

SweetVee™

R/C ROCKET GLIDER

- Rocket boosted high performance design capable of long duration thermal soaring.
- Great slope soarer too!
- Blow molded fuselage, fiberglass boom. Foam wings with pre-cut Obeche covering.
- Includes plans for easy to build, super stable launch platform (parts not included)

INCLUDES MECHANICAL MIXER FOR "VEE" TAILS



Requires single 2 channel R/C system (servo and motor) and an enclosure (using NOT RECOMMENDED) with mini or micro servo, mini battery pack, & mini receiver. Also requires electrical launch controller, launch platform (parts included) and Estes rocket engine (D18 P or E15 F).

SPECIFICATIONS:
Wing Span: 46 cm (15.5 in)
Wing Area: 22 sq m (380 sq ft)
Length: 86.4 cm (34 1/4")
Weight: 433.6-549.0 g (15.20-20 oz)
Recommended for ages 16 and up.

1 MODEL BUDKIT
PAINTURE ET COLLE NON COMPLETES
Use only with Estes engines D18 P, E15 F



EST 2116

Estes Industries
1266 N Street
Pomona, CO 80401
Made in USA. #784452

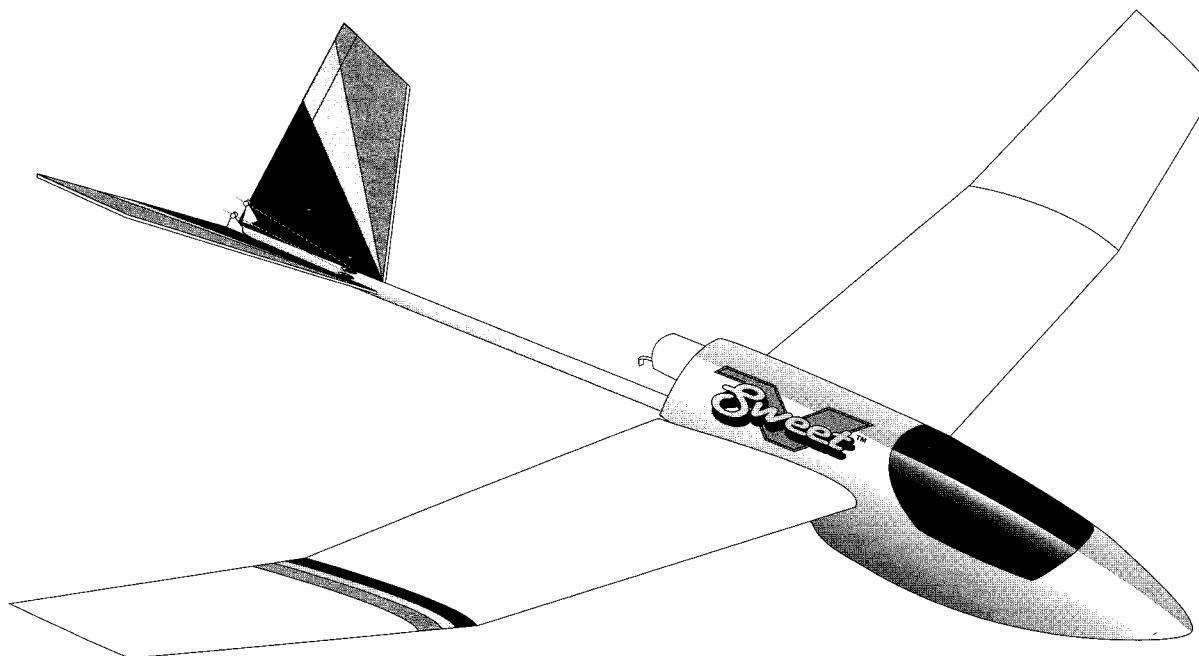
Color shown here is a photo model example only.

Sweet 'V'

Thermal Soaring - Rocket Boosted - R/C Glider

PN 84451

Instructions



Welcome to the exciting world of rocket-boosted, radio controlled model aircraft. The **SWEET VEE** is a high performance thermal soaring model capable of long duration flight. Unlike other sport sailplanes, it is **ROCKET LAUNCHED**, which adds a whole new dimension to R/C flying.

It requires the use of a **micro, mini, or mid sized basic R/C system** (see list under Radio Installation). It is designed for the **experienced R/C builder/flyer**. Model rocketry experience would be helpful, but not necessary, as this kit will provide you with some basic instruction in the safe use of Estes rocket engines and accessories. **This kit includes plans for building a launch pad.**

BEFORE YOU START

Read all instructions before you begin building.

This instruction is divided into *construction segments*. It is best to follow them in order.

You will need the following tools and accessories to complete your model.

- ◇ Hobby Knife with extra blades (X-acto #11)
- ◇ Razor saw
- ◇ Steel straight edge
- ◇ Assortment of sandpaper (80 to 320 grit)
- ◇ Razor plane (optional)
- ◇ Masking tape
- ◇ A Dremel-type hobby drill with a 1.5mm (1/16") and 3mm (1/8") drill bits
- ◇ **GLUE:** We recommend the use of Cyanoacrylate adhesive (CA) and 2 hour cure formula Epoxy (see Wing Construction). Also, ordinary white glue will be needed.

WARNING: Some CA glues will "attack" styrene foam. The "odorless" variety of CA is less likely to do so and should be used whenever CA is recommended in this instruction. Follow all manufacturer's safety instructions with all adhesives.

FINISHING MATERIALS

For optimum performance we suggest that you simply coat your completed wings and tail surfaces with sanding sealer. Two coats will provide a great looking light weight protective finish. **However**, you can cover your models' wing and tail surfaces with any of the iron-on "heat shrink" model aircraft covering materials. Because of the styrene wing cores, the "**Low Temperature**" type should be used. *The iron-on materials require the use of a tacking iron and heat gun.*

You can paint the fuselage with any enamel type spray paint, remember though, that weight is your "enemy." A finished Sweet Vee should weigh between 454 and 567 grams (16 and 20 ounces),..... Go easy !

PARTS LIST:

This kit contains the following parts. In the event that you should be missing any parts or need to buy replacement parts, please refer to the Estes part number to the left when ordering.

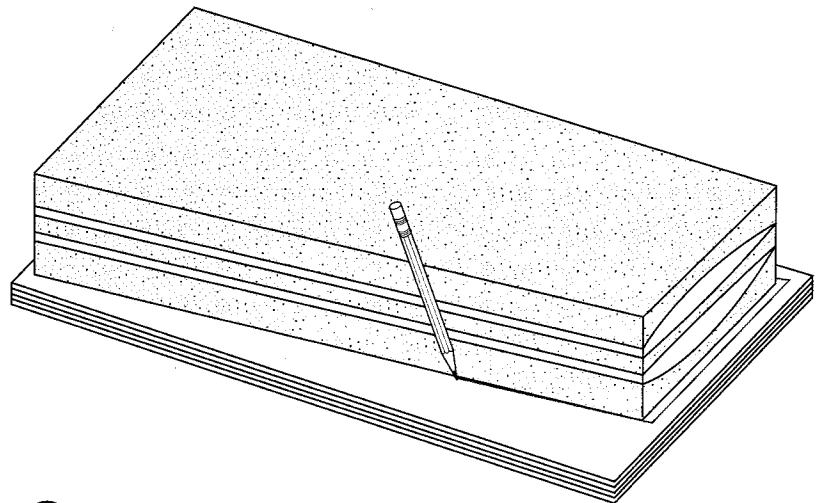
ESTES PART#	QUANTITY	PART DESCRIPTION
072721	1	Fuselage
037872	1	Canopy
085881	1	Tail Boom (slotted)
037873	1	V Tail Mixer (molded nylon set)
038290	1	Z-Bend Link (bagged w/engine mount)
038294	2	Z-Bend Control Wires
037994	1	Hardware Set (bagged)
033140	1 set	Wing Cores (main)
033139	1 set	Wing Cores (tip)
032048	1 set	Obeche Wing Skins (large)
032049	1 set	Obeche Wing Skins (small)
037155	1	Decal
032147	1	Balsa Sheet 3 x 102 x 457mm (1/8"x 4"x 18")
032148	2	Balsa Stick 6 x 9 x 432mm (1/4"x 3/8"x 17")
032149	2	Balsa Stick 6 x 9 x 305mm (1/4"x 3/8"x 12")
032099	2	Balsa Block 12 x 12 x 152mm (1/2"x 1/2"x 6")
087175	1	Fiberglass Tape 18 x 1016mm (3/4"x 40")
031222	1	Engine Mount Tube
035030	1	Engine Mount Hook
030164-2	1	Engine Block Ring
030160	1	Engine Mount Over-sleeve
034998	1	"D" Engine Spacer

WING PANEL CONSTRUCTION

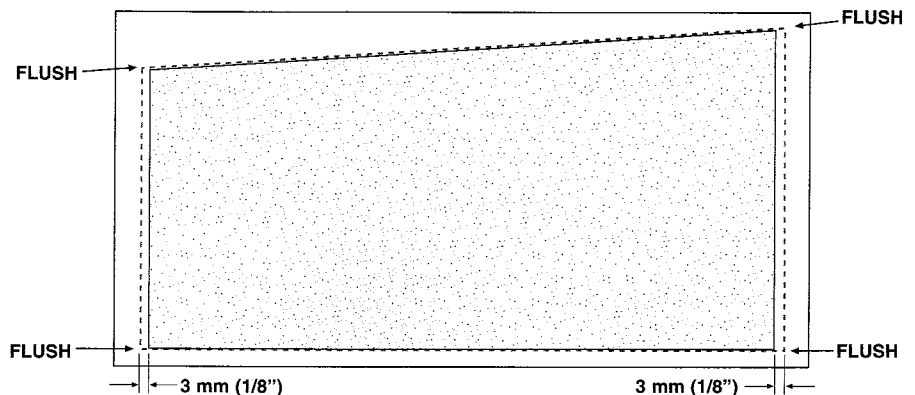
The following section deals with the fabrication of the wing panels. Use extreme care while handling both the foam wing cores and the Obeche wood wing skins. Accuracy in construction is essential for optimum performance. Read all steps thoroughly.

1. Preparing the wing skins

- Locate the Large and Small Obeche Wood wing skin sets and the Inner (larger) and Outer (smaller) foam wing core sets.
- Note that the small set of four Obeche skins will be used to cover the two outer wing panels. The larger set of four Obeche skins will be used to cover the two inner wing panels.
- Lay the foam **outer** wing panel set on top of the **smaller** of the two Obeche sets. Adjust it so that you can mark and trim the Obeche 3mm (1/8") larger than the core beds at each end and flush to the core beds along the leading and trailing edges. *See Pattern.*
- Use a sharp blade and steel rule to cut the Obeche wood skins along the lines that you just drew. **Note:** Obeche splits easily, so use great care while handling and cutting. You may find it easier to cut each obeche skin separately.
- Repeat this process for the larger inner wing panel set and Obeche skins. Flush to the leading and trailing edges and 3 mm (1/8") at each end.



(C)



2. Adhering The Wing Skins To The Wing Cores

There are several methods for adhering the obeche skins to the top and bottom surfaces of the wing cores. If you have skinned foam wings before, you may have a preferred method.

We have tested several methods and have found that, without question, the "slow cure" epoxy method works the best. Its strength-to-weight ratio is superior, and therefore our first choice. Follow the next steps carefully and measure accurately; a small scale will be helpful. You will be mixing a total of 58g (2 oz.) of epoxy to adhere all eight wing skins. About 8.5g (3/10oz.) for each of the four inner wing panel skins, and 5.7g (2/10oz.) for each of the four outer wing panel skins.

