

# HOBIBICO

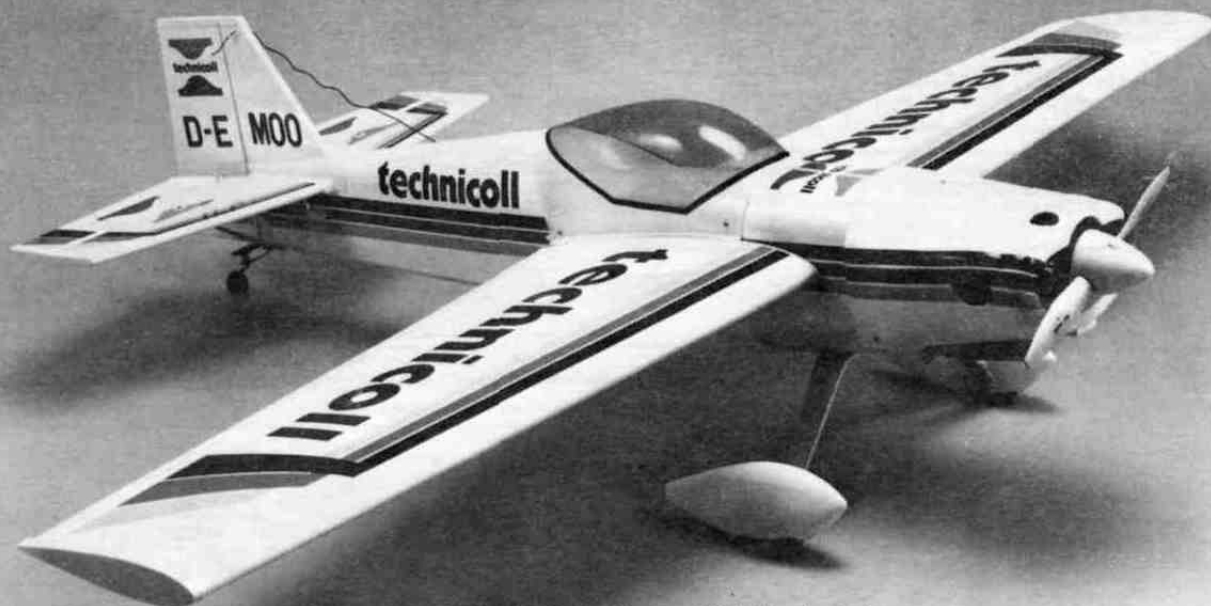
# ASAP™ SERIES

# Diabolo 40

**ALMOST READY-TO-FLY RADIO CONTROLLED MODEL AIRPLANE**

- **SUPERIOR QUALITY IN AN ALMOST-READY-TO-FLY MODEL**
  - **SPECIAL COVERING PROCESS YIELDS A STRONG, BRILLIANT, AND FUEL-PROOF FINISH**
- **90% COMPLETE OUT OF THE BOX—NO SANDING, PAINTING, OR FINISHING REQUIRED**
- **SMOOTH, STEADY FLIGHT CHARACTERISTICS, JUST LIKE A REAL PLANE**
  - **CAPABLE OF FULL 4-CHANNEL AEROBATICS**

WINGSPAN: 55 $\frac{3}{4}$ "  
LENGTH: 44 $\frac{1}{2}$ "  
WING AREA: 543 sq. in.  
WEIGHT: 91-95 oz.



RADIO: 4-Channel (Not Included)  
ENGINE: 40-45 Two Stroke (Not Included)  
or 60-70 Four Stroke (Not Included)  
ACCESSORIES: Starting Battery w/Clip, Fuel Etc. (Not Included)

## IMPORTANT: BEFORE YOU BEGIN.

Congratulations on your choice of an ASAP kit **BEFORE** you begin assembly, carefully look through the box and thoroughly read the instruction manual Also check the parts list against the items in the box to be sure you have everything that is on the parts list Although we have taken great pains to simplify the building process, there are no shortcuts to safety These instructions are your guide to safe and successful flying

Only after you are thoroughly familiar with the construction process should you proceed with assembly **REMEMBER! Under no circumstances will a dealer accept a kit back for return if assembly has already begun.**

If the Diabolo 40 is not quite what you expected, return it to your dealer in **NEW** and **UNUSED** condition However, we think you will agree with us that the Diabolo 40 is one of the finest models of its type and will offer you many hours of enjoyment

## BEFORE ASSEMBLY

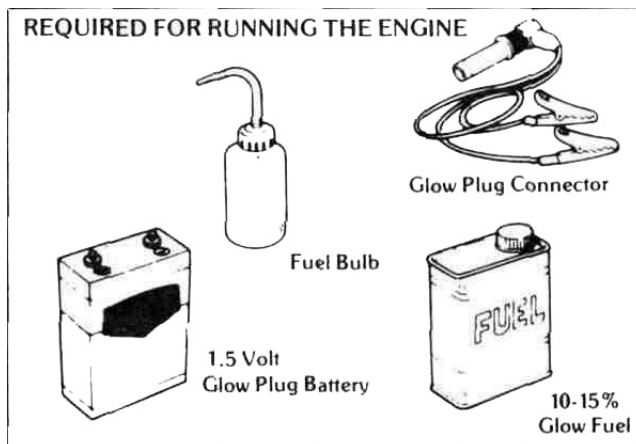
### CONSTRUCTION HINTS:

- (1) Trial fit each part before gluing Be certain that the parts fit properly
- (2) Use PlastiZap or a thin type Cyanoacrylate glue for installing the plastic parts Do not use too much as it may run and spoil the appearance Do not get Cyanoacrylate on the foam parts of the Diabolo Cyanoacrylate will destroy the foam
- (3) It is best to use 30 minute epoxy where required This allows time to position the parts before the epoxy cures
- (4) Before assembly, place your radio system on charge

### ADDITIONAL ITEMS

The following items are needed for completing the Diabolo 40 kit

Medium Fuel Tubing (12 ")	(1)
40 45 Sized 2 Stroke	(1)
or	
60 70 Sized 4 Stroke	(1)
4 Channel Radio System	(1)
Pacer PlastiZap CA Glue	(1)
Screw Locking Compound (Pacer Zap Lock)	(1)
Goldberg #481 Foam Rubber	(1)
30 Minute Epoxy	(1)
Silicone Sealer	(1)
Dubro 121 E Z Connects (Optional)	(2)
Dubro 203 Kwik Switch Mount (Optional)	(1)



Most engines require a 1.5V glow plug starting battery a glow plug clip and a quality brand fuel (consult the engine manufacturer's recommendations)

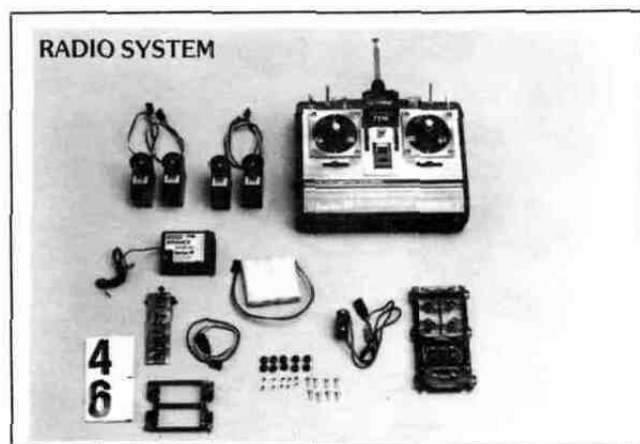


A quality brand engine will be needed We recommend the OS 40 FP or 40 SF 2 stroke engine A prop and fuel tubing will be required for the engine



### TOOLS —

You will need the following tools to assemble the Diabolo 40 X Acto knife, Phillips screwdriver (small and medium) needle nose pliers drill drill bits sand paper and ruler

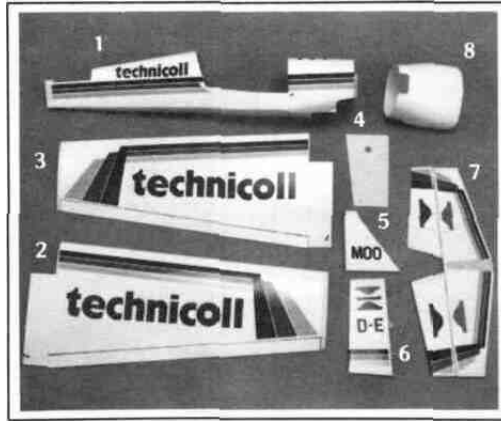


A four channel radio control system with 4 servos is required for the Diabolo 40 The various components are pictured above

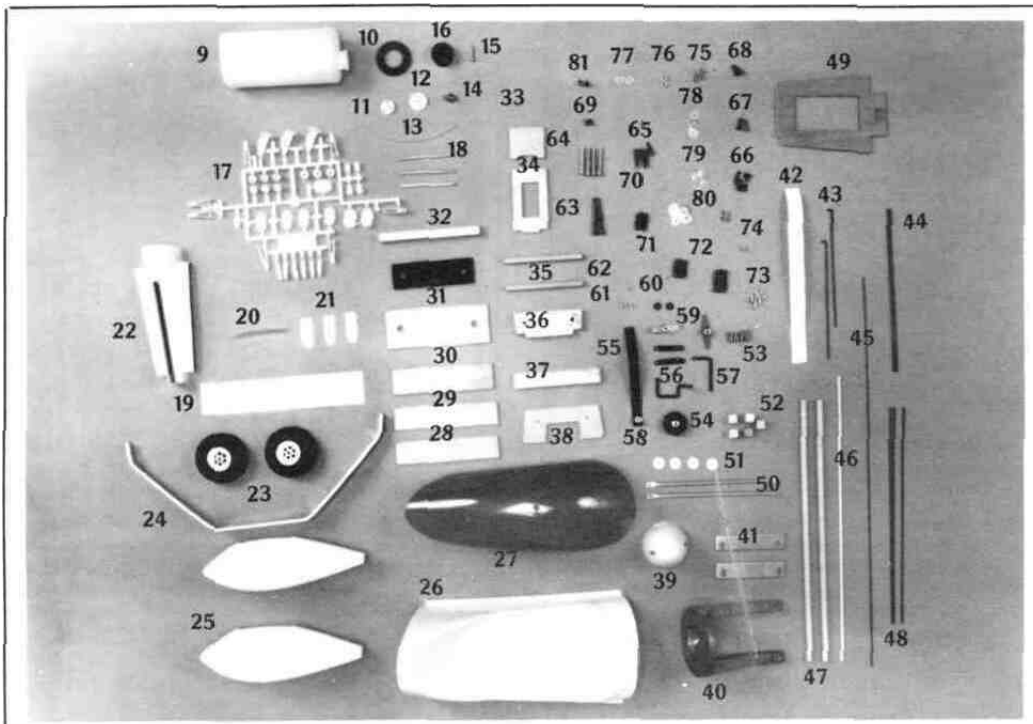
# PARTSLIST

Before assembly match the parts in the exploded view of the Diabolo with the parts in the kit. Check off each part on the parts list. If any parts are missing or damaged return the kit to your hobby dealer.

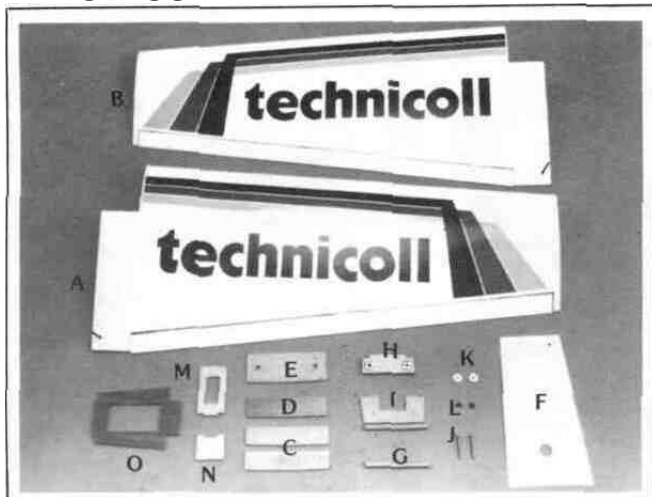
Check to make sure that **all the listed** parts are included in your kit.



