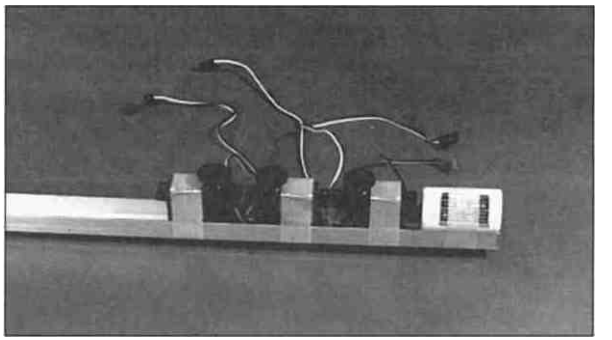
D 4. Use a small piece of coarse sandpaper to scuff up the inner floor of the aluminum channel in the area around the front 11/64" bolt hole.



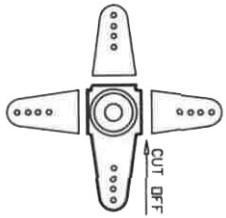
D 5. Insert one of the 8-32 x 1/2" machine screws into the hole so that it sticks out the bottom of the channel and glue it in place with plenty of thick C A or epoxy. This screw will be covered by the battery pack, prohibiting a screwdriver from being used to keep it from turning. Glue it securely, but be careful not to get any glue on the threads.



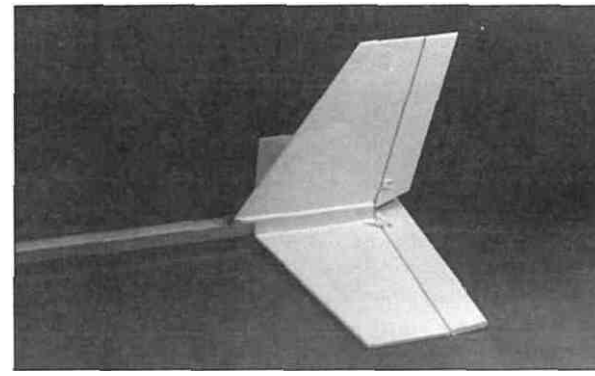
D 6. Use some nylon reinforced strapping tape to securely hold the battery pack on the front end of the channel. Square battery packs fit nicely but most flat packs will also fit. Just tape them flat onto the channel. The battery should protrude approximately 1/8" past the end of the channel to keep the fuel tank from rubbing against the end of the channel.



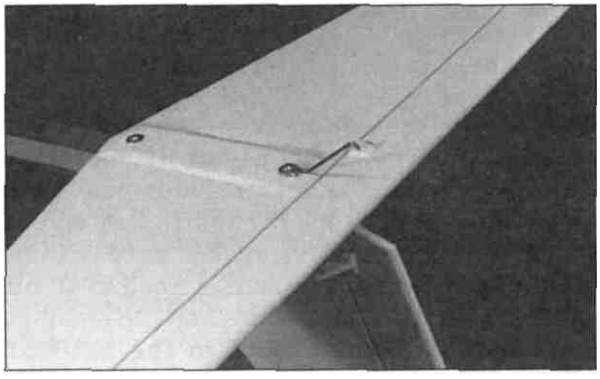
D 7. The servos are "press fit" into the aluminum channel and then held in place with nylon strapping tape. Standard size servos should fit very nicely and smaller servos can be held in place by using a piece of wood to fill the space between the servo sides and the channel. **Large servos will not work in the STURDY BIRDY II.** The servos should be placed as far forward in the channel as possible and right next to each other, but do not overlap the servo mounting lugs. The front two servos should be mounted with their servo output shafts towards the back of the plane and the back servo should have its output shaft towards the front of the plane. The servo wires should be routed out to the side of the servo without going under any servos. Wrap two layers of nylon strapping tape all the way around each servo and the aluminum channel to hold it in place. Hook up the entire radio system and turn it on (see the instructions included with your radio). Adjust the transmitter trims so they are in the middle of their slots.