TIP: Epoxy is available in several cure time formulas. We recommend the use of the 2 hour formula for this step. This allows plenty of time for positioning parts.

A. Begin by laying out all eight wing skins to determine which sides will have glue applied to them. Lightly sand the surfaces to be glued to remove any fuzz or irregularities.

B. To start, apply a measured amount of epoxy to the correct surface of the **bottom-outer-left wing skin** and spread it using the edge of a piece of card board or scrap balsa. Do your best to spread a very thin (paper thin) coat over the entire surface of the skin. **Note:** Use caution not to get epoxy on the opposite side of the skin.

C. Remove the **outer left** foam wing panel from the core bed and carefully set it down on the glue covered skin surface so that a 3mm (1/8") skin margin is visible all the way around the foam core.

Note: This is possible even though you cut the obeche skins flush to the leading and trailing edges of the foam core beds because the wing cores themselves are narrower than the surrounding foam beds by approximately 6 mm (1/4") overall.

D. Apply a measured amount of epoxy to the correct surface of the **upper-outer-left** wing skin. Spread it as before and carefully place it on the upper surface of the foam wing panel so that the trailing edges of the upper and lower wing skins are aligned.

E. Repeat this process for the outer right wing panel and skin assembly and go quickly to the next step.

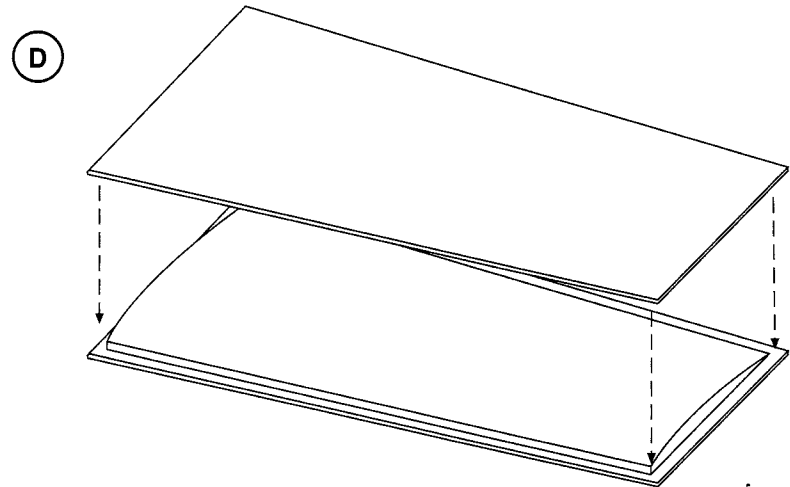
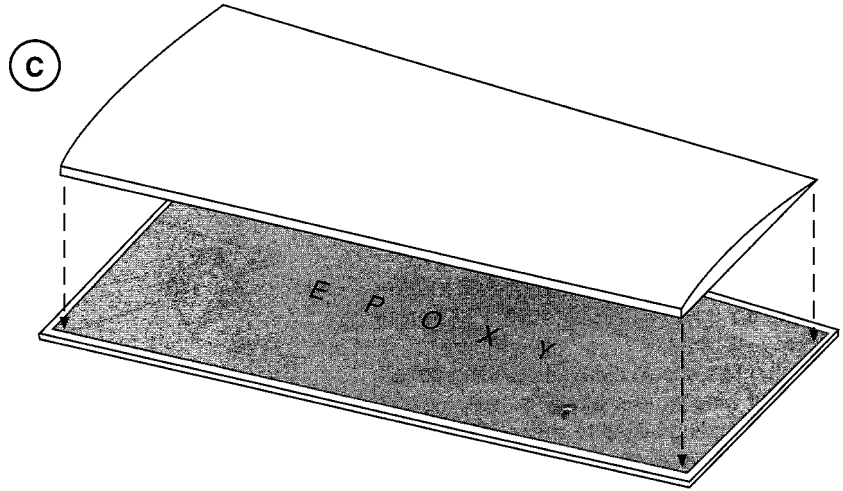
F. Now, place both assemblies back in the foam core beds as shown. Carefully align all the foam edges on all four sides. Place the whole assembly on a flat surface and weight it down with evenly distributed books or other heavy flat objects.

This method assures flat and straight wing panels with 100% skin to core contact.

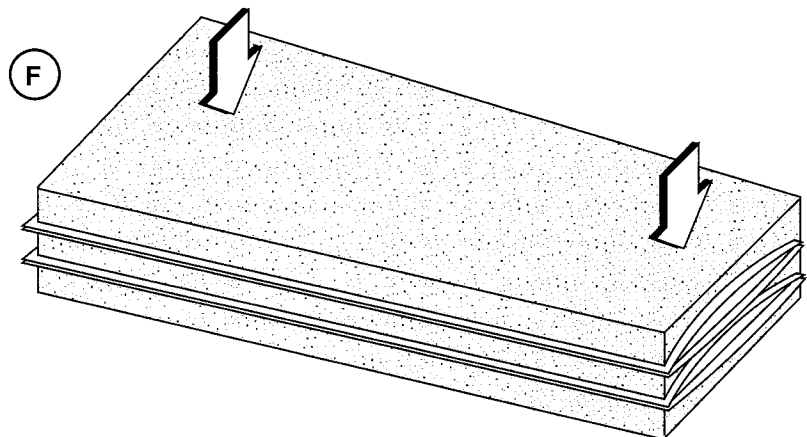
G. Repeat this process for the two inner wing panels. Allow the epoxy to cure at least **SIX** hours before removing the panels from the core beds.

Tip: Save the core beds for use in the next section.

Note: The outer wing panels are cut to provide 2° of washout (spanwise twist). Do not be alarmed if your outer panels appear to be slightly twisted.

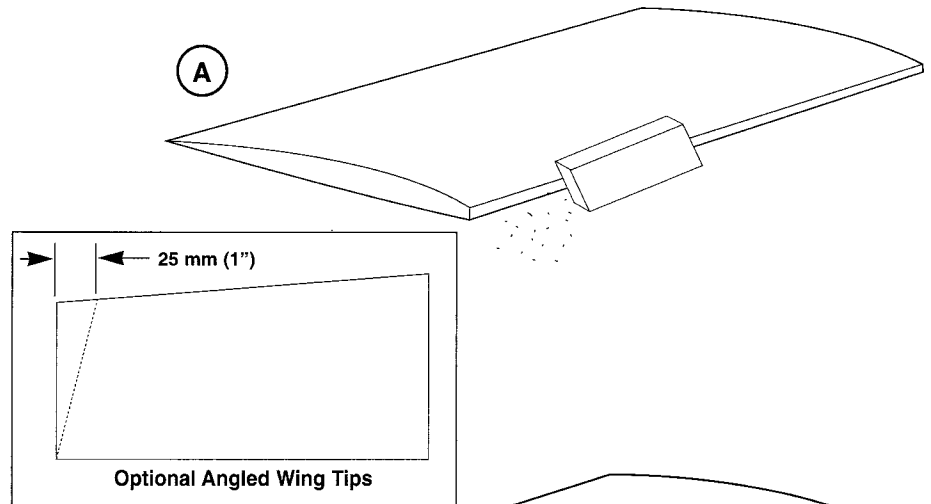


WEIGHT



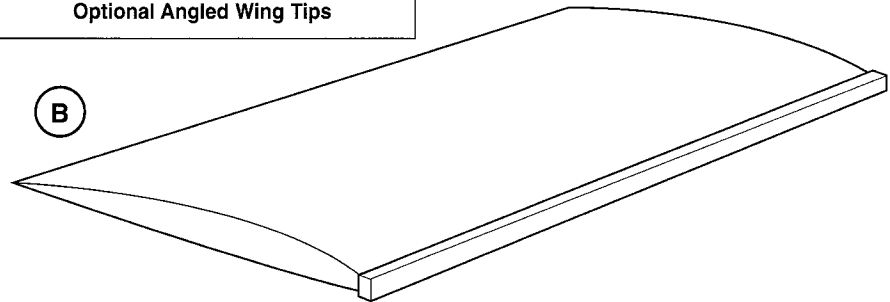
3. Trimming The Wing Skins

- A. Trim the excess wing skins with a block sander or "T" Bar type sander. Trim the skins flush to the foam cores along the leading edge and to each end of the panel. NOTE: If you aligned the foam core the prescribed 3 mm (1/8") from the trailing edge of the lower skin and aligned the upper skin to the lower, you need only sand the trailing edge smooth.
- B. Repeat this process for all four wing panels.



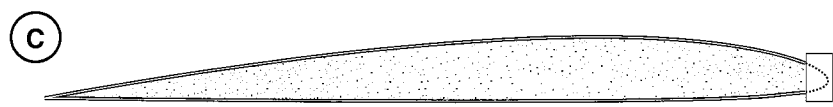
4. Optional Angled Wing Tips

- A. Cut each outer wing panel end at an angle as shown. This creates a more streamlined look. Flying characteristics are not noticeably affected.



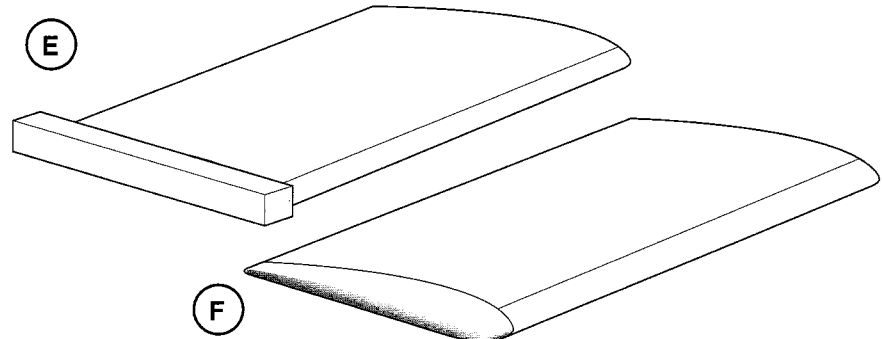
5. Installing The Leading Edges and Wing Tips

- A. Locate The 6 x 9 x 432mm (1/4"x 3/8" x 17") and the 6 x 9 x 305mm (1/4"x 3/8"x 12") balsa sticks.
- B. Glue them as shown along the leading edges of all four wing panels. Epoxy is best.
- C. Sand the leading edges to shape (note cross section view). A razor plane followed by a sanding block works best. Sand all the wing surfaces smooth. Use caution not to damage the Obeche sheeting.



TIP: Place the wing sections in the appropriate foam core bed when sanding. The bed makes a good protective layer between the wing and your work surface and helps to hold the wing panel steady.

- D. Locate the two 12 x 12 x 152mm (1/2"x 1/2"x 6") balsa wing tip blocks.
- E. Glue them as shown to each of the outer wing panel ends.
- F. Use a sanding block to shape as shown. Again use caution not to damage the wing skins.

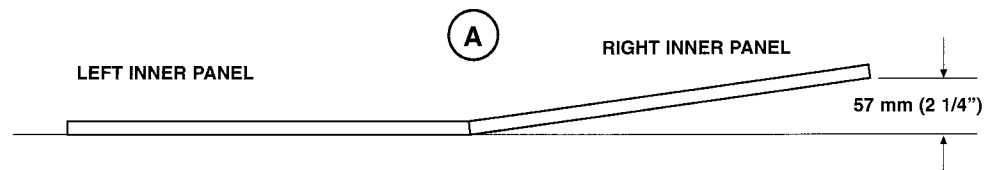


JOINING THE WING PANELS

The outer wing panels of your Sweet Vee are attached to the inner panels at approximately a 10 degree angle, and the inner panels are joined together at approximately an 8 degree angle. Use scrap wood blocks or other items to prop the panels up to the correct angles as the epoxy cures in the following steps.