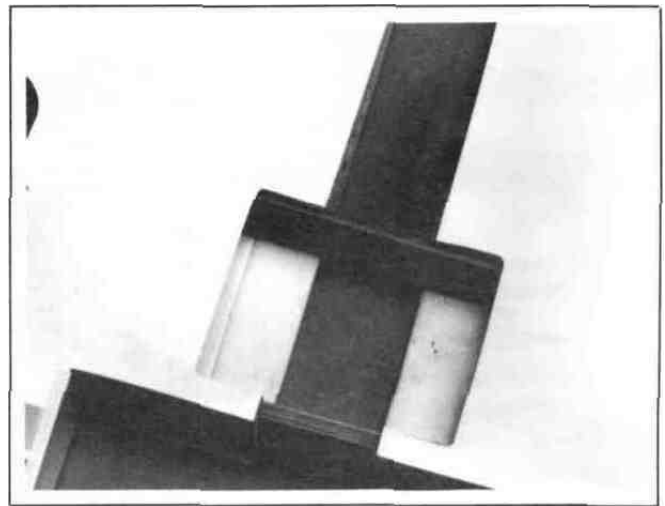
- |    |                               |    |                              |    |                           |
|----|-------------------------------|----|------------------------------|----|---------------------------|
| 1  | Fuselage                      | 25 | WheelPants                   | 48 | Control Rod (Long)        |
| 2  | Right Wing                    | 26 | Cock Pit                     | 49 | Main Servo Tray           |
| 3  | <b>Left</b> Wing              | 27 | Canopy                       | 50 | Stabilizer Supports       |
| 4  | Wing Center Cover (Plastic)   | 28 | Main Wing Joiner             | 51 | Plastic Disc              |
| 5  | Vertical Fin                  | 29 | Rear Wing Joiner             | 52 | Cock Pit Mounts           |
| 6  | Rudder                        | 30 | Front Wing Joiner            | 53 | Brass Sleeve              |
| 7  | Horizontal Stabilizer (Stab.) | 31 | Rubber Shock Absorber        |    | Brass Tube                |
| 8  | Cowl                          | 32 | Cowl Brace                   | 54 | Tail Wheel                |
| 9  | Fuel Tank                     | 33 | Aileron Servo Tray Mount     | 55 | Spring Steel Strip        |
| 10 | Neoprene Ring                 | 34 | Aileron Servo Tray           | 56 | Tail Gear                 |
| 11 | Plastic Disc (Small)          | 35 | 8mm Dowel Rod                | 57 | Tail Control Arm          |
| 12 | Plastic Disc (Large)          | 36 | Wing Bolt Mounting Block     | 58 | Springs                   |
| 13 | Silicone Tubing               | 37 | Balsa Tank Support           | 59 | Brass Arms                |
| 14 | Clunk                         | 38 | Wing Mounting Brace          | 60 | O-Ring                    |
| 15 | 3x18mm Self Tapping Screw     | 39 | 3x12mm Self Tapping Screw    | 61 | Collars                   |
| 16 | Rubber Plug                   |    | Spinner                      | 62 | Wheel Collar              |
| 17 | Plastic Collar                |    | Spinner Back Plate           | 63 | 4x40mm Screw              |
|    | Aileron Horn                  | 40 | Engine Mount                 | 64 | 4x30mm Screw              |
|    | Control Horns                 | 41 | Mounting Plates              | 65 | 2x15mm Screws             |
|    | Snap Clevis                   | 42 | Shrink Tubing                | 66 | 3x8mm Self Tapping Screw  |
|    | Rod Clevis                    | 43 | Control Rod (Short-Bent)     | 67 | 3x8mm Screw               |
|    | Back Plates                   | 44 | Aileron Control Rods (Short) | 68 | 3x12mm Self-Tapping Screw |
| 18 | Fuel Pipe                     | 45 | Throttle Control Rod (Long)  | 69 | 3x5mm Screw               |
| 19 | Mounting Plates (Angled)      | 46 | Throttle Tube                | 70 | 3.5x15mm Screw            |
|    | Mounting Plates (Rectangle)   | 47 | Wood Push Rods               |    | 3x12mm Screw              |
| 20 | Clevis Retaining Tube         |    |                              | 71 | 4x15mm Screw              |
| 21 | Push Rod Exits                |    |                              | 72 | 4x20mm Screw              |
| 22 | Stab. Root Cover (Plastic)    |    |                              | 73 | 4mm Nut                   |
| 23 | Wheel                         |    |                              | 74 | 2mm Nut                   |
| 24 | Main Gear                     |    |                              | 75 | 3mm Nut                   |
|    |                               |    |                              | 76 | 4mm Washer                |
|    |                               |    |                              | 77 | 3mm Washer                |
|    |                               |    |                              | 78 | 2mm Washer                |
|    |                               |    |                              | 79 | Lock Washers              |
|    |                               |    |                              | 80 | 4mm Washer                |
|    |                               |    |                              | 81 | 4mm Nylon Nut             |
|    |                               |    |                              | 82 | 1/8" Plywood Wedge        |



# WING ASSEMBLY



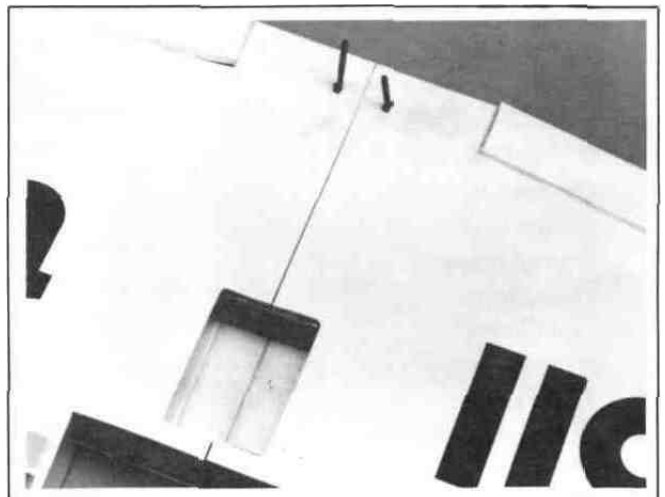
- |  |  |
|--|--|
| (A) Right Wing (Aileron Installed) . . . . . 1 | (I) Wing Mounting Brace . . . . . 1      |
| (B) Left Wing (Aileron Installed) . . . . . 1  | (J) 4x30mm Bolts . . . . . 2             |
| (C) Main Wing Joiner . . . . . 2               | (K) 4mm Washer . . . . . 2               |
| (D) Rear Wing Joiner . . . . . 1               | (L) O-Ring . . . . . 2                   |
| (E) Front Wing Joiner . . . . . 1              | (M) Aileron Servo Tray . . . . . 1       |
| (F) Wing Center Cover (Plastic) . . . . . 1    | (N) Aileron Servo Tray Mount . . . . . 1 |
| (G) 8mm Dowel Rods . . . . . 2                 | (O) Main Servo Tray . . . . . 1          |
| (H) Wing Bolt Mounting Block . . . . . 1       |  |



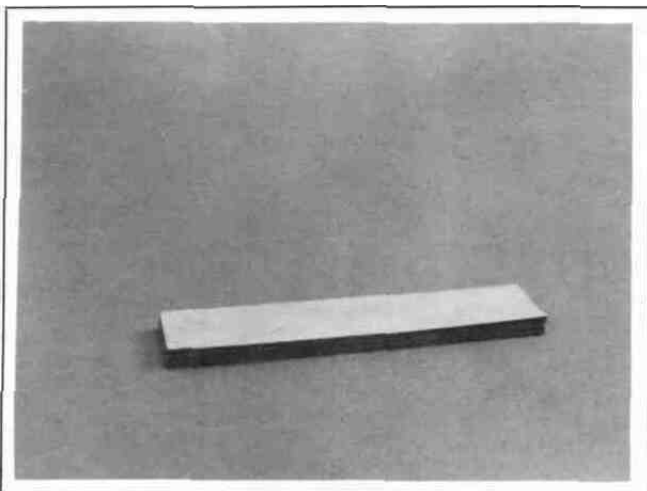
(3) Remove the foam covering from the aileron servo mounting area. Test fit the main wing joiner and the rear wing joiner in the right and left wing sections. The dihedral angle of the joiners should make the wing tips slightly higher than the center.



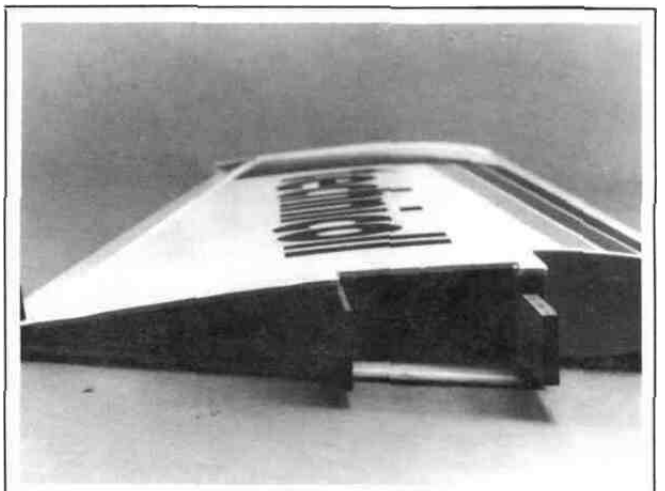
(1) Check each wing half for smooth aileron operation. It is a good idea to exercise (move back and forth) the ailerons to insure easy deflection. Sand the end if any rubbing is noticed.



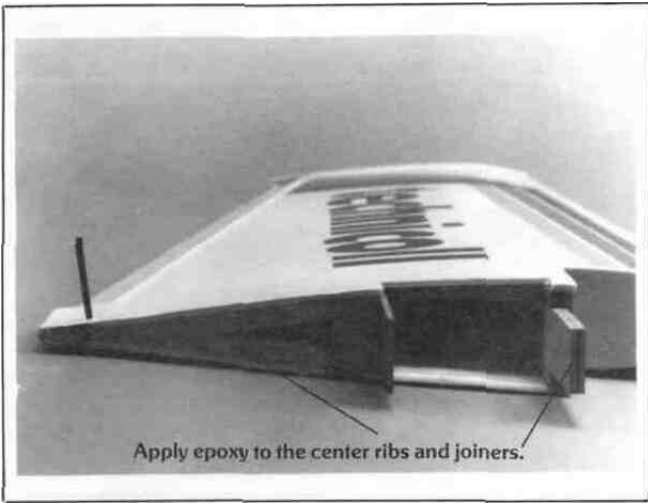
(4) Make sure that there is no gap between the wing halves. If there is, sand the wing joiner ends until there is a tight fit.



(2) Align and epoxy the two main wing joiners together. Hold tight until the glue sets. You'll notice that there is dihedral angle cut into the joiners so make sure they are perfectly lined up.



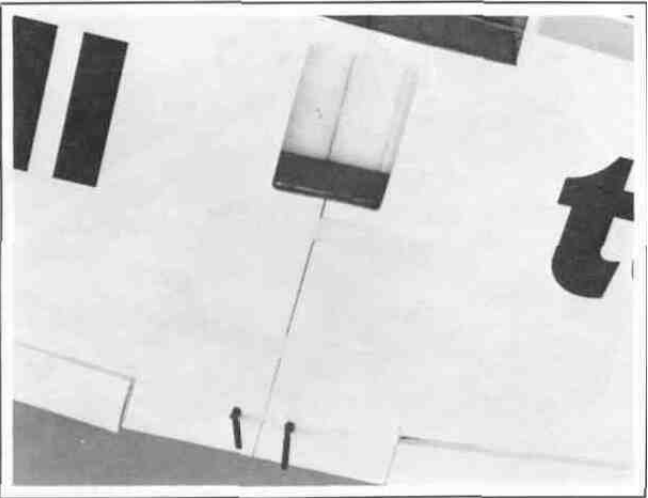
(5) Apply epoxy to one half of one side of both the main and rear wing joiners and glue them to one wing half. Make sure the dihedral angle is correct and that they are slid in all the way.



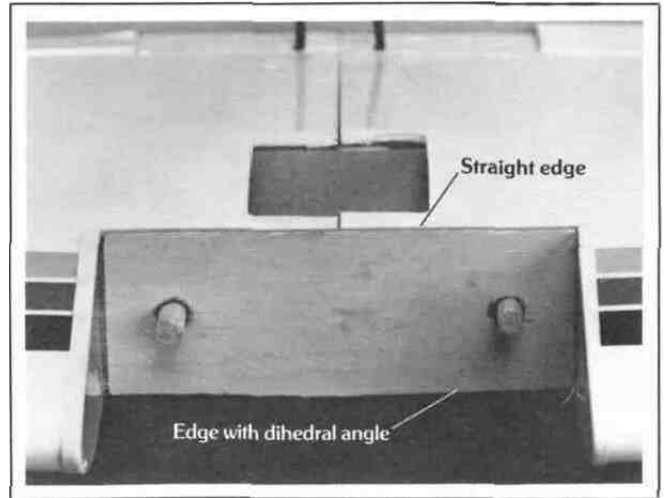
(6) After the joiners have dried, apply epoxy where shown. The wing roots, the wing joiners and inside the other wing joiner slot should be evenly covered with epoxy.



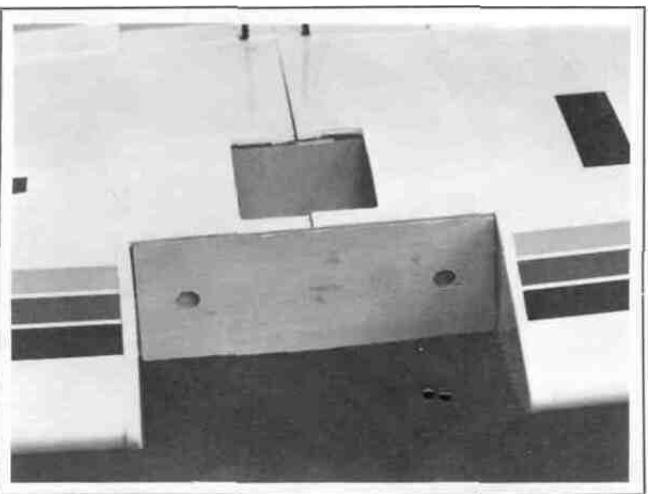
(9) Drill two 8mm holes into the wing joiners for the dowel rods.