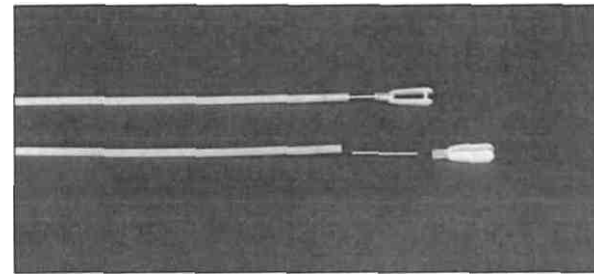
Remove the screws that hold the servo horns in place and adjust the horns so that they are perpendicular to the servo. This will be their neutral position. It is a good idea to use single arm servo horns rather than the round horns most servos come with. The sketch shows how to cut a horn for use here. Reinstall the screws that hold the horns in place.



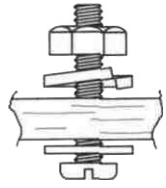
D 9. Press the fin/rudder into the channel with the back edge of the *fin* even with the back edge of the channel as shown in the photo.



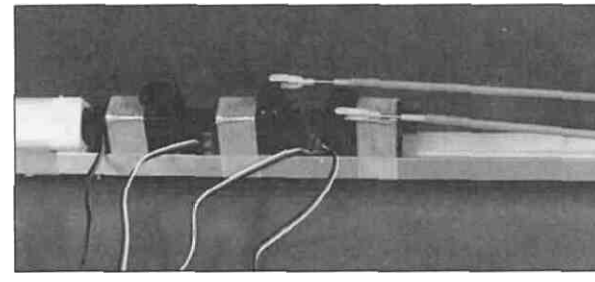
D 8. Attach the stabilizer/elevator to the back of the channel using two 4-40 x 5/8" machine screws, two #4 flat washers, two 4-40 lock washers and two 4-40 nuts.



D 10. Assemble the two pushrods by screwing a 1" threaded rod into one end of each inner pushrod and then screwing a nylon clevis onto each threaded rod. The rod should thread into both the pushrod and the clevis at least 13 turns.

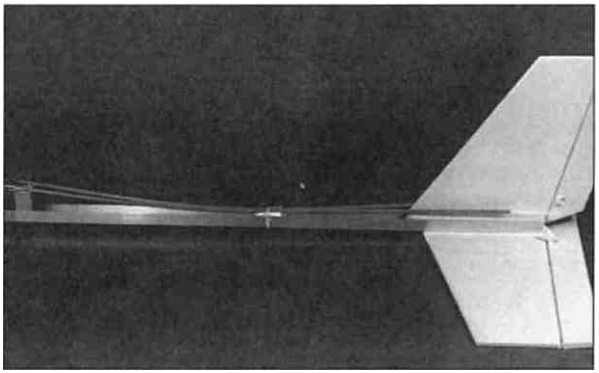


The sketch shows how the pieces are installed. The prebent tail skid is held in place by the rear screw.



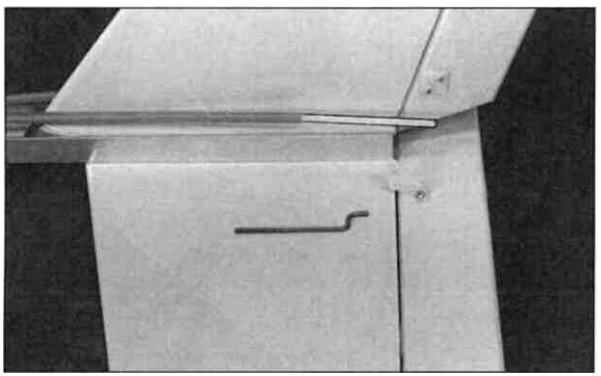
D 11. Attach the two long pushrods to the two rear servos as shown in the photo. Slide

the outer pushrod tubes over the inner pushrod until they are about 1/2" from the servo end of the inner pushrod.