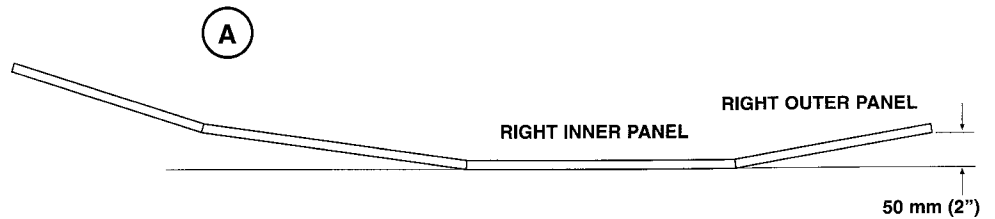
1. Joining The Inner Wing Panels

- A. Begin by joining the two inner wing panels together. With one panel flat on your work surface, block the other so that the narrow end sets 57mm (2-1/4") above the work surface as shown.
- B. Using a sanding block, gently sand a slight angle in the root (large) end of each inner wing panel. This is done so that the panels will mate with a minimum gap.
- C. When you are happy with the fit between the wing panels use epoxy to glue them together. **Double check the 57mm (2-1/4") rise in the elevated panel before the epoxy cures.**



2. Joining the Outer wing panels

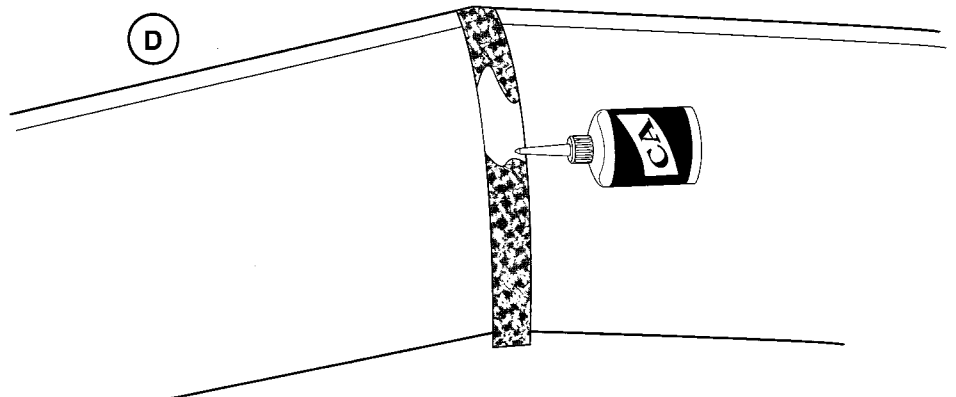
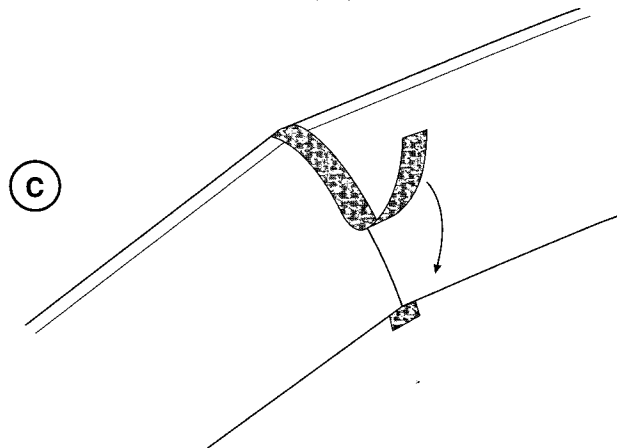
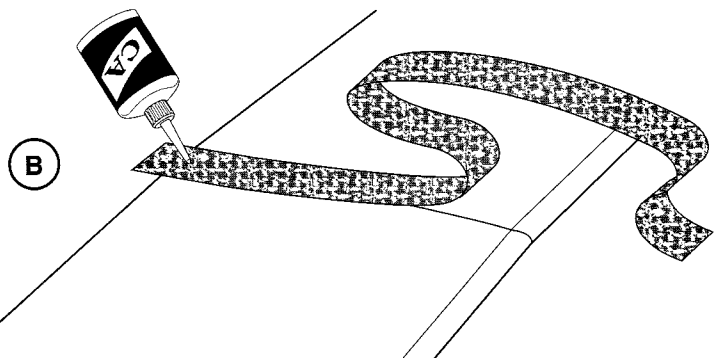
- With an inner panel laying flat on the table, position the appropriate outer panel so that the narrow end measures 50mm (2") up from the work surface.
- Again sand the joining ends of the inner and outer panels to produce a minimum gap and epoxy the outer panel in place. **Double check the 50mm (2") tip elevation** before allowing the epoxy to cure.
- Repeat this process for the opposite outer panel installation.



3. Fiberglass Reinforcement Tape

Your Sweet Vee kit supplies you with enough 18mm (3/4") wide fiberglass tape to reinforce all three wing panel joints. Follow the next steps carefully. Your Sweet Vee wing will go through some significant load changes during the boost phase of its flights; the wing joint integrity is very important.

- Carefully cut the fiberglass tape into one 381mm (15") and two 318mm (12 1/2") pieces. Start with the 381mm (15") piece of tape. Use it to reinforce the center wing joint.
- Position the tape along the bottom of wing over the center joint starting at the trailing edge as shown. Use a couple of drops of CA to attach the tape.
- Pull the tape over the leading edge and across the top of the wing and back to the trailing edge as shown. Be sure that the tape stays centered over the wing joint. Attach with a couple more drops of CA.
- Carefully flow thin CA into the weave of the tape. It will spread and adhere the tape uniformly to the surfaces of the wing. It is best to use CA accelerator to 'kick-off' the CA.
- Repeat this process for the inner to outer wing panel joints and trim excess tape at the trailing edge of each joint.

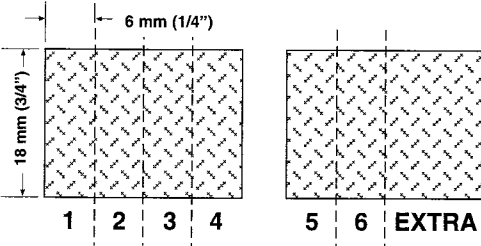


NOTE: Epoxy may be used for this procedure, however it is harder to control and weighs much more.

'V' TAIL ASSEMBLY

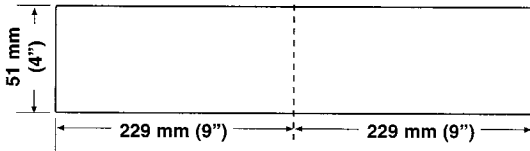
1. Hinge Preparation

- Locate the two 25 x 18mm (1"x 3/4") pieces of hinge material.
- Follow the diagram and cut six hinges, 6 x 18mm (1/4"x 3/4") each. Set them aside and go on to the next section.

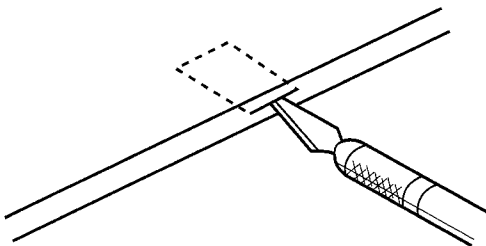


2. Cut and Shape the Tail Surfaces

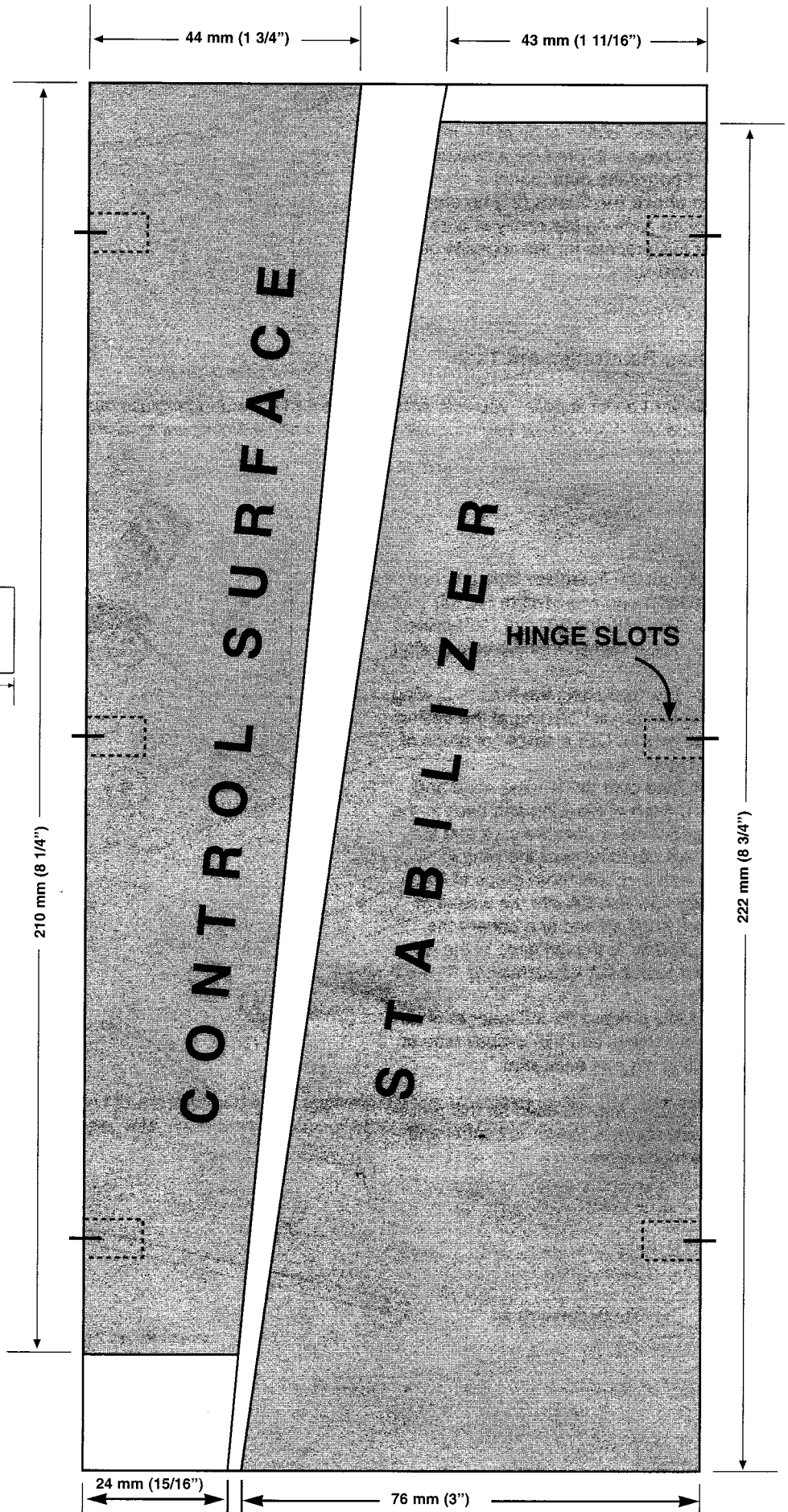
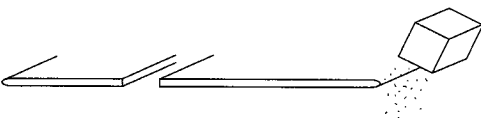
- Locate the 3 x 102 x 457mm (1/8"x 4"x 18") Balsa sheet. Begin by cutting the sheet in half as shown.