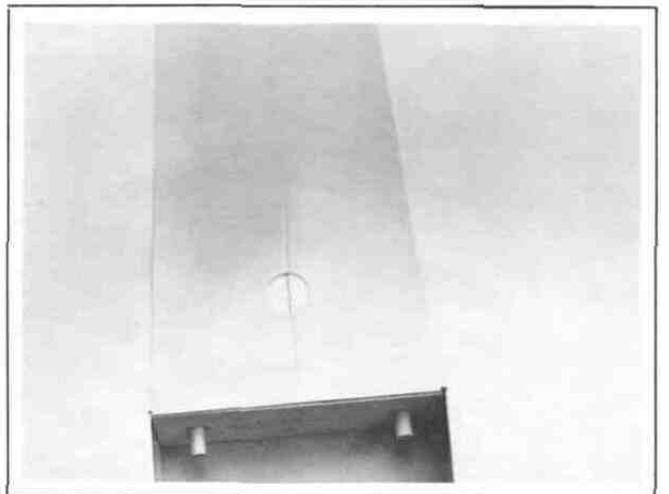
(7) Slide the two wing halves together slowly and wipe off any excess glue. Hold the two wing halves firmly together with tape until the epoxy has cured.



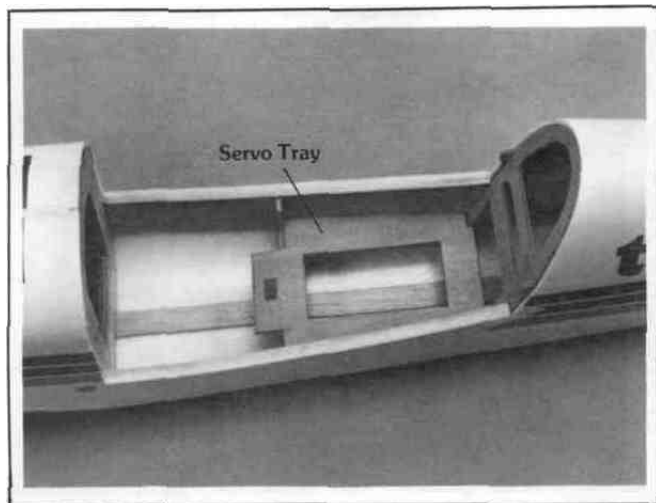
(10) Epoxy the two dowel rods into the holes. Make sure they are all the way in.



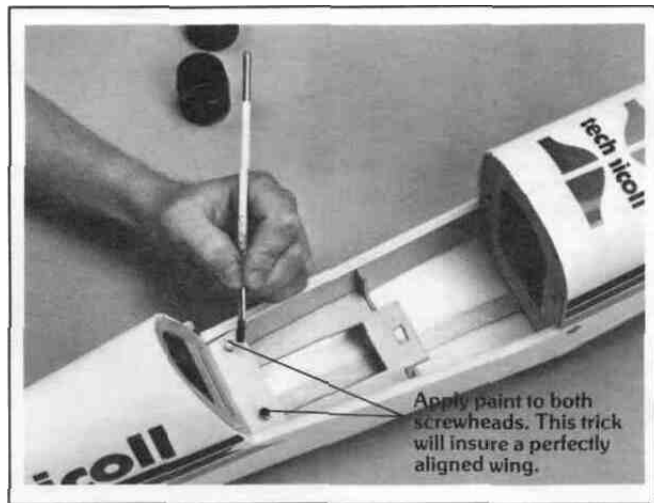
(8) Once dry, remove the tape. Position the front joiner as shown. The flat edge of the joiner should line up with the top of the wing. next, remove and epoxy in that same position. Let cure.



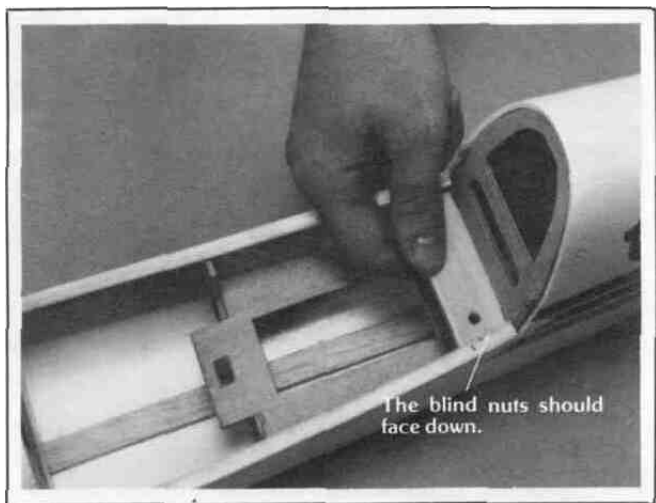
(11) Position the wing center cover on the bottom of the wing. Apply Cyanoacrylate glue under the edges and hold until it dries.



(12) Epoxy in the main servo tray where shown



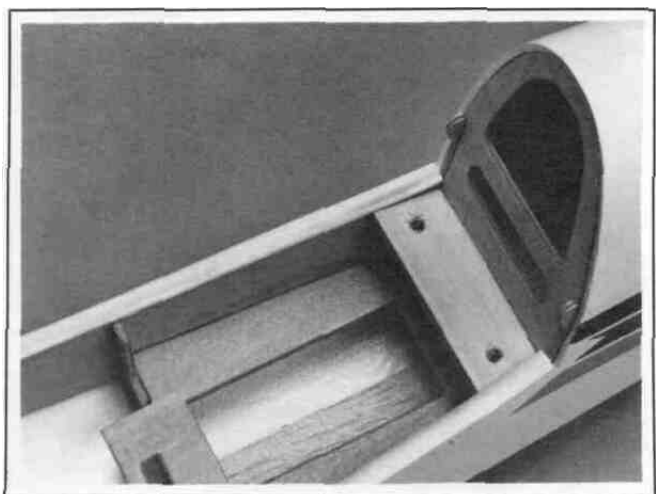
(15) Screw in the wing bolts half way into the wing bolt mounting block. Apply ink or paint to the heads of the two bolts. Next center the wing and set it onto the bolts. This will mark where you need to drill.



(13) Test fit the wing bolt mounting block to the inside of the fuselage. The blind nuts should face down.



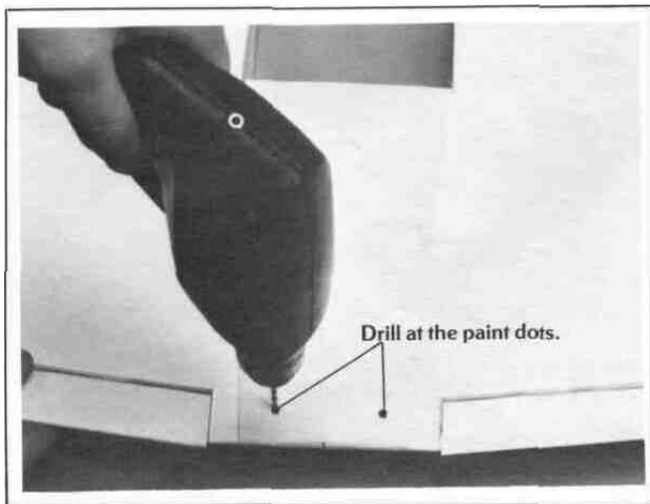
(16) After the epoxy has cured, place the wing into the fuselage as shown. Put the front in first, aligning the dowel rods in the holes. Once in place, lower the back into position.



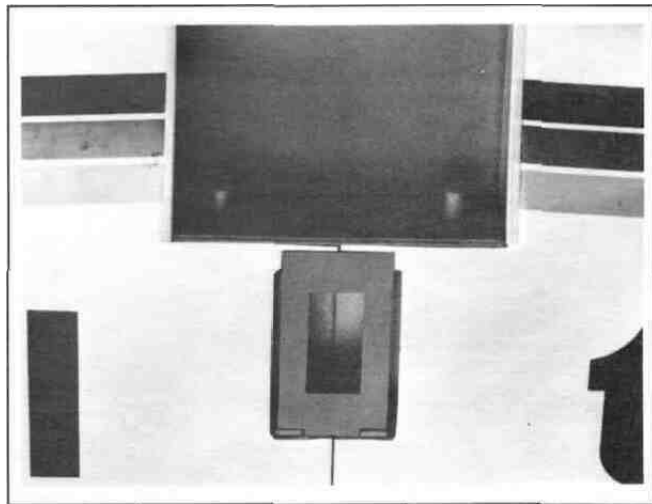
(14) Epoxy the wing bolt mounting block in. This is a high stress point and extra care should be taken to ensure a strong joint.



(17) Place the wing mounting brace onto the wing as shown and center the wing and brace with the fuselage. **NOTE** The two indentations on the brace should face up. PlastiZap it on.

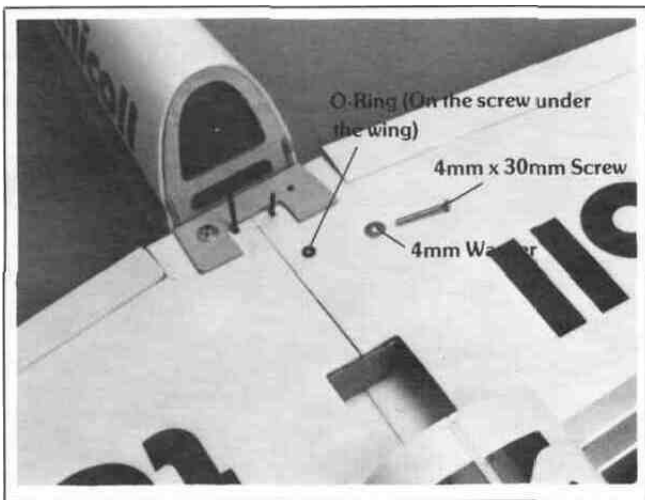


(18) Drill two 4mm holes 90° from the top wing surface for the wing bolts where the paint marks are.

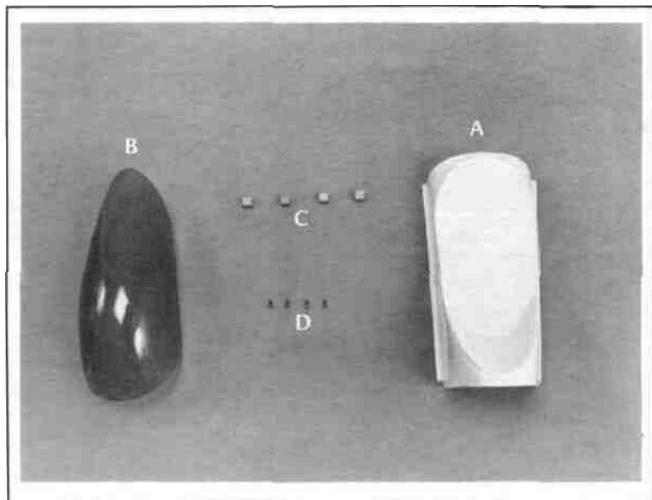


(21) Epoxy the aileron servo tray mount into the rear section of the wing servo mount and then epoxy in the tray.

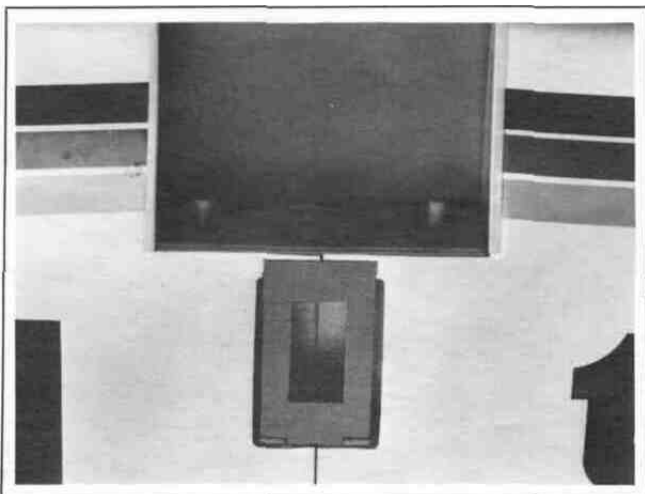
## COCKPIT/CANOPY ASSEMBLY



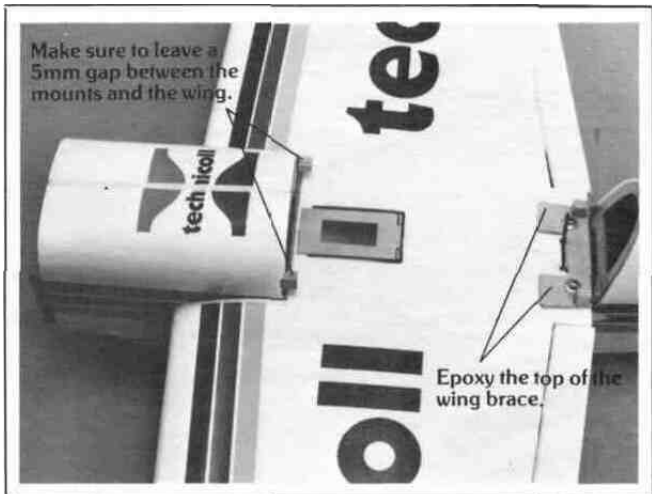
(19) Assemble the wing bolts as shown (bolt — washer — wing — o-ring) and temporarily fasten down the wing. Check for good fit and then remove.