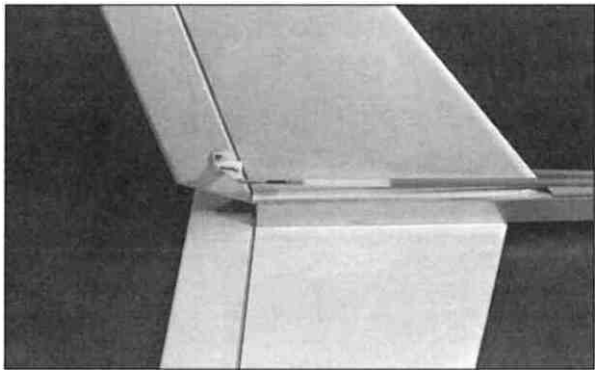


D 12. Press the balsa pushrod holder into the channel about 6" in front of the fin and secure the pushrods to it with the nylon tie wrap. It is a good idea to seal the balsa pushrod holder with a light coat of epoxy that will also help hold it in place.

Note: The rudder pushrod goes to the left side of the fin. The elevator pushrod goes to the right side (as viewed from the back).

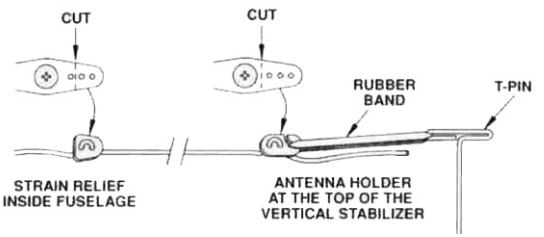


D D 13. Cut 2" off the threaded end of two of the 12" long link rods. Use a pair of long nose pliers to bend the "Z" in the **unthreaded** end of the 2" pieces.

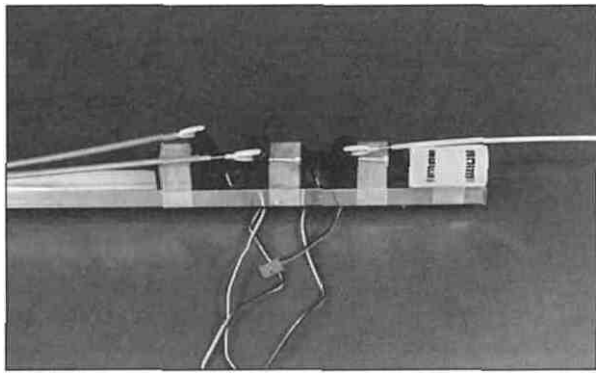


D 14. Install the link rods in the 2nd hole from the outer end of each control horn. With the control surfaces and the servo horns in their neutral positions, cut the inner pushrod so the link rod will thread into the inner pushrod approximately 2/3 of the way. Install the link rods into the inner pushrods and adjust so that the control surfaces are at neutral positions.

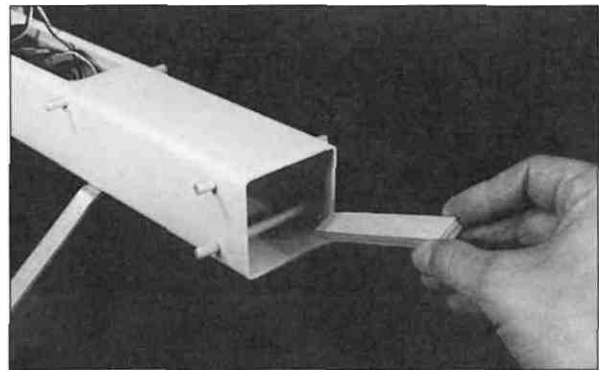
D 15. Wrap the receiver in at least 1/4" thick foam rubber to protect it from vibration, hard landings, etc. and use two rubber bands **to** hold the foam rubber in place. Disconnect the rudder and elevator pushrods from the servos and slide the pushrods under the rubber bands on the top of the receiver. Position the receiver behind the servos and reattach the clevises to the servo horns. The switch can be servo taped to the fuselage behind the receiver so it can be reached from the back of the fuselage.