- Use the pattern diagram to plot out the stabilizer and the control surface (elevator/rudder) on each of the two pieces. Measure and mark the cut lines accurately. *The stability and control responsiveness depend on accurate surface area.*
- Mark and cut the hinge slots. **NOTE:** Hinge slot cutting tools are available from your hobby dealer, however, a hobby knife can be used. Work slowly and carefully. Use one of the hinges that you previously cut as a test piece to check the depth and placement of each slot. **DO NOT glue hinges in at this time.**



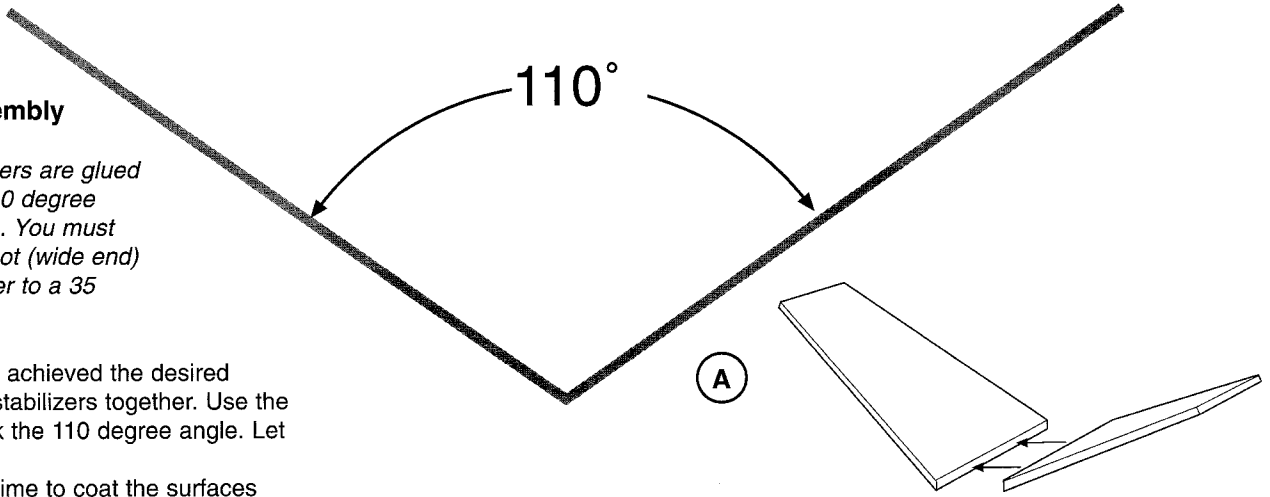
- Use a sanding block to shape the leading and trailing edges of all four pieces as shown.



3. Stabilizer Assembly

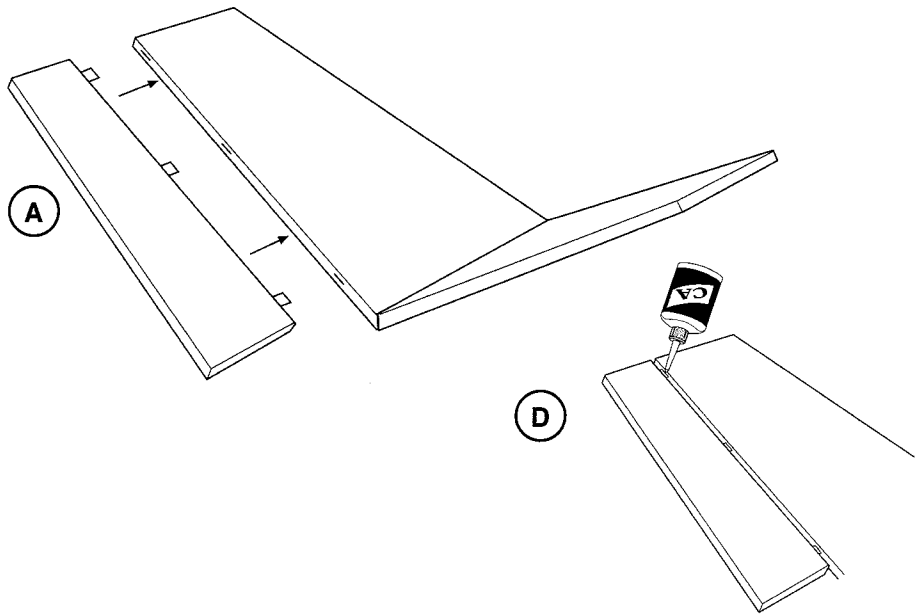
The two stabilizers are glued together at a 110 degree angle as shown. You must first sand the root (wide end) of each stabilizer to a 35 degree angle.

- A. When you have achieved the desired angle glue the stabilizers together. Use the pattern to check the 110 degree angle. Let dry.
- B. Now is a good time to coat the surfaces with sanding sealer. Sand between coats and allow to dry thoroughly. **NOTE:** If you plan to cover the tail with iron-on covering, do so now, but you must leave approximately 6mm (1/4") of the top surface of each stabilizer root bare. This will allow for a good glue joint between the stabilizer balsa and the fiberglass tail boom.



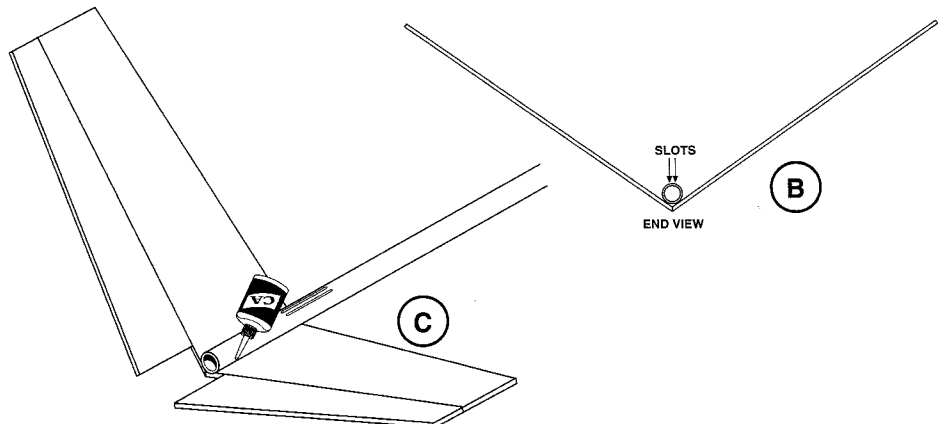
4. Control Surface Assembly

- A. Install the control surfaces by inserting the hinges into each of the slots (no glue yet).
- B. Align the hinge tabs with the slots in the stabilizers and push the control surfaces against the stabilizer so that the hinges are fully inserted.
- C. Flex the control surfaces up and down. This will create a gap between the stabilizer and control surface.
- D. Use **thin CA** type glue and apply two or three drops to each hinge at the gap between the stabilizer and control surface. The CA will 'wick' into the hinge slots and adhere the hinges to the balsa.



TAIL BOOM ASSEMBLY

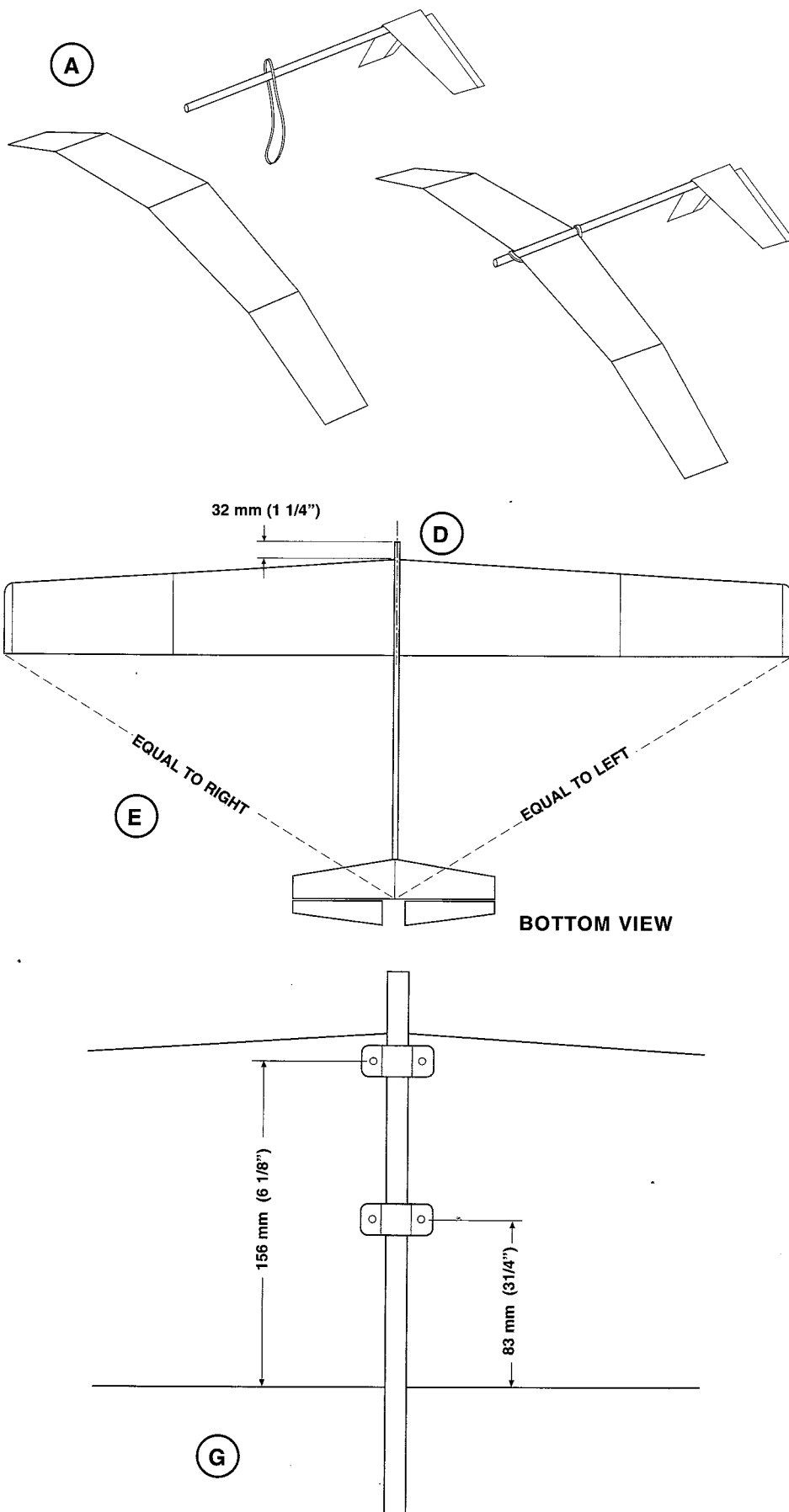
- A. Locate the fiberglass tail boom. Notice the two parallel slots about one inch long cut into one end. **The slotted end is the rear end of the boom.**
- B. Position the slotted end of the boom along the glue joint of the tail assembly as shown. Adjust it so that the end of the boom is flush to the rear edge of the stabilizers and so that the slots are positioned exactly between the stabilizers as shown. **NOTE:** The slot position is important so take your time.
- C. Use thin CA to adhere the boom to the 'V' tail. **TIP:** A better glue joint will be achieved if you rough sand the surface of the fiberglass boom where it makes contact with the tail surfaces. Also, once the thin CA has cured, go back and make a 'fillet' along the glue joint with thick CA.