- (A) Cockpit, . . . . . 1
- (B) Canopy . . . . . 1
- (C) Cockpit Mounts . . . . . 4
- (D) 3x8mm Self-Tapping Screws . . . . . 4

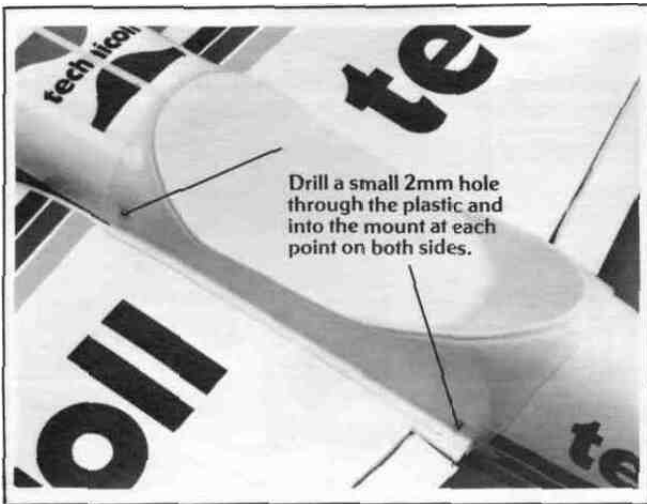


(20) Trial fit the aileron servo tray mount and tray to the wing. NOTE: The front edge should be on the wood, therefore, you will have to trim away a little covering for a good fit.

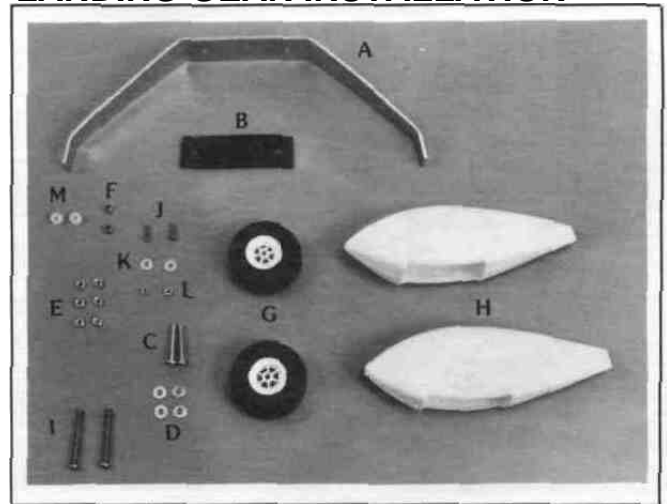


(1) Epoxy the four cockpit mounts to the fuselage as shown. Be careful when gluing the rear mounts to only glue them to the wing mounting brace.

## LANDING GEAR INSTALLATION



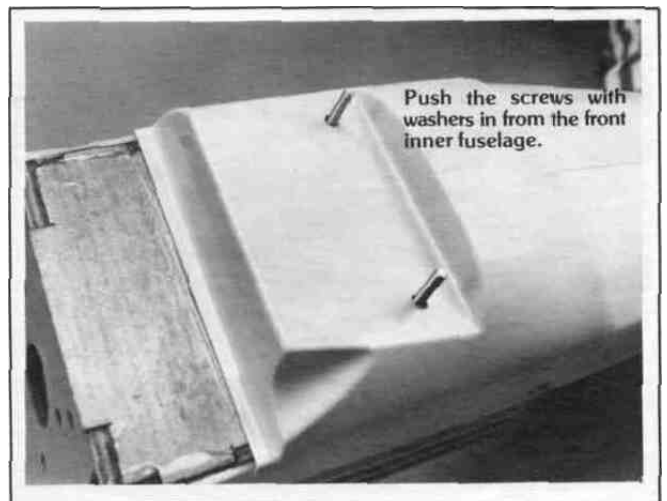
- (2) Once the epoxy has cured, position the cockpit on the fuselage. Make 4 small holes where cockpit mounts are located. Attach with the 4 small self-tapping screws. Do not glue the cockpit.



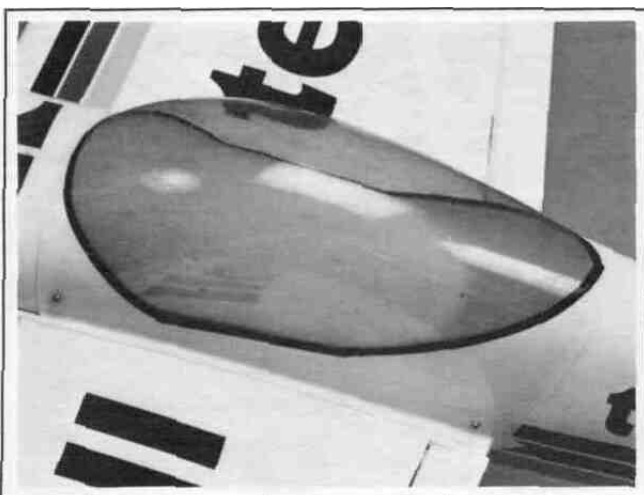
(A) Main Gear	..... 1	(H) Wheel Pants	..... 2
(B) Rubber Shock Absorber	..... 1	(I) 4mmx40mm Screw	..... 2
(C) 4mmx30mm Screw	..... 2	(J) 3mmx12mm Screw	..... 2
(D) 4mm Washer	..... 4	(K) 3mm Washer	..... 2
(E) 4mm Nut	..... 6	(L) 3mm Nut	..... 2
(F) 4mm Nylon Nut	..... 2	(M) Plastic Collar	..... 2
(G) Wheel	..... 2		



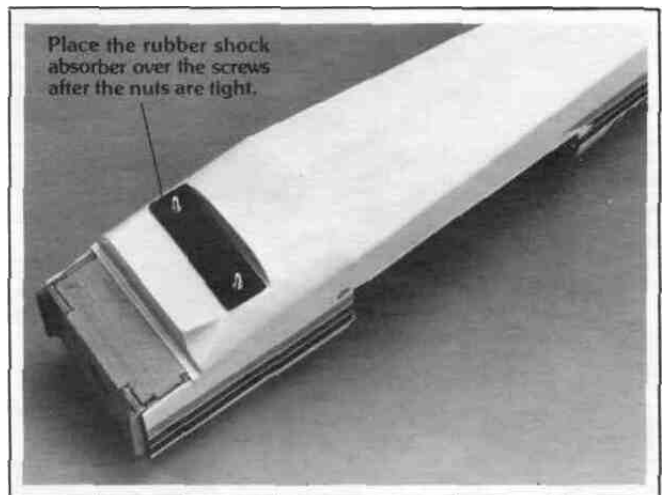
- (3) Trial fit the canopy to the cockpit. If necessary, trim for a perfect fit. Apply a thin bead of Cyanoacrylate glue to the cockpit and attach and hold the canopy until



- (1) Remove the cockpit and the wing. Place the two 4mmx40mm screws with the 4mm washers into the two landing gear holes that are located inside of the front fuselage section.



- (4) Apply the black striping tape to the edge around the canopy.

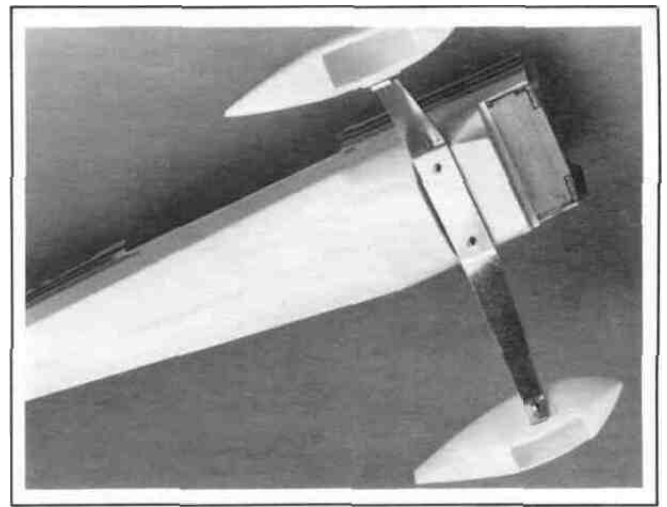


- (2) Thread two 4mm nuts onto the two screws and tighten. Next place the rubber shock absorber over the screws.

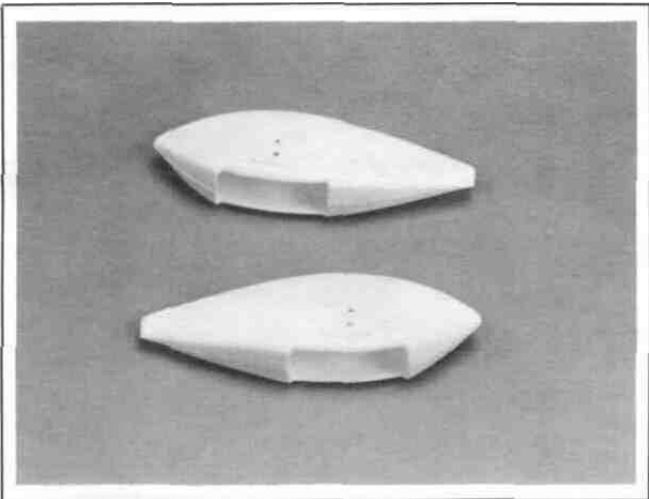




- (3) Now place the main gear (angled side facing back) over the screws and secure it with two 4mm nylon nuts. NOTE: tighten the nuts all the way and then loosen them both one turn. This will give the gear the correct shock absorbing qualities.



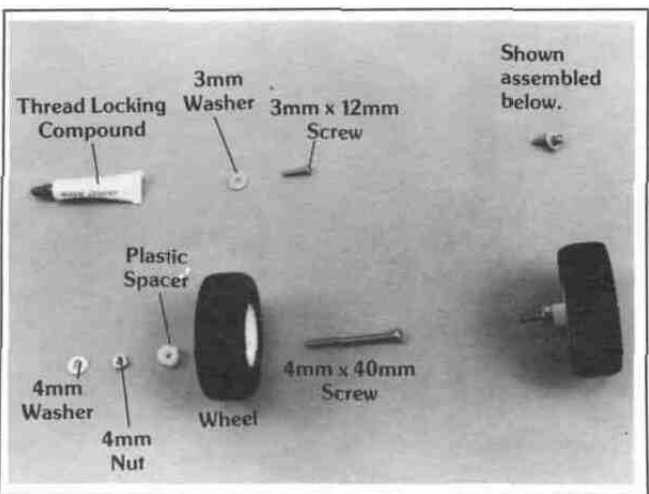
- (6) Place the 3mm screw/washer into the top hole of the wheel pants from the inside. And then attach it to the top hole of the main gear using the 3mm nut.



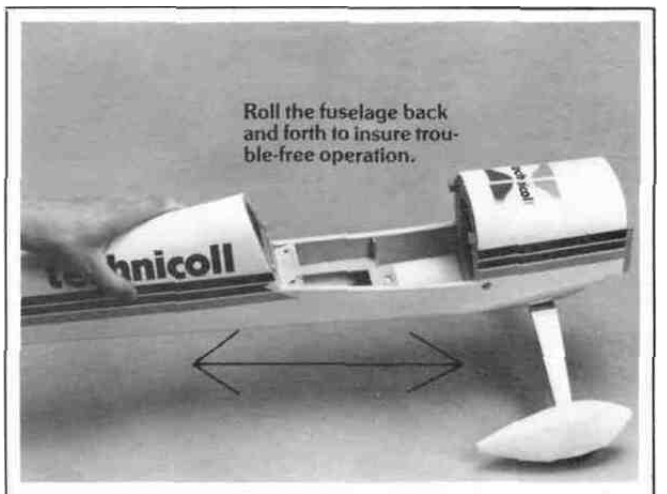
- (4) Next take the two wheel pants and drill two holes in each one. The first hole should be at the indent (4mm in diameter). The second should be 3/8" above the first and smaller (3mm diameter).



- (7) Flare open the pants and insert the wheel assembly. Install the 4mm nut and tighten, holding the inside nut with needle nose pliers.

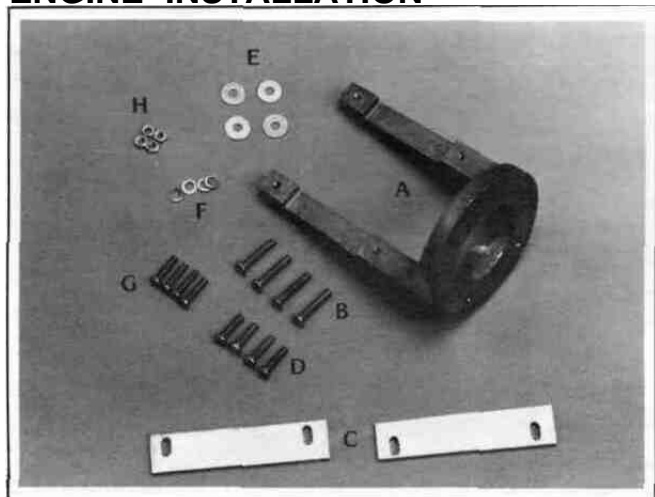


- (5) Arrange the above parts as shown and then assemble together. Do this twice. Place screw locking compound on the threads when installing the nuts.