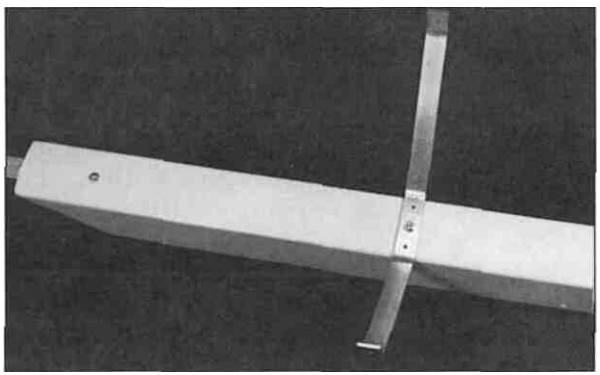
The receiver antenna should exit out the back of the fuselage without encountering any other wires if possible. Use a small rubber band to hold the antenna on a T-pin inserted in the top of the fin.



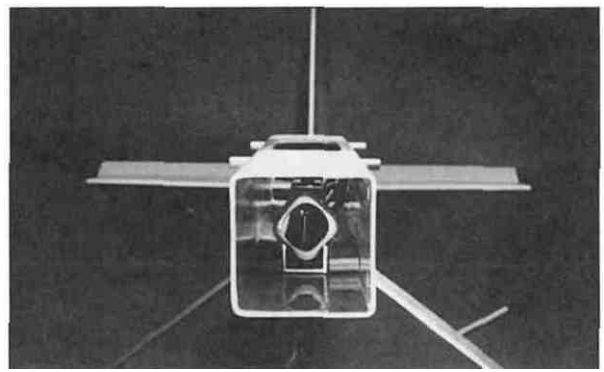
D 16. Assemble the throttle (short) pushrod by screwing the remaining nylon clevis and 1" long threaded rod into one end of the short inner pushrod and snapping this assembly onto the throttle servo horn.



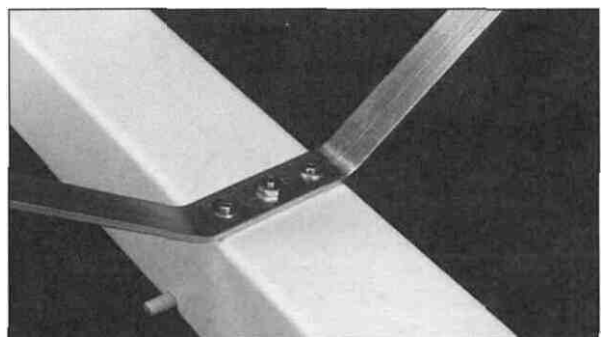
D 18. Slide the two 1/4" plywood landing gear supports **into** the fuselage, one on each side of the aluminum channel. The front of the supports should be even with the front of the aluminum channel.



D 17. Attach the plastic fuselage tube to the channel by sliding it over the channel assembly and pushing the front 8-32 screw through the middle hole in the bottom of the tube. Put the aluminum landing gear in place on the 8-32 screw and secure the whole assembly with a #8 lock washer and an 8-32 hex nut. Insert the remaining 8-32 screw in the rear hole from the bottom and secure it with a # 8 lock washer and an 8-32 hex nut in the channel. It is a good idea to use some medium strength thread locking cement on these bolts.

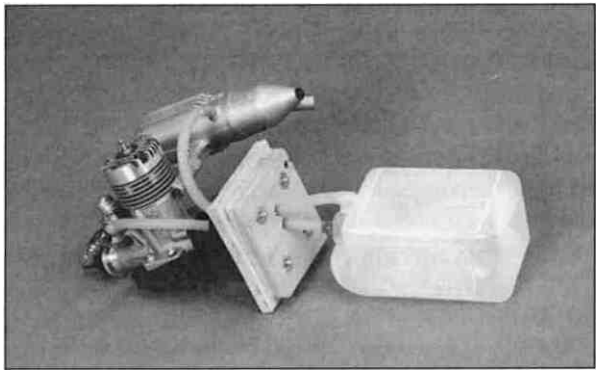


D 19. Tack glue or hold these in place for the next step.