JOINING THE WING AND TAIL BOOM ASSEMBLY

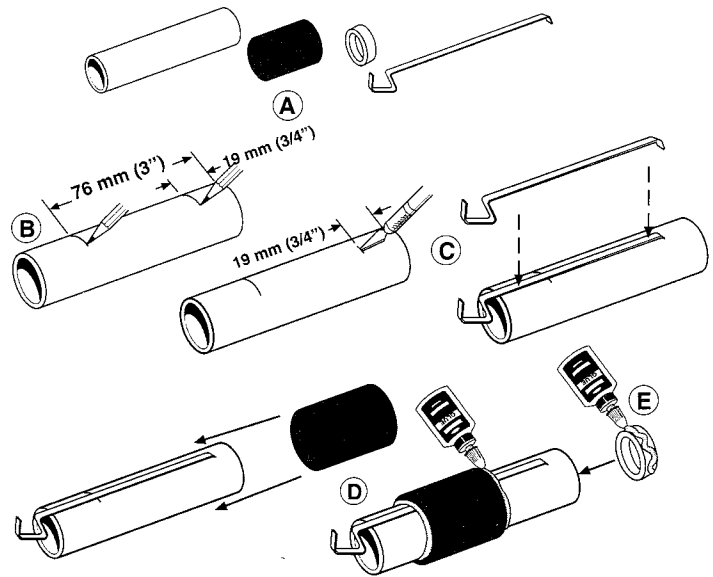
This section involves attaching the completed boom and tail assembly to the wing. Great care should be taken to align the components accurately. Measure precisely and apply glue only when you are sure that the measurements are correct.

- A. Obtain a large rubber band to assist you in this step. A # 64 band works best
- B. Position the boom through the rubber band as shown. Pull the band over the top surface of the wing and back over the end of the boom.
- C. Turn the entire assembly upside-down on a flat surface so that each wing tip and each 'V' tail tip make contact with the work surface. This will assist in a good wing-to-tail alignment.
- D. Position the boom directly over the center wing joint with 32 mm (1-1/4 inch) of the front end of the boom protruding ahead of the wing.
- E. Carefully measure from the wing tip rear corner to the rear edge of the tail boom. Compare each side. The measurement on the right must equal the measurement on the left to assure a square boom-to-wing relationship. If not adjust the boom until satisfactory measurements are achieved.
- F. When you are satisfied with the position of the components, use thin CA to adhere the boom to the wing. When the CA has cured use thick CA to reinforce the joint.
- G. Locate the two Nylon Boom Straps from the nylon parts set. Position and glue them as shown. CA or Epoxy can be used here. **TIP:** Rough sand the bottom of the strap tabs. This will help strengthen the glue joint. Allow the adhesive to fill the holes in the nylon strap tabs. This creates a 'rivet' effect that will hold much better.



ENGINE MOUNT ASSEMBLY

- Locate the 25 mm (1") diameter - 102 mm (4") long white paper engine mount tube, the green paper engine block ring, the black paper over-sleeve tube, and the metal engine hook.
- Mark the large tube as shown.
- Cut a 3 mm (1/8") wide slot at the 19 mm (3/4") mark. Insert the end of the engine hook as shown.
- Position the black over-sleeve tube as shown. Use white glue to adhere it in place.
- Glue the green engine block ring into the end of the engine mount tube as shown. Install it against the end of the engine hook. Set aside to dry.

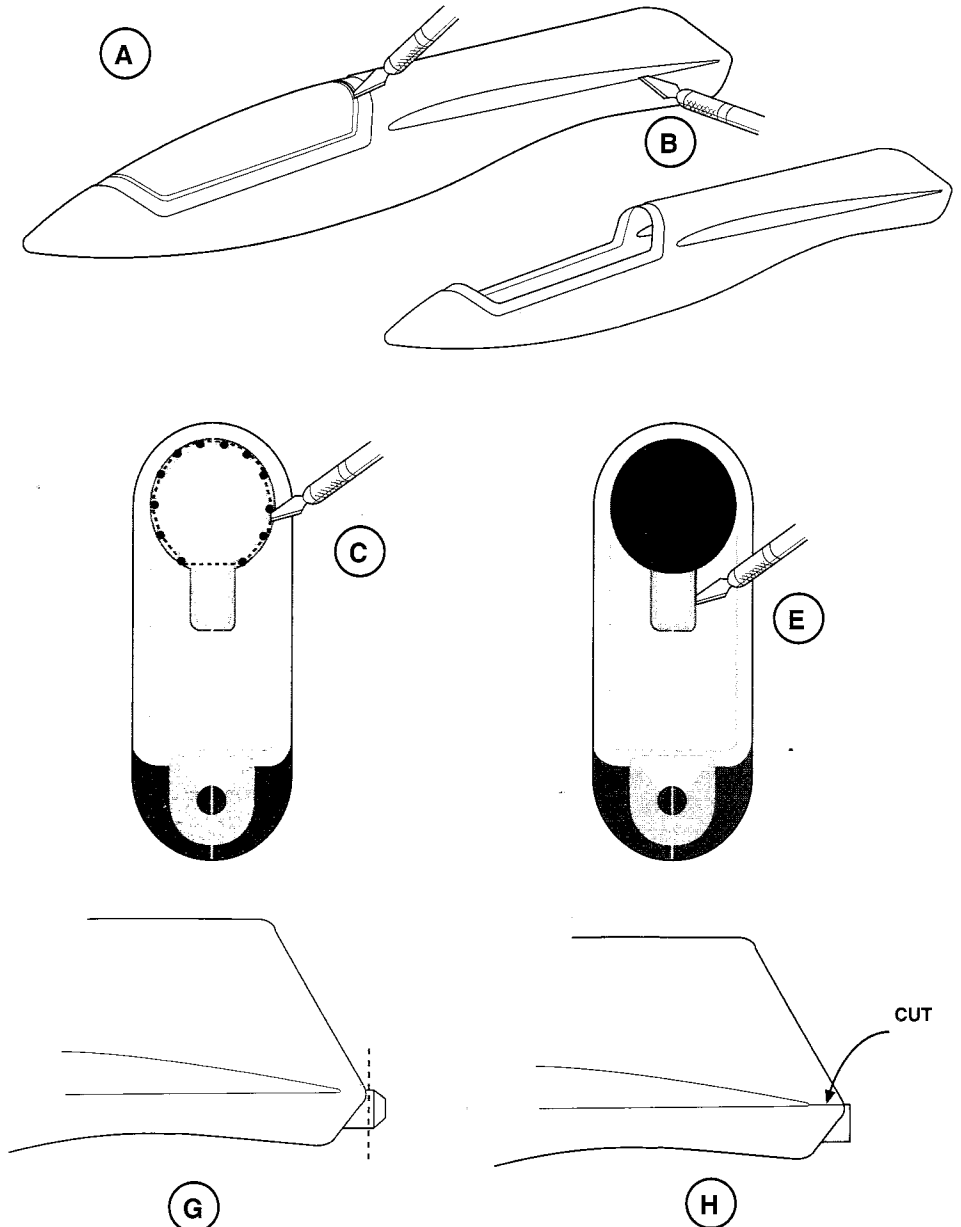


FUSELAGE PREPARATION

Your Sweet Vee kit comes with a high impact molded styrene fuselage. You must make several cuts to remove certain areas of the fuselage. Follow the next steps carefully to prepare and install the fuselage.

Note: Remove molding seam line by scraping with a razor blade or hobby knife.

- Begin by cutting open the canopy area. Use a hobby knife and make repeated score cuts between the double guide lines as shown. **NOTE:** A dull knife blade actually works best here. DO NOT attempt to cut through in one cut. As you make repeated cuts you will eventually break through. You can then flex the part you are removing and it will tear free along the score cuts. Also, you may use a fine razor saw to complete the cuts once you have broken through the surface.
- Next, cut the wing slots open. Use the same procedure. Repeat score cuts until you break through.
- Now, cut the rocket engine mount hole. The best procedure here is to drill a series of 3mm (1/8") holes as shown. Use your hobby knife and cut from hole-to-hole to remove the center.
- Sand the hole to shape. **NOTE:** Make a sanding tool by wrapping some sandpaper around a short length of 18mm (3/4") diameter dowel.
- Now cut the engine hook slot as shown.
- Use the engine mount assembly as a gauge to check the engine mount hole. It should slide freely into the completed hole when held parallel to the fuselage top surface from the inside.
- Use a fine razor saw and cut the end off the tail boom channel as shown.
- Finally, make a cut with a fine razor saw from the end of each wing slot through the top of the boom channel as shown. This opens up the back of the fuselage so that you can insert the wing and boom assembly.

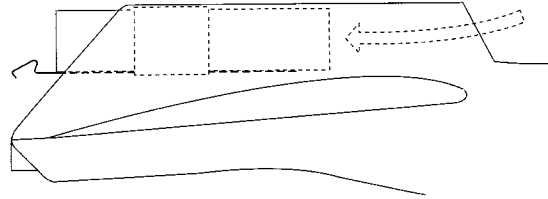


ENGINE MOUNT INSTALLATION

- A. Position the engine mount assembly as shown and glue it in place with thick CA glue. First, rough sand the inside of the fuselage in the engine mount contact area. Carefully align the mount so that it is parallel and centered in the fuselage, and extends out the back as shown.

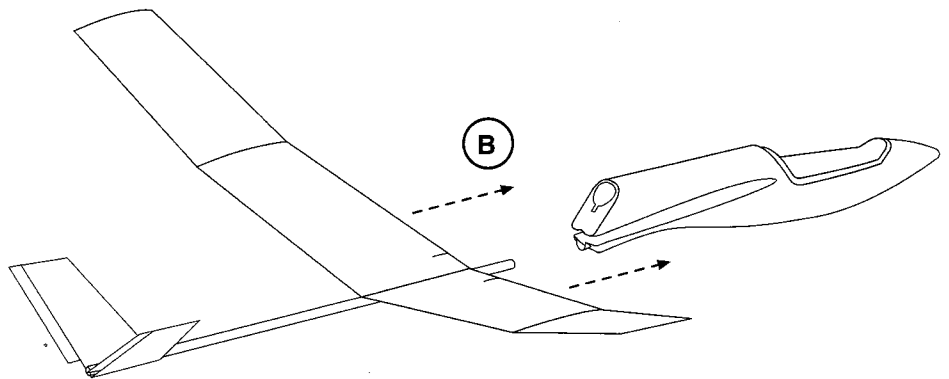
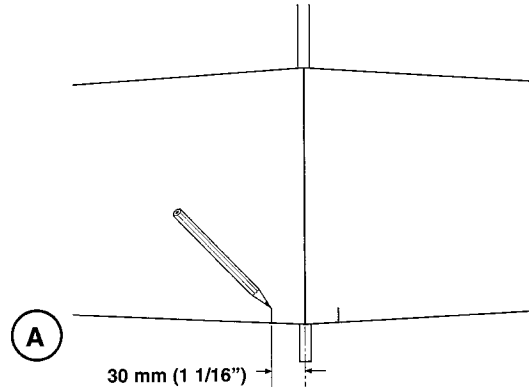
Note: This glue joint is critical. Be sure to use ample glue to insure a **very strong joint**.