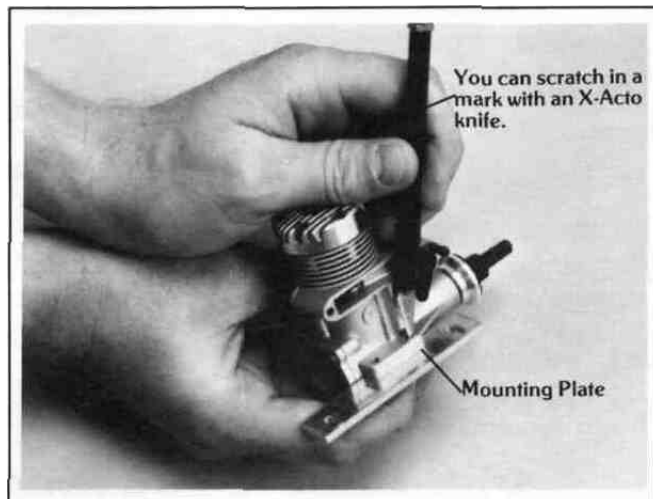


- (8) Make sure that both wheels rotate freely. If they do not, trim away the plastic as needed. Or, if need be, loosen the nuts, unscrew the wheel screw, and retighten.

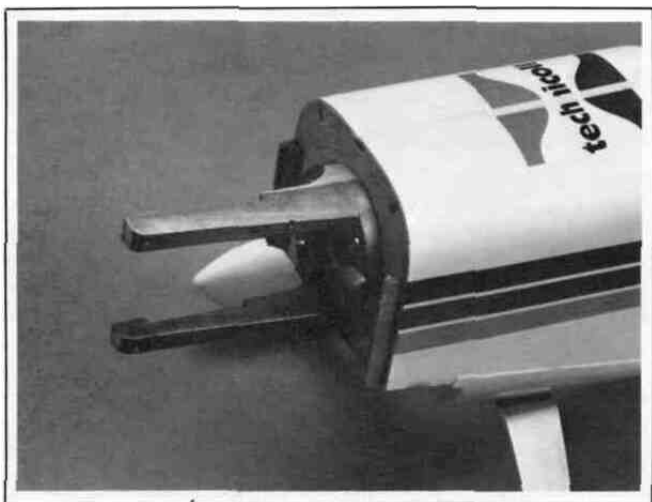
# ENGINE INSTALLATION



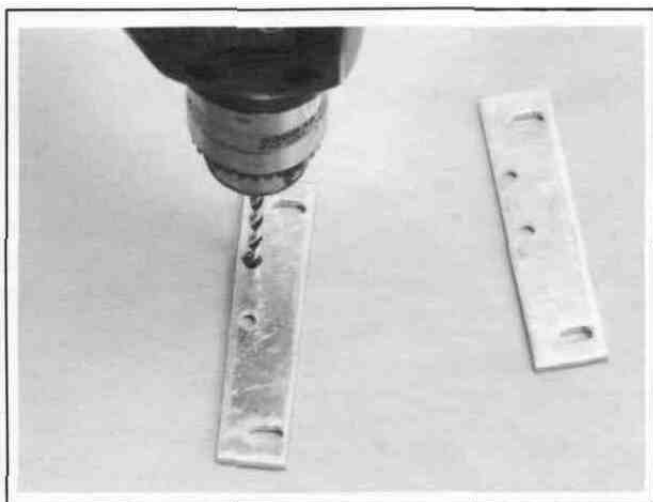
- (A) Engine Mount .....1
- (B) 4mmx20mm Screws .....4
- (C) Mounting Plates .....2
- (D) 4mmx15mm Screws .....4
- (E) 4mm Washers .....4
- (F) Lock Washers .....4
- (G) 3.5mm Screw .....4
- (H) 3.5mm Nuts .....4



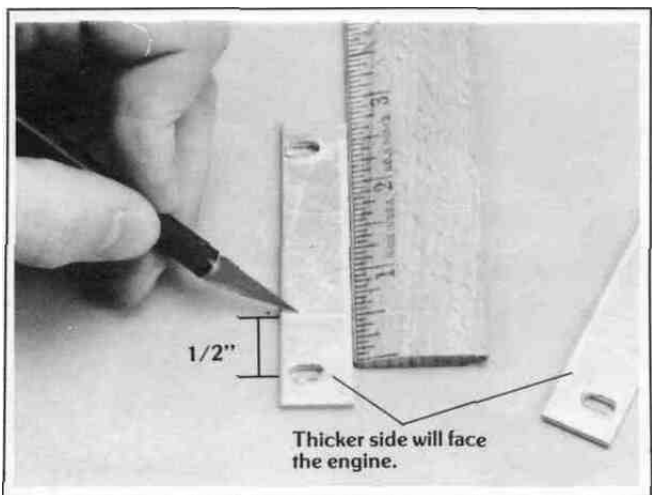
- (3) Hold each mounting plate under one engine mount as shown (Thick side towards the engine ) Line up the mark with the front hole of the engine mount. Mark the plates where the engine mounting holes are.



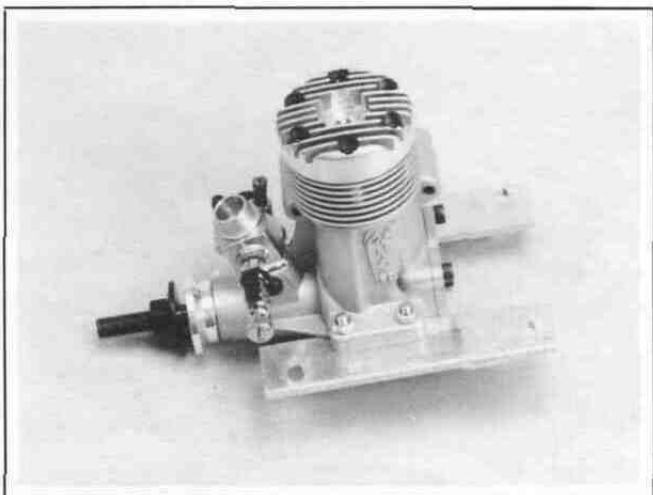
- (1) Install the engine mount to the fuselage using (4) 4mmx20mm screws. Note the direction the mount is installed for proper engine positioning. Also use screw locking compound on the screw threads.



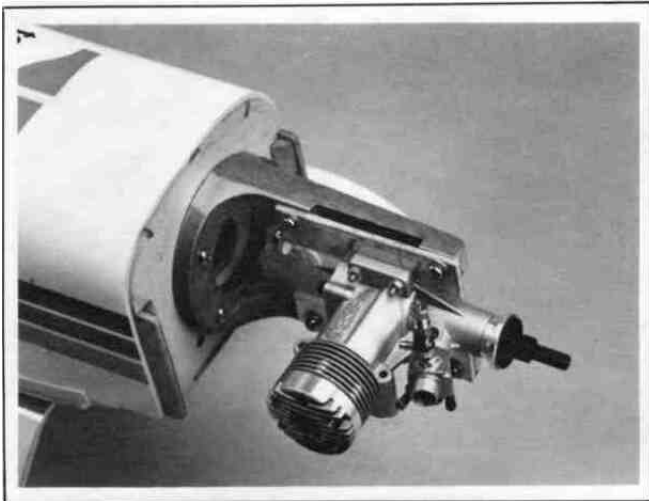
- (4) Drill two 3.5mm holes in each mounting plate at the marks.



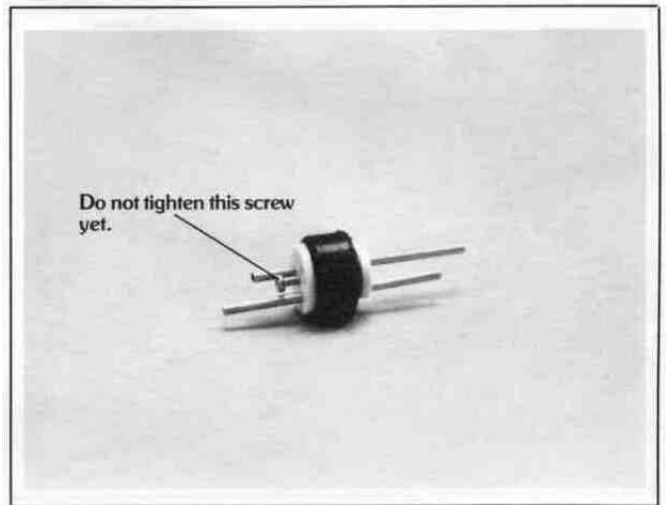
- (2) Make a mark 1/2" to 5/8" back from the hole on one end of each mounting plate using a sharp knife. **NOTE:** When mounting the engine, the thicker sides of the plates should be mounted facing the engine.



- (5) Mount the plates to the engine using the 3.5mm screws and lock washers up from the bottom as shown. Next apply screw locking compound to the screw threads and tighten on the 3.5mm nuts. Now do this to both sides.

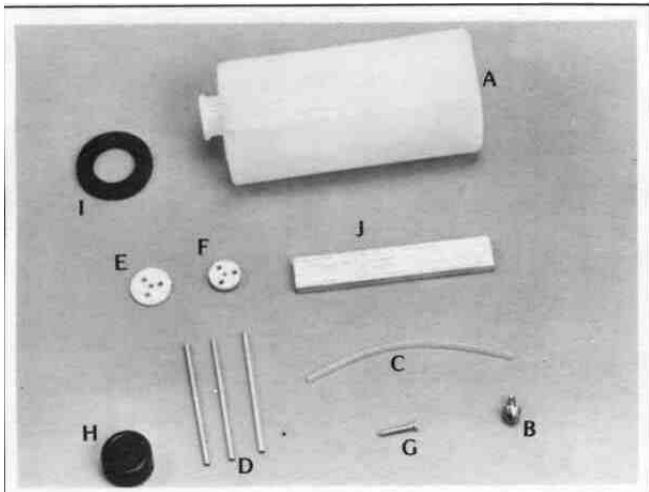


(6) Now mount the engine to the fuselage. Use (4) 4mmx15mm screws with the (4) 4mm washers. Be sure to use screw locking compound on the threads.

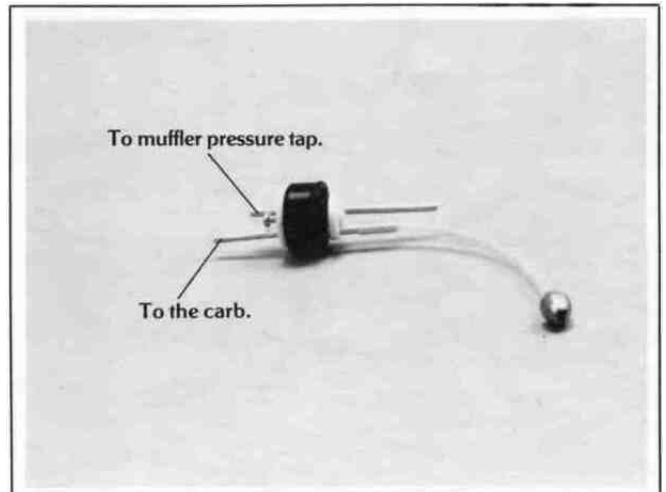


(2) Put the self tapping screw in the center hole from the large end and tighten it only a couple of turns.