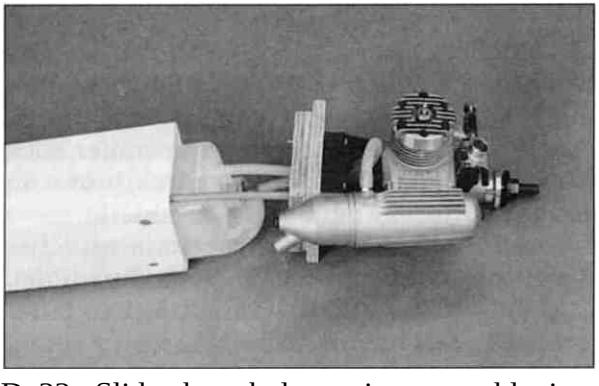


D 20. Drill a 1/8" diameter hole in each support using the attached landing gear as a guide. Remove the supports from the fuselage

and enlarge the holes to 5/32". Insert a 4-40 blind nut in each hole and use a hammer to seat the blind nut in place. Replace the supports into the fuselage with the blind nut facing up and use the 4-40 x 5/8" machine screws to hold everything together.



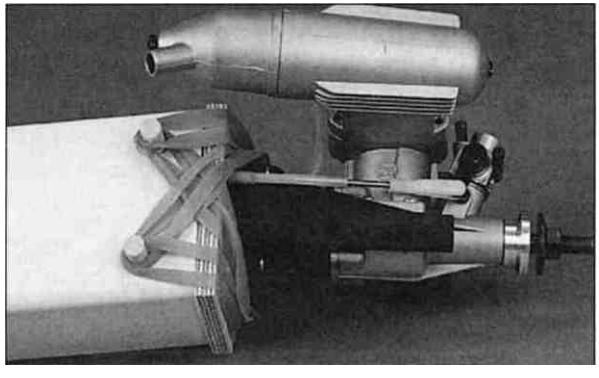
D 21. Assemble your fuel tank according to the manufacturer's instructions. Connect the fuel tank to the engine by routing the fuel tubing through the two holes in the middle of the engine mount and attaching the pickup line to the carburetor and the vent line to the pressure tap on the muffler. Make the fuel lines long enough so that there is a 1" gap between the fuel tank and the back of the firewall. Also make sure that the fuel lines are not kinked.



D 22. Slide the whole engine assembly into place in the front of the fuselage with the throttle pushrod extending through the hole in the firewall. Cut the outer pushrod so it starts about 1/2" from the 1" threaded rod and extends about 1/4" past the front of the firewall. Remove the engine assembly from the fuselage and glue the outer pushrod in place.

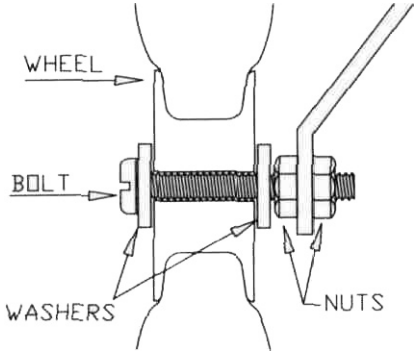
D 23. Reinstall the engine assembly into the fuselage. Push two 1/4" x 3-1/2" dowels into place in the four holes at the front of the fuselage. The dowels should be a nice, tight fit. If they are too tight you can enlarge the holes slightly with your hobby knife. If they are too loose you can use a drop of glue **to** hold them in place. Do not use very much glue on the front dowels since you will need to remove the dowels to get the fuel tank out of the fuselage. Secure the engine assembly to the fuselage with four #62 or #64 rubber bands as shown in the next photo.

Note: There are eight #2 x 3/8" sheet metal screws provided if you would rather screw the firewall in place instead of using the rubber bands to hold it on. Tests have shown that the rubber bands work extremely well and help eliminate damage to the front end during crashes.



D 24. Cut the inner pushrod to length and cut and install the remaining 1" threaded link rod to hook up the throttle control. Make sure you can achieve both full throttle and idle without binding of any kind. It is also nice if you can shut the engine off at low throttle and full down throttle trim. Bend the link rod if necessary to make this possible. The entire engine / fuel tank assembly can be removed at any time by simply removing the rubber

bands, the throttle clevis from the servo horn and the two front dowels. This makes adjustments and checking of the fuel system quick and easy.