19 mm (3/4")



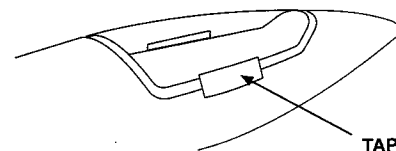
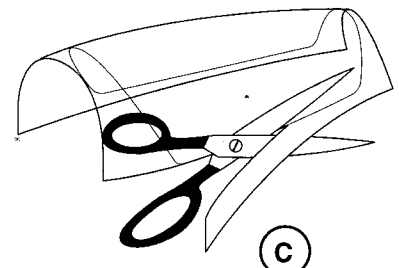
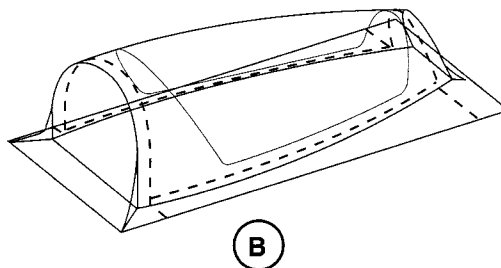
FUSELAGE INSTALLATION

- A. Place marks 27mm (1-1/16") on each side of the center wing joint as shown.
- B. Gently pull the back of the fuselage open and slip it over the wing and boom assembly as shown. BE CAREFUL; do not over stress the plastic fuselage.
- C. Align the fuselage sides with the pencil marks. In this position the fuselage should be able to close over the wing and boom. Some minor adjustments may need to be made to the wing opening in order to achieve the best fit. Work slowly and make small adjustments.
- D. Once you are happy with the fuselage-to-wing and boom fit, use thin CA glue to bond the fuselage to the wing. Double check alignment before gluing.
- E. Use epoxy, thick CA, or filler compound to create a smooth fillet between the wing and fuselage.



CANOPY PREPARATION

- A. Locate the vacuum-formed Sweet Vee canopy. It must be trimmed to fit the fuselage opening. Medium size sharp scissors work best.
- B. Cut the closed ends and the flanges from the canopy. This makes the canopy more flexible and easier to handle.
- C. Note the cut line impression around the canopy. Use scissors and carefully cut to the OUTSIDE of this line.
- D. Test fit the canopy to the fuselage. Make the required adjustments with careful scissor cuts or with a sanding block. The canopy should fit inside the lip around the opening in the fuselage.



TAPE DURING FLIGHT

NOTE: We recommend the use of *Magic Mending* tape to hold your canopy on during flight. It's very light and nearly invisible, as well as easy to replace. One piece along the bottom edge of each side works well.

FINISHING

Except for radio system and control linkage installation, your model is completed. Now is a good time to apply finish to your Sweet Vee wing and fuselage.

1. Finishing the Wings

- A. If you follow our recommendations and plan to use sanding sealer to finish the wings, do the following. Apply the sanding sealer with a soft brush. Apply two coats. Sand between coats with fine sand paper.

WARNING: DO NOT use sanding sealer if you have bonded your wing skins with any adhesive other than epoxy.

- B. If you use iron-on model aircraft covering, use the LOW -TEMPERATURE variety only. Follow the manufacturer's application instructions.

2. Finishing the Fuselage

- A. If you paint your fuselage, we suggest that you mask off the wings about 6mm (1/4") from the fuselage. This allows you to paint the fillet between the wing and fuselage.

WARNING: DO NOT use lacquer type paint as it may damage the plastic.

RADIO SYSTEM INSTALLATION

1. Servos

Your Sweet Vee requires the installation of Micro, Mini, or Mid-Sized Servos. Our prototype used the Futaba S-133 servos. The following is a list of some of the servos that should work in your Sweet Vee:

ACE	COX HOBBIES	HI-TEC	FUTABA	AIRTRONICS	JR
Micro 380	80111	HS-80 or 80MG	FP-S5202	94407	Micro341
Micro 310		HS-101 or 101MG	FP-S3002	94501	Mini 321, 3021, or 3025
Pro 342HS or 342		HS-205BB or 205MG	FP-S133		Mid 901 or 9021
Sport 330S					

Other brands may work as well. You will need to compare sizes and torque rating.

2. Receiver and Battery

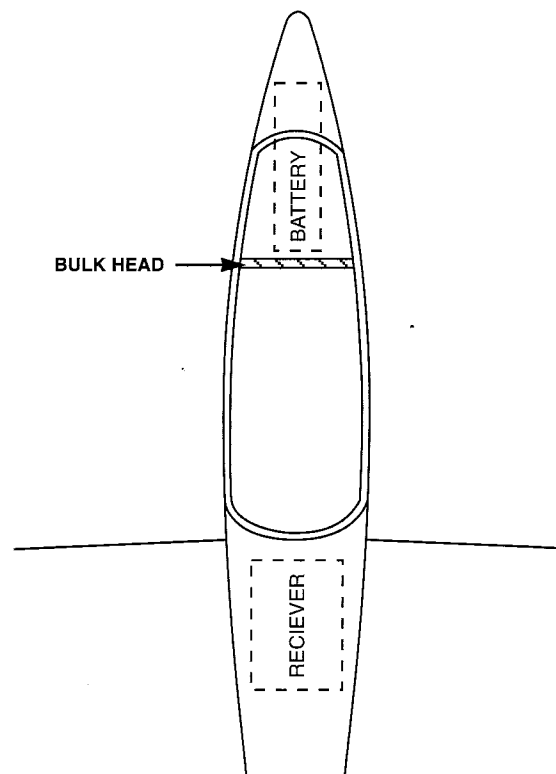
The Sweet Vee requires the use of a small receiver and battery pack. The prototype airplanes used the Futaba FP-R114H **Receiver** which measures approximately **33mm (1.3") wide, 48mm (1.9") long, and 20mm (.8") thick** and the NR-4K Nicad **Battery Pack** which measures approximately **32mm (1.3") wide, 57mm (2.25") long, and 15mm (.6") thick**. Systems with similar size components or smaller will work well.

- A. Place the Receiver and Battery Pack in the positions indicated. Run all connecting wires so that they do not interfere with the smooth operation of the mechanical mixer. **A scrap wood bulkhead must be installed behind the battery** so that it can not slide back. Be sure that the bulkhead does not interfere with the proper operation of the mixer (see mixer assembly).
- B. We recommend that you mount your receiver switch so that it can be operated from the outside and so that **ON is back** towards the rear of your Sweet Vee.
- C. The Receiver antenna can trail behind the model, although you run the risk of burning it in the rocket exhaust. Try running it down the inside of the fiberglass boom (this boom contains NO carbon fiber).

TIP: Ask your hobby dealer about the DEANS CORP. Mini Antenna # G-72 . It is a short replacement antenna that can be placed inside the fuselage. It worked great on our prototypes.

The Sweet Vee requires control mixing because of its 'V' tail configuration, i.e. the moving surfaces on the tail are both elevators and rudders. Your Sweet Vee kit comes with a mechanical mixer which allows you to use a simple two channel radio system without computerized mixing.

You may, however, use a computer radio if you wish. Follow these instructions.



COMPUTER RADIO INSTALLATION (Optional)

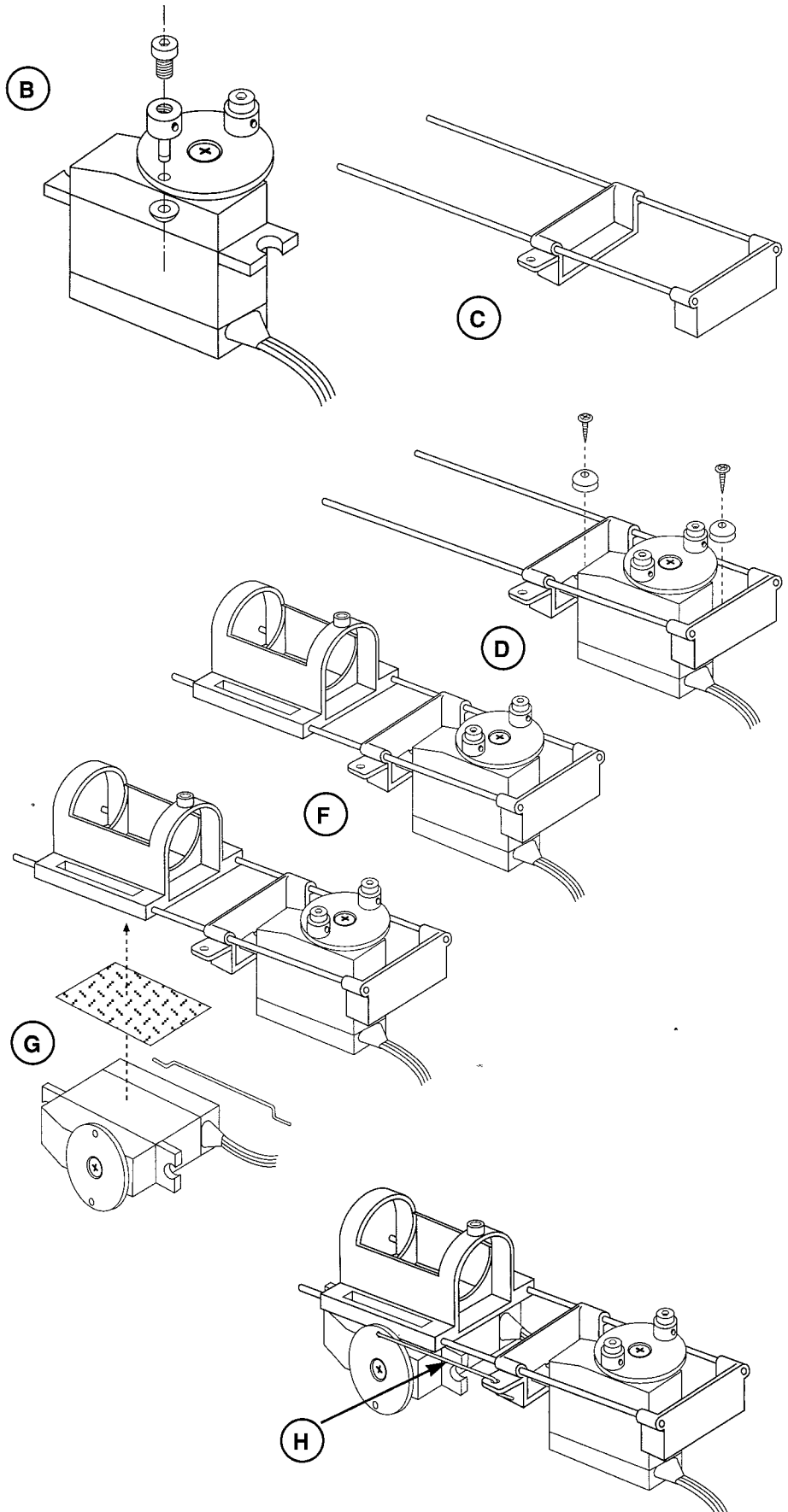
- A. If you chose to install a computer radio system, mount the two required servos side by side and hook up one control surface to each as described in the CONTROL LINKAGE section of this instruction. No servo mounting hardware is provided for this type of installation.
- B. Follow the radio manufacturer's instructions for the programming and operation of the "V" tail mix set-up.

SWEET VEE MECHANICAL MIXER

The mixer in your Sweet Vee allows one servo to move the other. This produces both elevator and rudder functions from the same two control surfaces of the 'V' tail.