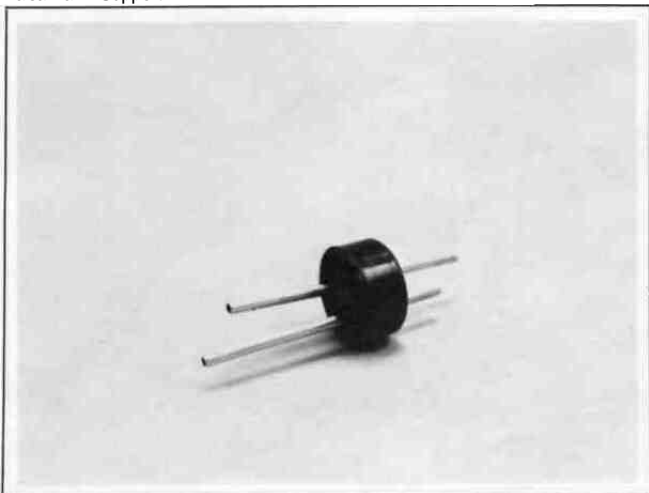
## FUEL TANK INSTALLATION



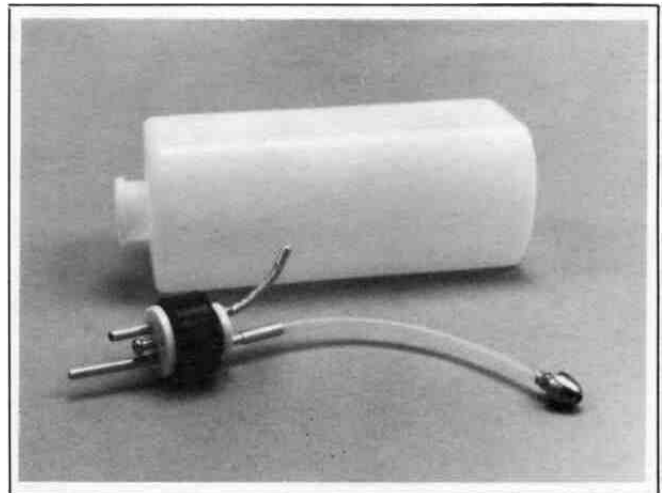
- |                                   |              |
|-----------------------------------|--------------|
| (A) Fuel Tank                     | 1            |
| (B) Clunk                         | 1            |
| (C) Silicone Tubing               | 1            |
| (D) Fuel Pipe                     | .3 (1 extra) |
| (E) Plastic Disc (Large)          | 1            |
| (F) Plastic Disc (Small)          | 1            |
| (G) 3mmx 18mm Self Tapping Screw. | 1            |
| (H) Rubber Plug                   | 1            |
| (I) Neoprene Ring                 | 1            |
| (J) Balsa Tank Support            | 1            |



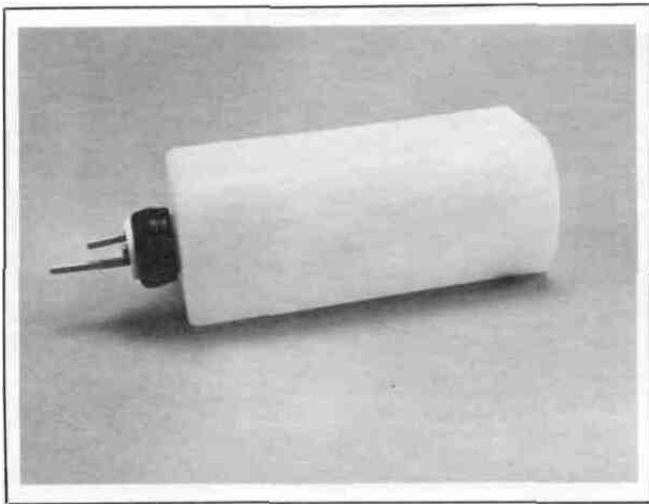
(3) Attach the silicone tubing to the centered fuel pipe and attach the clunk to the other end.



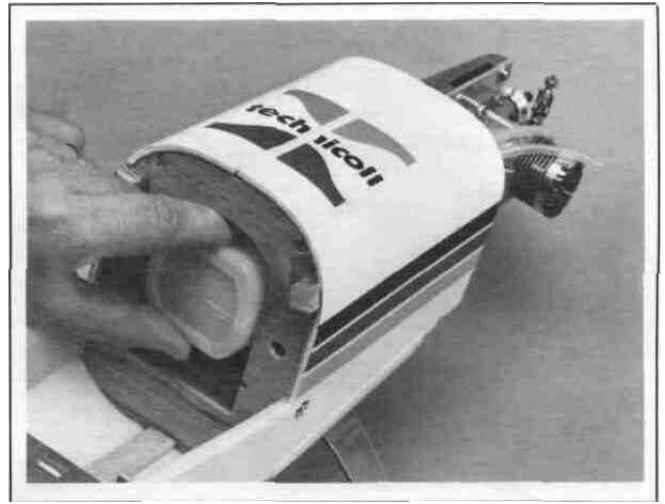
(1) Install two fuel pipes through the rubber plug. One should be halfway through, the other should be 2/3 through as shown. Next place the two plastic discs onto each side. The large one should be on the outside.



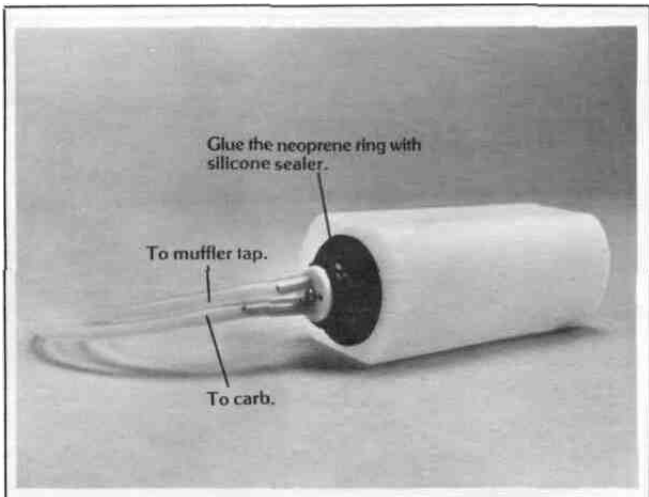
(4) Carefully bend up the other fuel pipe so it will just touch the inside top of the fuel tank.



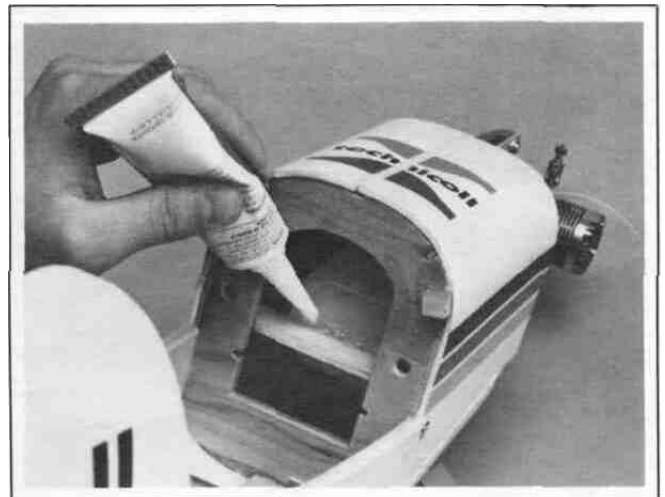
(5) Attach the complete fuel tank cap to the tank. Make sure that the bent pipe is pointing to the top. Slide the cap on until the lip on the fuel tank is in the groove of the cap. Then tighten the screw.



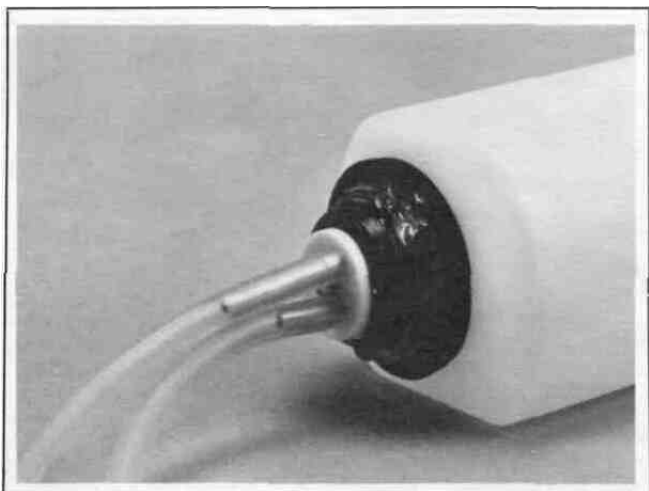
(8) Install the fuel tank from the inside of the fuselage with the fuel lines facing front. Slide the tank into its mount and up into the hole in front of the fuselage. Make sure that the fuel tubing is through the hole.



(6) Glue the neoprene ring to the tank with silicone sealer. Attach two pieces of fuel tubing (6" each) to the pipes. One is for the carburetor the other is for the pressure tap on the muffler.

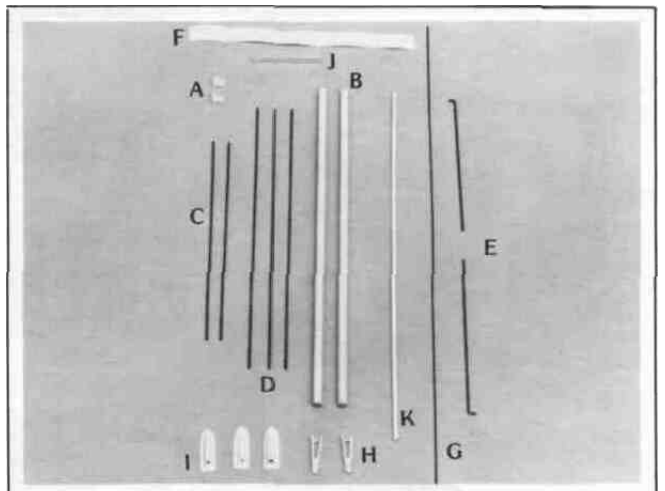


(9) Epoxy the tank support to the inside of the front fuselage. Once dry apply a heavy bead of silicone sealer in between the support and the tank.

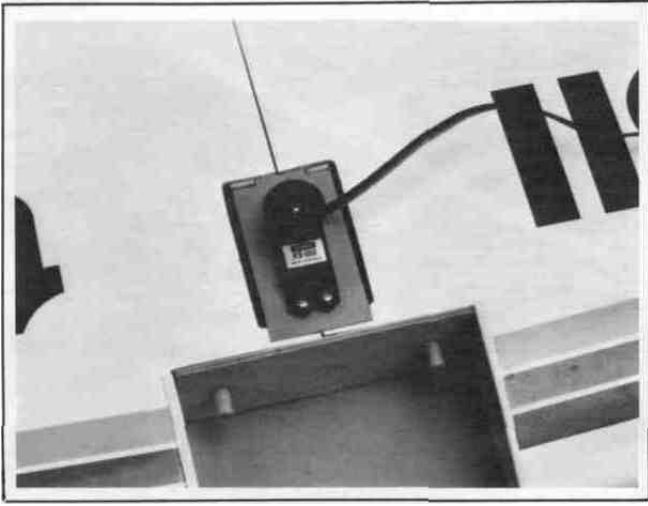


(7) Put a bead of silicone sealer on the top of the neoprene ring.

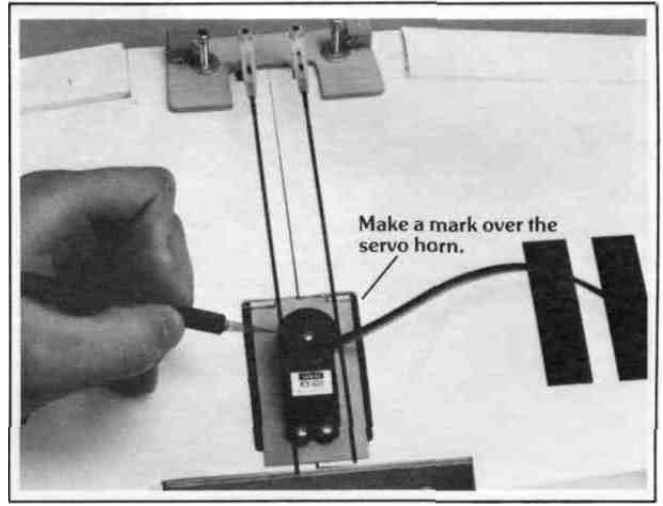
## RADIO INSTALLATION



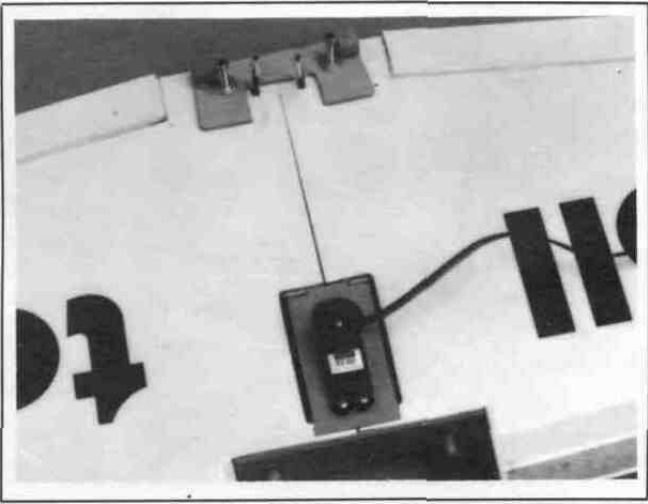
(A) Aileron Horn . . . . .	2	(G) Throttle Control Rod (Long) . . .	1
(B) Wood Push Rods . . . . .	2	(H) Snap Clevis . . . . .	2
(C) Aileron Control Rods (Short) . . .	2	(I) Push Rod Exits . . . . .	3
(D) Control Rod (Long) . . . . .	3	(J) Clevis Retainer Tubing . . . . .	1
(E) Control Rod (Short-Bent) . . . . .	2	(K) Throttle Tube . . . . .	1
(F) Shrink Tubing . . . . .	1		



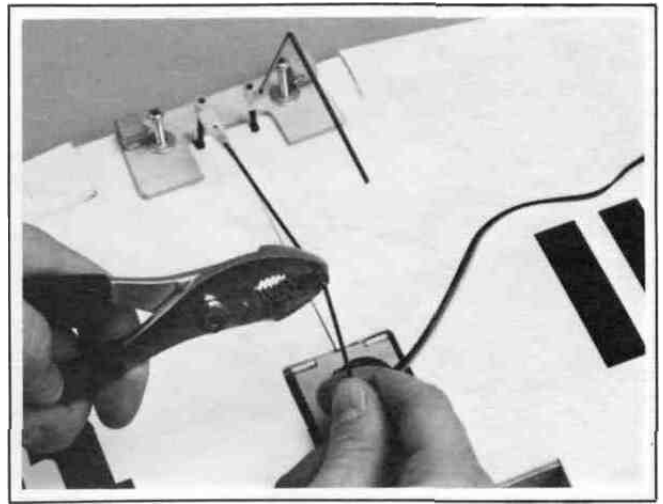
(1) Check the fit of your aileron servo in the aileron servo tray. You may have to trim away some of the servo tray for a good fit. Install the grommets onto the servo and fasten it to the wing using the screws provided with the radio system. Be sure to leave the wire outside.