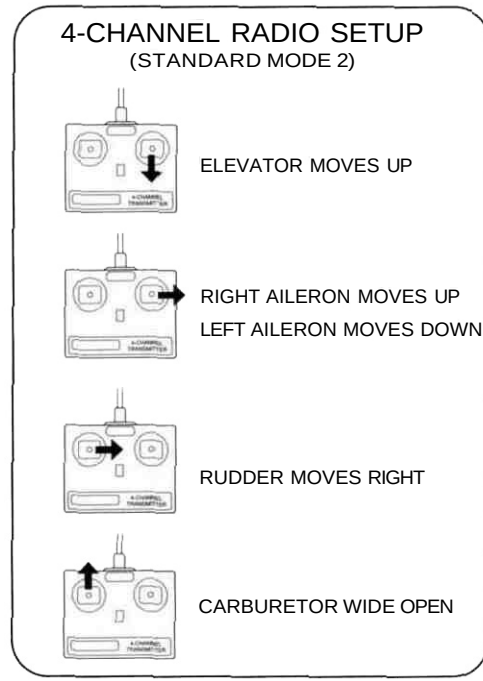


D 25. Each wheel axle is made up using a 6-32 x 1-1/2" machine screw, two 6-32 hex nuts and two #6 washers. The sketch above shows how these parts are assembled. It is a very **good idea** to use some medium strength thread locking cement between the screw and the hex nuts. Also make sure that the wheel can turn freely.

D 26. Slide the two 1/4" x 3-1/2" wing dowels into their holes in the fuselage. Secure with a few drops of CA.

B. The rudder moves to the right when the left transmitter stick is moved to the right (looking at the plane from the rear).

C. The throttle is closed almost all the way when the left transmitter stick is down (back) and is open completely when the stick is up (forward).



FINAL ASSEMBLY

D 1. With the fin positioned correctly, apply a few drops of thin CA around the base to hold it in place. This type of gluing method will keep the fin/ rudder in place unless the plane is crashed pretty hard, in which case the fin will come out of the channel, usually without breaking.

D 2. Turn the radio system on and adjust all of the trims on the transmitter so that they are in the middle of their slots.

D 3. Check the following:

A. The elevator moves up when the right transmitter stick is moved down (back).

D 4. Check to make sure that the tail control surfaces are in a neutral (straight) position and the servo arms are perpendicular to the aluminum channel when the transmitter stick is at neutral. Also check the control throws on the tail surface. You should be able to move the rudder 3/4" both directions and the elevator should move 1/2" both directions. This should give you a plane that is fairly responsive but not too radical.

D 5. Install the second nylon tie wrap around the aluminum channel and the pushrods right in front of the tail surfaces. This will help keep the control surfaces from fluttering.

BALANCING

With the wing rubber banded to the fuselage, the fuel tank empty and everything else in its place, lift the model by placing one finger-tip on the bottom of each wing at the approximate location of each end of the wing joiner which is 3" back from the leading edge. The STURDY BIRDY II should hang just slightly nose down or level. If the plane hangs with the nose pointing up, then you will need to add some weight to the nose of the plane. There are several ways you can add this weight, including stuffing lead weight around the fuel tank or using one of the heavy prop nuts available. Under no circumstances should you try to fly the plane if it does not balance correctly!

GETTING READY TO FLY

D Use at least four rubber bands to hold the engine/firewall in place and use eight #64 rubber bands to hold the wing in place.

D We recommend that you use a nylon propeller for your first flights since it will not break as easily as wood. Sand the edges of the prop before you use it. The edges of nylon props are very sharp and should be dulled before use. If a prop is damaged in any way it should be discarded and a new prop used in its place.

D Be sure to conduct a range test on your radio system before every flying session. The instruction manual that came with your radio should explain how to properly do this.

D If you are using a new engine in your plane, break it in on the ground according to the manufacturer's instructions before attempting to fly the plane.

D Never try to start the engine by flipping it over with your finger. Always use either an electric starter or a "Chicken Stick."

D Always adjust the needle valve on the engine from the back of the plane. Never reach over a rotating prop! Treat these engines with the utmost respect, they are not toys!