1. Mixer Assembly

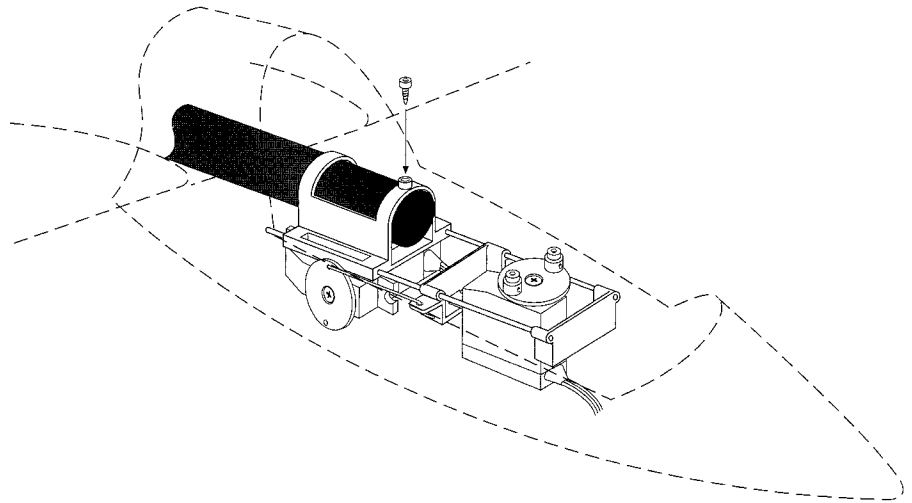
- A. Locate the following parts needed to assemble the mixer: Nylon servo mounts, nylon mixer base, the two 3mm (1/8") x 102mm (4") steel rails, double sided sponge tape, the 25mm (1") long 'Z'-bend link, the no.2 x 9mm (3/8") long set screw, and the two E-Z Connectors w/ set screws and retainers.
- B. Install the E-Z Connectors to a small output wheel or short double output arm on one of your servos as shown. This will be the rudder (turn command) servo.
- C. Position the nylon servo mounts on the steel rails as shown. *These parts fit snugly on the 3mm (1/8") wire. Use care during installation and adjustment.*
- D. Position the servo as shown. Drill the appropriate mounting holes in the nylon parts and use the servo mounting grommets and screws supplied by the radio system manufacturer.
- E. Use a drop of thin CA to seize the nylon mounts to the rails. **NOTE:** The nylon mount on the end is flush to the rail ends.
- F. Position the mount and rail assembly into the nylon mixer base as shown. The assembly should slide freely back and forth in the mixer base, **DO NOT GLUE.**
- G. Position the elevator (up and down) servo as shown. Use a small output wheel or short output arm on the servo.
- H. Install the z-bend link as shown and mount the servo with the piece of double sided tape provided.
TIP: Use great care to align the z-bend link to provide smooth and friction-free operation.



2. Mixer Installation

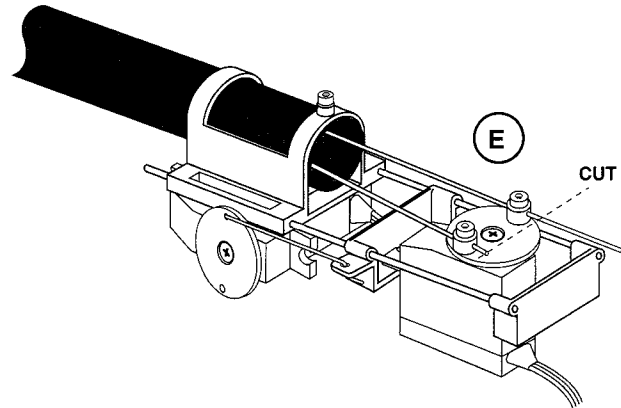
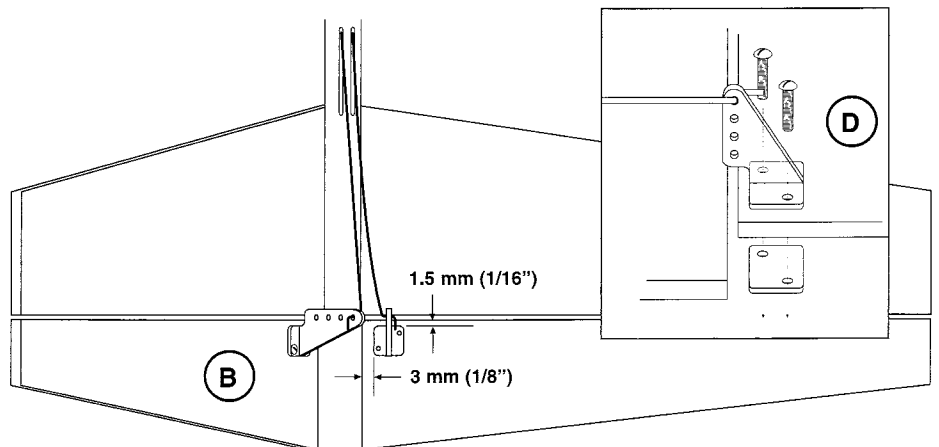
- Install the whole assembly over the end of the boom shaft inside the Sweet Vee fuselage as shown.
- Run a 1.5mm (1/16") drill through the hole in the mixer base and drill a corresponding hole in the boom shaft.
- Screw the no.2 x 9mm (3/8") long set screw into place as shown.

Note: Depending on the size of the servos that you use, you may need to "shim" the rudder servo up slightly to provide clearance between the servo and the bottom of the fuselage



3. Control Linkage

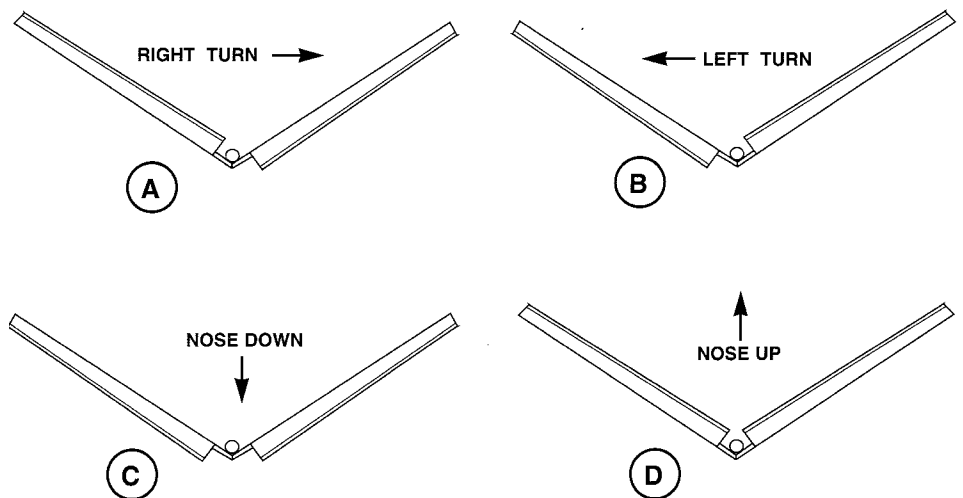
- Locate the 763mm (30") long Z-Bend wire push rods and the two Nylon Control horns with mounting screws.
- Position the nylon control horns as shown, one on the upper face of each control surface. Drill the holes for the mounting screws.
- Insert the push rod ends into the slots in the tail boom so that the right side rod goes through the boom and into the right E-Z Connector at the mixer. The left rod goes through the boom and into the left E-Z Connector.
- Insert the Z-Bend end of the push rod into the top hole of the nylon control horn as shown. Position the horns over the holes and install the mounting screws.
- With control surfaces in the neutral position and the servos in the neutral position, you can trim the push rod ends 12mm (1/2") forward of the E-Z Connectors at the mixer.



4. Control Movement Check

For this test, position yourself at the rear of the Sweet Vee looking forward.

- When you move the control stick on your transmitter to the right, **both** control surfaces on the tail should move towards the right about 6mm (1/4").
- When the stick is moved left, both surfaces should move left about 6mm (1/4").
- When the stick is moved forward (towards the top of the transmitter), **both** surfaces should move down about 6mm (1/4").
- When the stick is pulled back, **both** the surfaces should move up about 6mm (1/4").
- When the stick is moved to the corners, combinations of control surface movements are seen.



NOTE: RANGE TEST your radio system before test gliding. Use the manufacturer's suggested method.

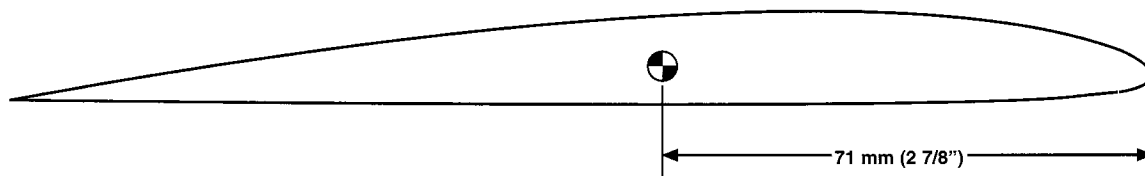
BALANCE AND TEST GLIDE

Depending on your choice of radio system and the type of finish you used, your Sweet Vee may require the addition of some extra weight in the nose or tail in order to balance it for flight. Lead shot mixed with epoxy works best. Our prototypes required no additional weight and flew at 482g (17 oz.)

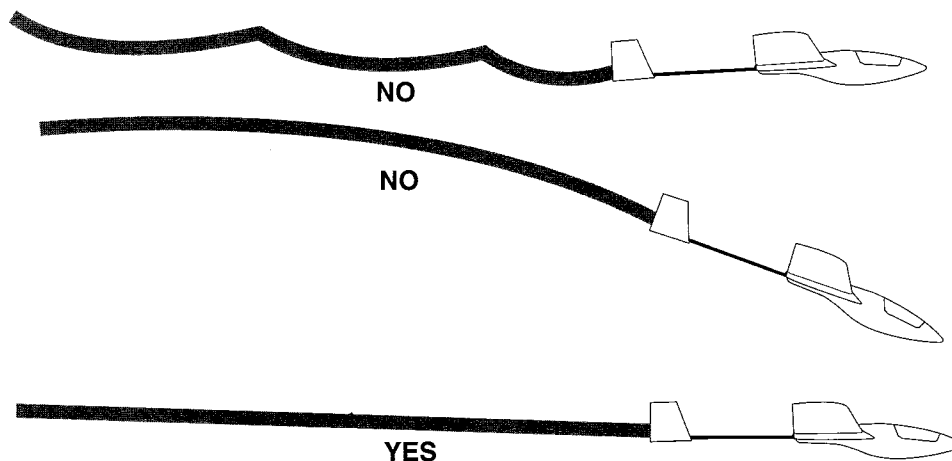
1. Center of Gravity

Balance your model with a spent rocket engine in place if possible. Otherwise, use 21 grams (3/4 oz.) of weight placed inside the engine mount tube during the balancing process.

- The best Center of Gravity location for the Sweet Vee is between 71mm (2-7/8") and 76mm (3") behind the leading edge of the wing where it exits the fuselage.
- Start at about 70mm (2-3/4") back to test glide and then move it to 71mm (2-7/8") and then to 76mm (3") as you become accustomed to the Sweet Vee's flight characteristics.
- Flat and level 'hands-off' glides should have neutral positioned control surfaces.



2. Test Glide



- Pick a large wide open area, preferably with tall grass for the first landing or two.
- In light or no wind conditions, with the radio system ON and functioning, and controls set at neutral, give your Sweet Vee a **brisk** throw in a flat level attitude.
- A well-balanced Sweet Vee should fly straight and level for 150 to 250 feet, with only minor corrections to hold straight and level flight.
- Make several test glides to ensure that your Sweet Vee is set up correctly and to familiarize yourself with the way it handles.

YOU'RE READY TO ROCKET LAUNCH !

LAUNCH PAD and IGNITION DEVICE

The center two pages of this instruction book contain a drawing of a simple, but efficient, launch pad suitable for your Sweet Vee. Built from hardware store components, this design proved to work well and cost very little to build (about \$8). The important dimensions are called out on the drawing and we believe that the rest is self explanatory.