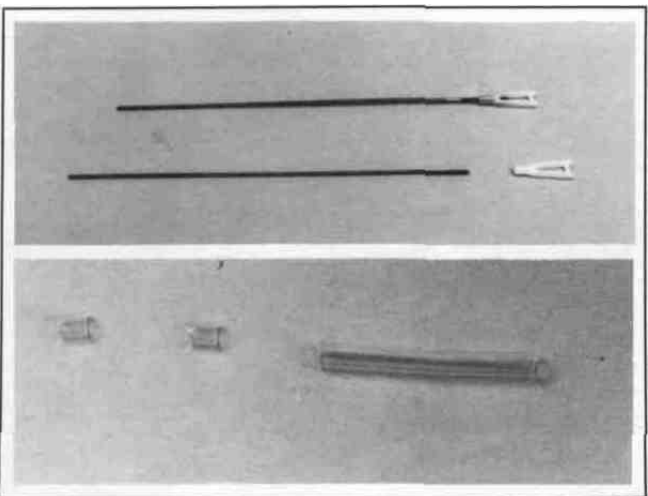
(4) Attach the clevises to the aileron horns and slide on the retaining tubes. After checking the neutral position of the aileron servo and ailerons, put a mark on the push rods where the servo arm holes are.



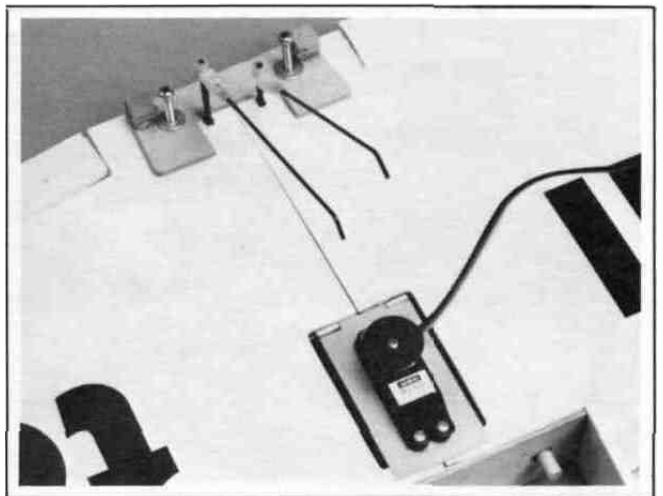
(2) Screw the aileron horns onto the aileron control arms. Trim the wing mounting brace as needed for full aileron movement.



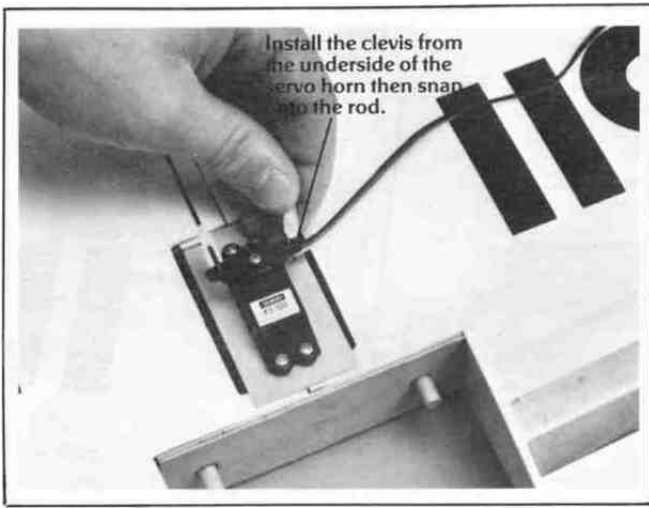
(5) At the mark, bend each push rod at a right angle.



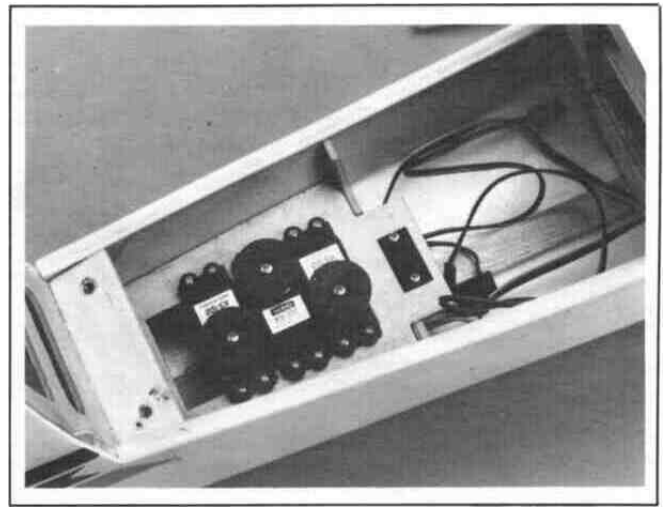
(3) Screw two snap clevises half way up the threads on the aileron control rods. Next, cut two pieces of the clevis retaining tubing and slide them onto the rods.



(6) Cut the push rods 6mm from the bend.



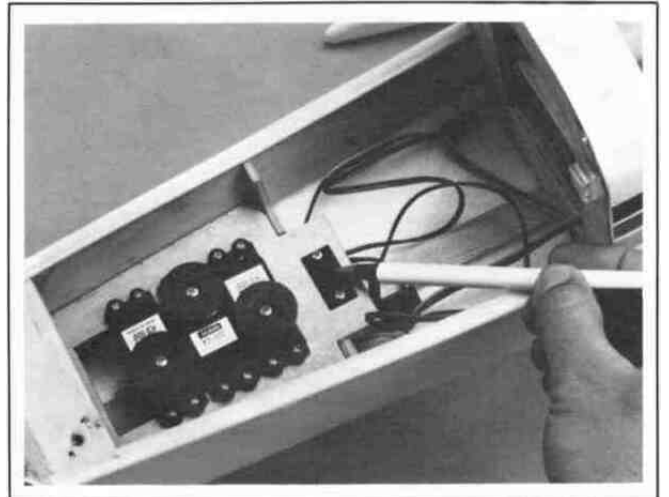
(7) Attach the rods to the servo arm using the rod clevis **NOTE** You may have to use a different style servo horn for more throw as shown



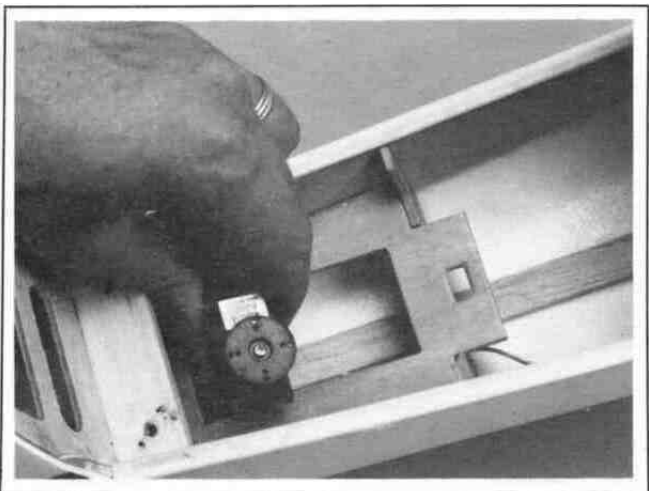
(10) Install the three remaining servos into the tray using grommets and screws. Be sure that the servos are positioned correctly. Next mount the radio switch **NOTE** Make sure that the servo wires all run forward so they are easily accessible



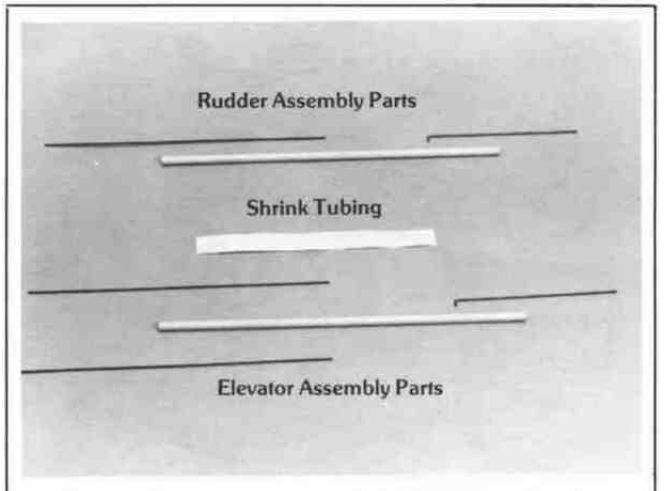
(8) Connect the aileron servo to the receiver and check the movement of the ailerons. Make sure that both ailerons are neutral when the servo is neutral. Adjust the clevises as needed.



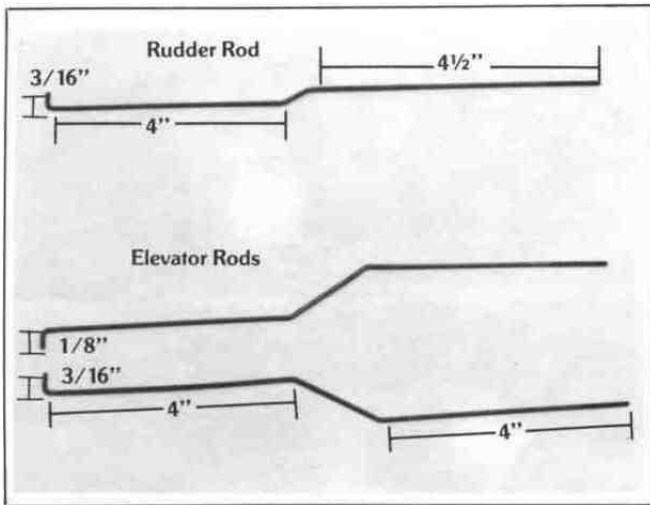
(11) We suggest installing an external switch mount so that the radio system can easily be turned on and off from the outside without taking the wing off. (The Dubro #203 Kwik Switch Mount works well)



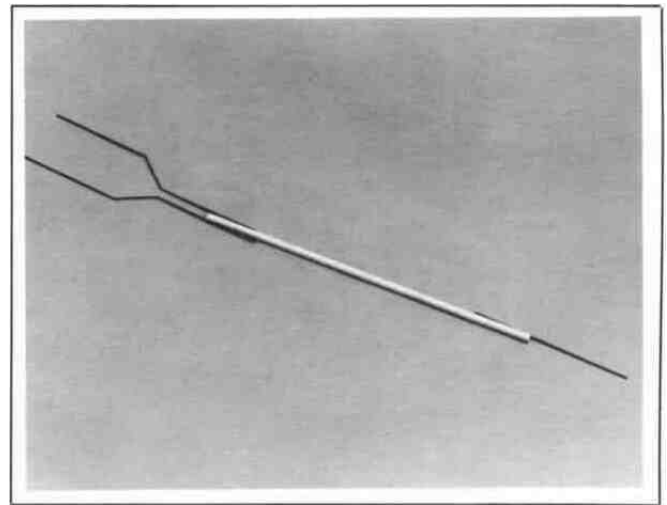
(9) Trial fit the servos into the fuselage and trim the tray as needed for a good fit



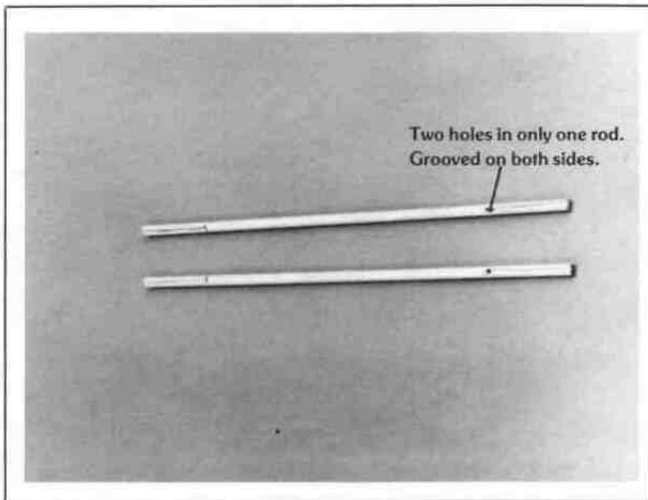
(12) Assemble the rudder and elevator control rods using the parts above