D After each flight, check the propeller, engine bolts, control surfaces, control linkages, hinges and rubber bands for damage or looseness and correct if necessary. An once of prevention here will keep you happily flying longer.

FLYING

The STURDY BIRDY II is a very stable Hying airplane with a unique self-recovery system designed into it. This makes it one of the easiest flying planes available. However, it is highly recommended that you consult an experienced pilot to help trim out the plane and help you with your first flights. The most important thing to remember when learning to fly is that you need to be able to relate to the control inputs as if you were sitting in the plane. If you don't, it will seem like the rudder is working backwards when the plane is flying towards you. It may also seem a little strange that you pull the stick down (back) in order to make the plane go up, but this is how it works in real planes. It is a good idea to keep facing the same direction that the model is flying.

The STURDY BIRDY II should be hand launched **into the wind** for your first flights. Have a helper hold the plane firmly behind the landing gear with the wings level while you check the controls. Advance the throttle to full throttle. Your helper should then take a few running steps and let the plane fly out of his hand with a slight push (being careful to keep the wings level). A strong throw is not necessary. Be prepared to make any initial adjustments to keep the plane climbing slightly and flying straight. Your control inputs should be very gentle until the plane has climbed high enough to be out of danger

of hitting any ground based objects (especially the ground). Once you have reached a safe altitude, trim the plane for straight and level flight with the engine running about half throttle. If you get disoriented or the plane does not seem to be doing what you think it should, just release the control sticks and the plane will right itself. If you see that the plane is heading for danger which you can not prevent, reduce the throttle to idle and pull the elevator stick back (up elevator) to reduce the impact speed. When the plane banks into a turn, it is normal for the nose to drop down so be prepared to put in a little up elevator to keep it flying level.

Once you are familiar with how the **STURDY BIRDY II** handles under power, pull the throttle back to near idle and slow the plane down. Be sure to do this at a safe altitude! Feed in up elevator to try to keep the plane flying at the same altitude. If the plane stalls (falls off to one side abruptly) just release the control sticks, advance the throttle to at least 1/2 and **gently** pull in some up elevator. Try to determine the slowest speed the plane will fly at and remember that you need to stay above that speed when landing and taking off to avoid a stall. If you find the plane getting too high and it is hard to determine what it is doing, reduce the throttle to idle and be patient. The **STURDY BIRDY II** will lose altitude fairly quickly and you can resume control.

When preparing to land it is a good idea to make several practice passes from a safe altitude and gradually get lower until you feel comfortable with your approach. Then on one of your next passes, just decrease the throttle and the plane will land by itself. Landing is really not very tricky if you just concentrate on guiding the plane with the rudder where you want it to go and let it settle to the ground. Of course it helps to fly at a field that is big enough so you don't have to worry about where you need to land.

The **STURDY BIRDY II** also handles very nicely on the ground despite the fact that it is a tail dragger without a steerable tall wheel. When taxiing in grass, hold in up elevator until the plane is moving pretty well to help keep it from nosing over. To steer the model when it is moving slow, throw in full rudder and use bursts of throttle to move the plane around.

REPAIRING

The **STURDY BIRDY II** is very tough, but there may be crashes hard enough to break parts of the plane. The fuselage should not be repaired. It is inexpensive and very easy and quick to replace. Due to the nature of plastic, it is very hard to properly mend if cracked or broken. It should be replaced for safety reasons.

The foam wing will really take a beating and survive. Small dents and dings can be removed by patching or reheating the covering material. A broken wing can be quickly repaired with epoxy, but check the nylon tape and replace it if needed. If the wings get bent you can straighten them by bending them the opposite direction and adding a couple more strips of strapping tape. It is important that the wings are kept in their original configuration with the molded-in washout (wing twist). This gives the **STURDY BIRDY II** its exceptional recovery characteristics.

The tail surfaces can be repaired with CA glues, or new surfaces can be cut from 1/4" balsa available from your local hobby shop.

If dirt gets into the carburetor or onto the engine it should be cleaned off before it has a chance **to** get inside the engine and cause damage.

Good Luck and Happy Flying!