We recommend the use of any of the following ESTES launch controllers:

- Command Controller p/n 2234
- E2 Launch Controller p/n 2236
- Electron Beam controller p/n 2220

LAUNCH SET-UP

For Your Safety And Enjoyment

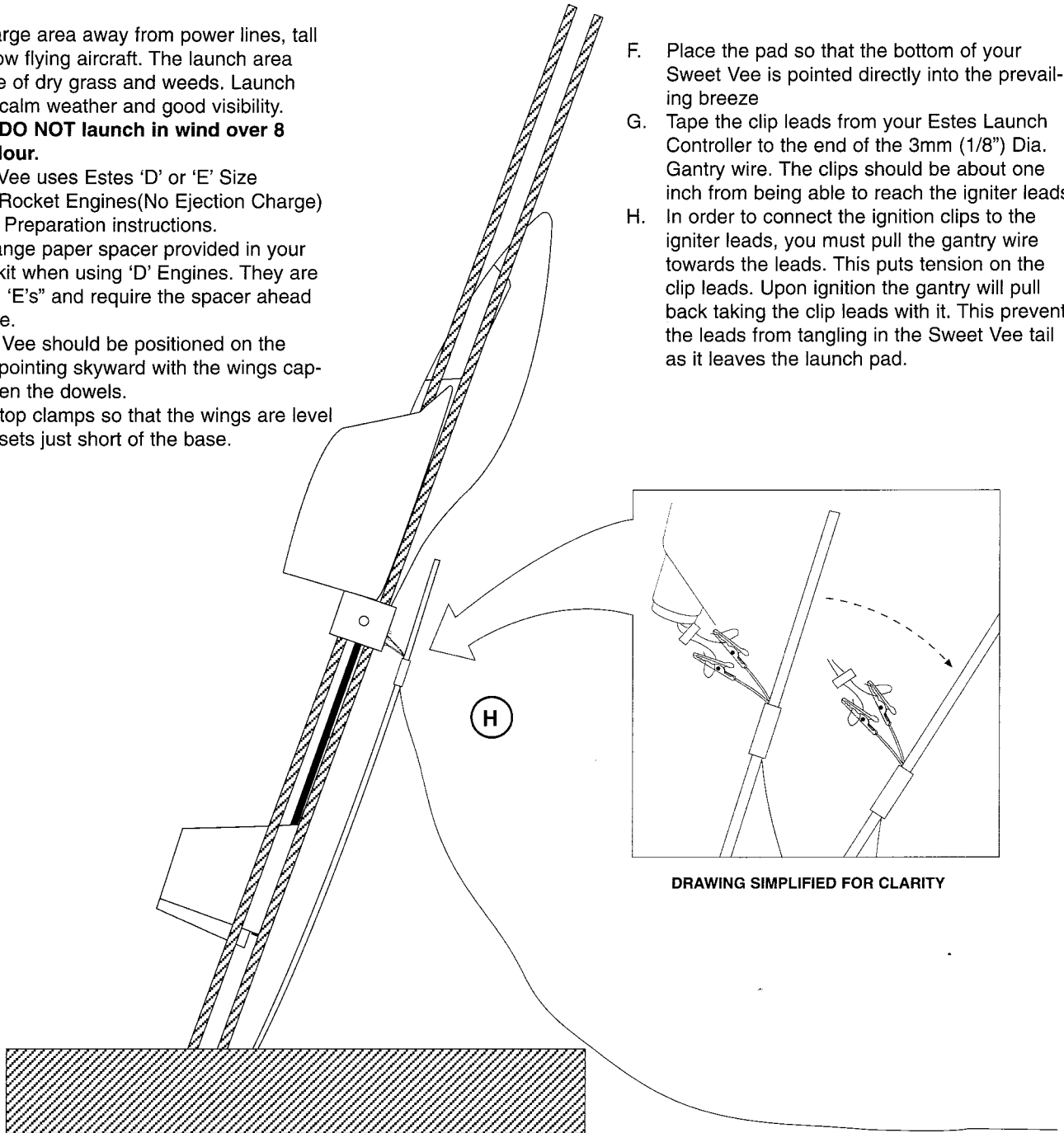
Familiarize yourself and follow the NAR* Model Rocketry Safety Code as well as the AMA* Safety Codes while operating your Sweet Vee model.

*National Association of Rocketry

*Academy of Model Aeronautics

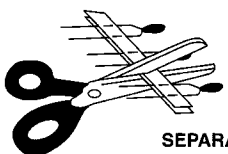
- A. Choose a large area away from power lines, tall grass and low flying aircraft. The launch area must be free of dry grass and weeds. Launch only during calm weather and good visibility.
CAUTION: DO NOT launch in wind over 8 Miles Per Hour.
- B. The Sweet Vee uses Estes 'D' or 'E' Size PLUGGED Rocket Engines (No Ejection Charge) See Engine Preparation instructions.
- C. Use the Orange paper spacer provided in your Sweet Vee kit when using 'D' Engines. They are shorter than 'E's' and require the spacer ahead of the engine.
- D. Your Sweet Vee should be positioned on the launch pad pointing skyward with the wings captured between the dowels.
- E. Adjust the stop clamps so that the wings are level and the tail sets just short of the base.

- F. Place the pad so that the bottom of your Sweet Vee is pointed directly into the prevailing breeze
- G. Tape the clip leads from your Estes Launch Controller to the end of the 3mm (1/8") Dia. Gantry wire. The clips should be about one inch from being able to reach the igniter leads.
- H. In order to connect the ignition clips to the igniter leads, you must pull the gantry wire towards the leads. This puts tension on the clip leads. Upon ignition the gantry will pull back taking the clip leads with it. This prevents the leads from tangling in the Sweet Vee tail as it leaves the launch pad.



PREPARE ENGINE

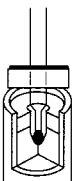
Note: Igniter plugs come with rocket engines. If your engines did not come with plugs, follow the instructions that came with the engines.



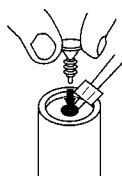
SEPARATE THE IGNITER AND PLUG



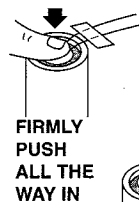
HOLD ENGINE UPRIGHT, DROP IN IGNITER



IGNITER MUST TOUCH PROPELLANT



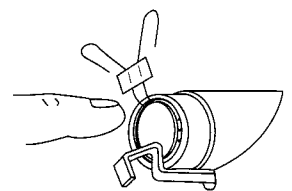
INSERT IGNITER PLUG



FIRMLY PUSH ALL THE WAY IN



BEND IGNITER WIRES BACK



INSERT ENGINE INTO ROCKET

COUNTDOWN AND LAUNCH

- A. Make sure spectators are well clear of the launch pad.
- B. You and any assistants should be at least 15 feet from the launch pad. Position yourself so that the sun is at your back if possible.
- C. Insert the safety key into your Estes launch controller to arm it.
- D. Give an audible countdown 5..4..3..2..1
- E. **LAUNCH!!** push and hold the launch button until the engine ignites. At this time your assistant should remove the safety key from the launch controller.
- F. As your Sweet Vee streaks skyward avoid large control movements. Make only those control inputs required to keep Sweet Vee on a smooth straight trajectory. You will gain more control with every launch.

MISFIRES

If the igniter functions properly but the propellant fails to ignite, keep in mind the following:

The coated tip of the igniter **MUST** be in direct contact with the propellant. So, carefully install the igniter as deeply as possible to insure proper ignition.

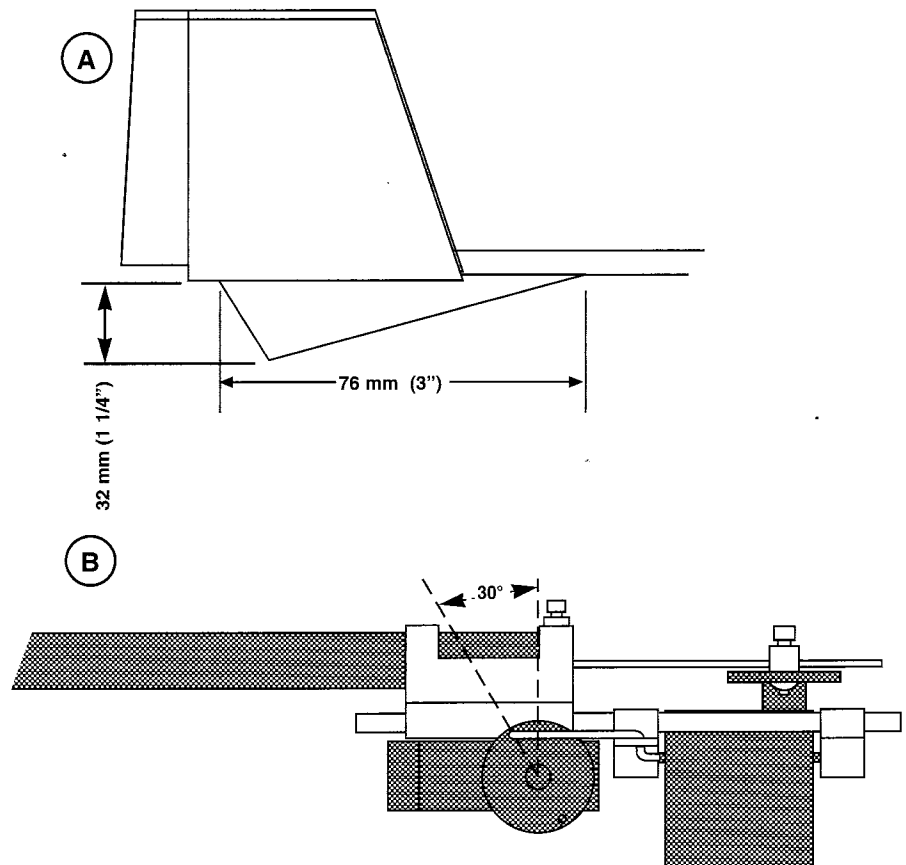
WHAT TO EXPECT

- A. Rocket boosting might very well be the most exciting way to launch an R/C aircraft yet ! It will take two or three launches for you to feel totally confident. Your Sweet Vee when properly built and balanced should climb to about 175 feet on a 'D' Engine boost and approximately 300 feet or better on an 'E' Engine.
- B. Small control inputs may be required during the boost. A well trimmed model should not need major stick movements, however, be prepared.
- C. When your model reaches the top of the boost trajectory and has finished coasting up, gently push the stick forward and **you're soaring !**
- D. The Sweet Vee is a very responsive highly efficient sail plane. It can stay aloft in good thermal activity for as long as your receiver batteries and flying skills will allow. During the hundreds of prototype flights made during development of the Sweet Vee many flights lasted 30 minutes and longer. Several exceeded one hour.

MODIFICATIONS

Although Sweet Vee flies GREAT as is, everyone has different preferences. Here are some things that we discovered that may enhance the way your Sweet Vee flies.

- A. If your model displays some 'Dutch roll' or 'fish tailing' as you roll out of medium and high speed turns, add a Sub Fin as shown.
- B. Some test pilots preferred some elevator differential. If you are not using a computer radio, simply adjust the 'fixed' servo output arm so that neutral is facing back 30 degrees as shown. This will provide less down elevator than up, and make high speed runs less elevator sensitive. If you're using a computer radio simply adjust the elevator throw. Two-to-one seems to work best.



ENJOY YOUR SWEET V FROM ESTES INDUSTRIES!