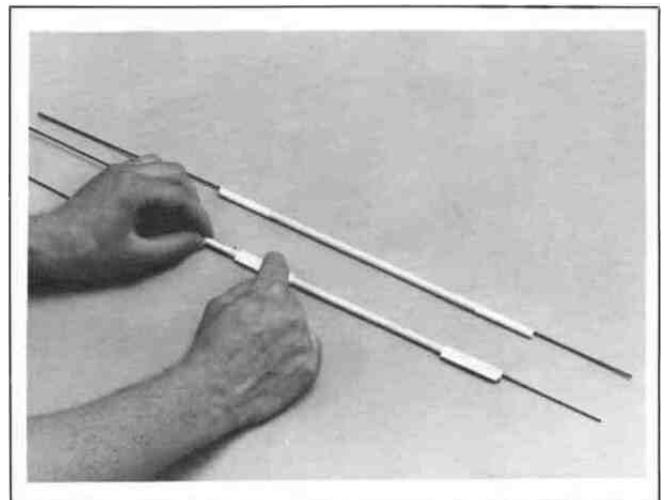
(13) Bend two of the long rods as shown for the elevator and one of the rods for the rudder



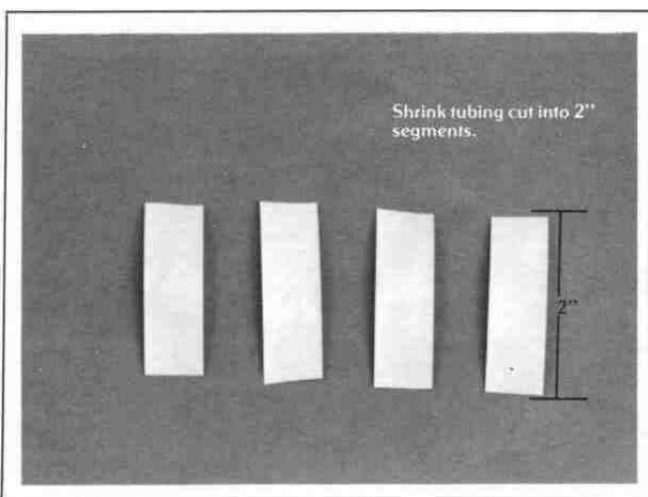
(16) Assemble the push rod as shown. Place the two short (pre bent) rods into one end of each rod with the single grooves. Slide a piece of shrink tubing over each rod and heat with a heat gun or a lighter to shrink the tubing for a tight fit. Place the elevator rods into the double grooved end of one of the rods.



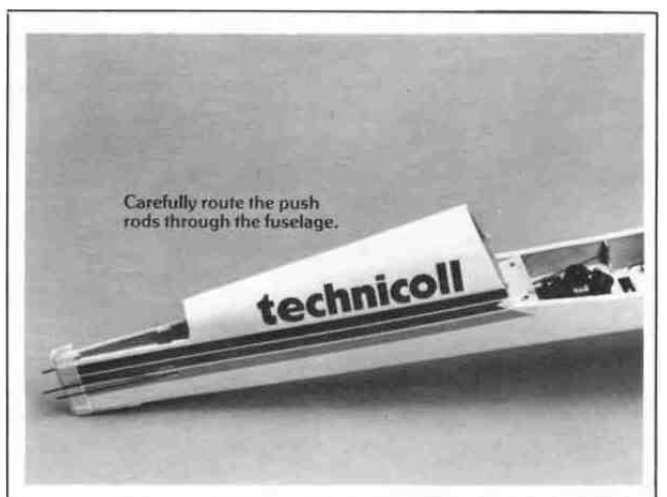
(14) Drill a  $1/16''$  hole 2" from the ends (2 holes  $1/16''$  apart on one end of one rod) of both wood push rods and with a hobby knife. Carefully cut straight grooves from the holes to the ends. Only cut a groove on one side of each end, except for one end of one rod (the one with two holes). For this one end, make a groove on both side.



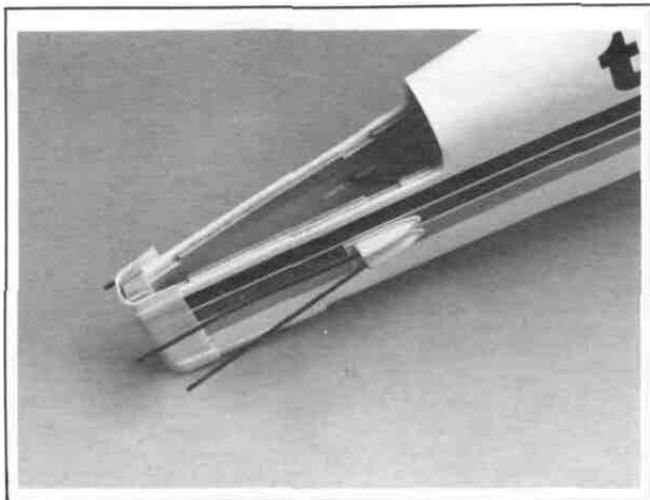
(17) Next, do the same with the other rod. Make sure that each rod fits in a groove.



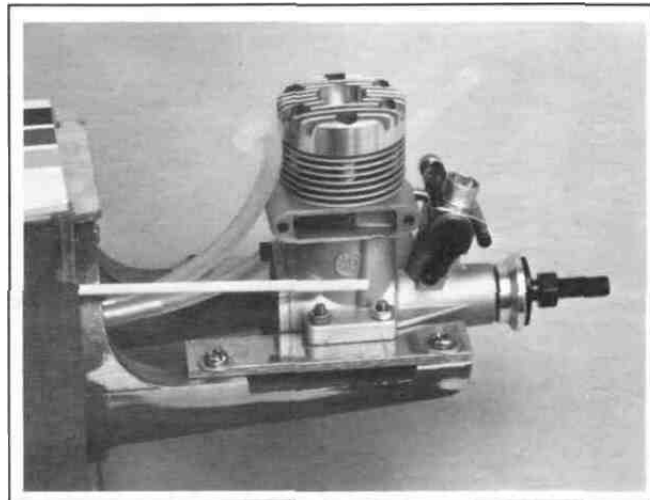
(15) Cut 4 equal (about 2" each) pieces of the white shrink tubing



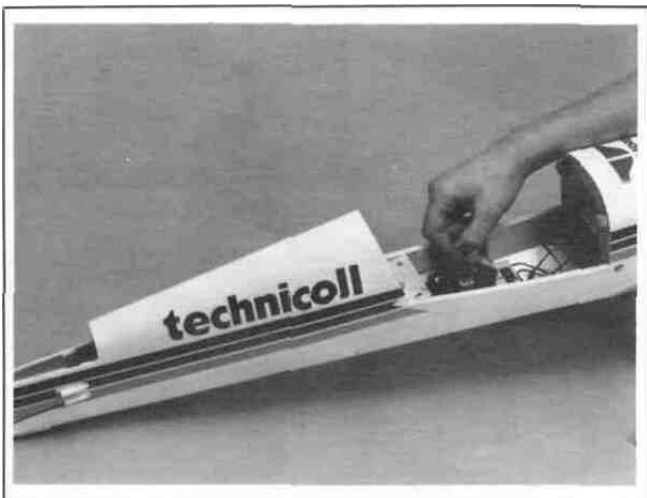
(18) Punch out the three rod exits at the tail and insert the rudder push rod into the fuselage from the front and then through the bottom exit on the right side. Do the same with the elevator rod but put those through the top two holes. It may be necessary to bend the rods to fit.



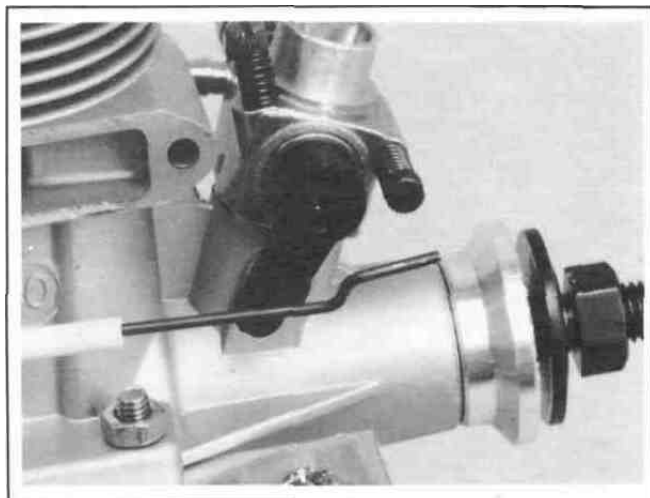
(19) Use PlastiZap and glue the three plastic push rod exits to the fuselage



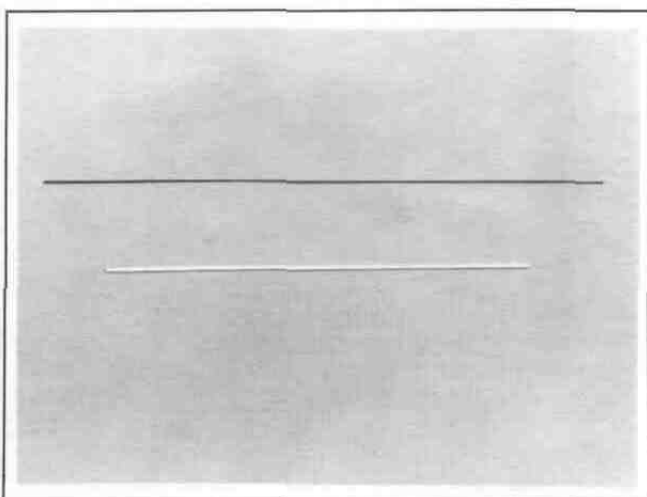
(22) Install the plastic tubing through the hole in the firewall to the servo tray Epoxy the tube where it goes in



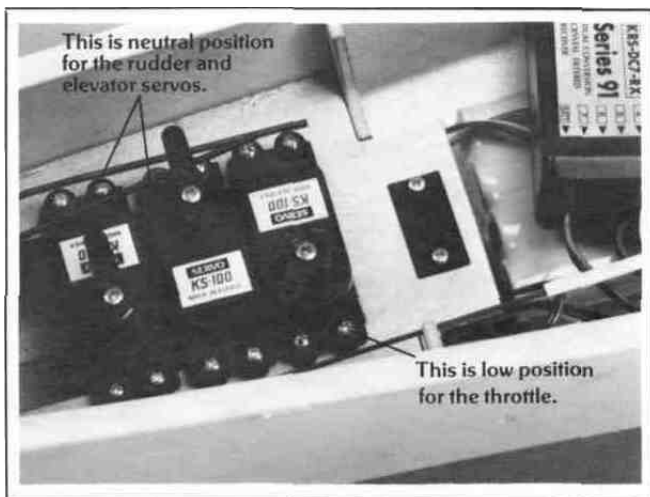
(20) Check to make sure that the rods will easily move in and out with little resistance You may have to bend the rods slightly for a perfect fit (We will connect the rods to the servos after the tail assembly )



(23) Make a "Z" bend on one end of the throttle control rod and insert the opposite end into the tube

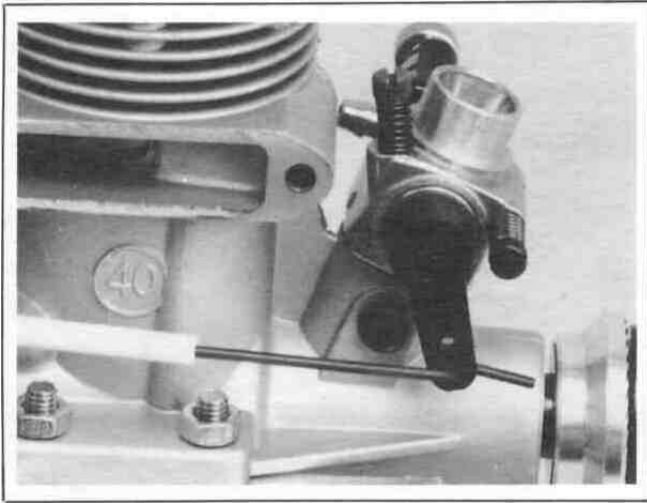


(21) Use the throttle control rod and the white throttle tube for the engine linkage Lightly sand the plastic tube so the epoxy will adhere to it

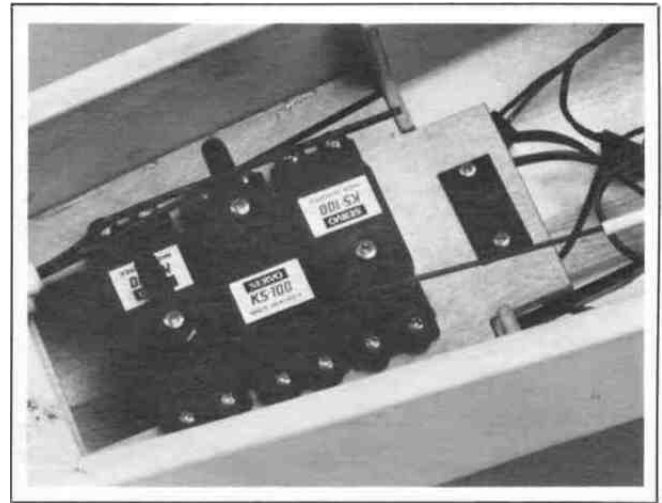


(24) Connect the servos to the receiver and battery and center all radio controls (including the throttle stick and move the servo horns so they are in line with the servo as shown After they are centered pull the throttle stick back down (low throttle) Install the straight servo horns

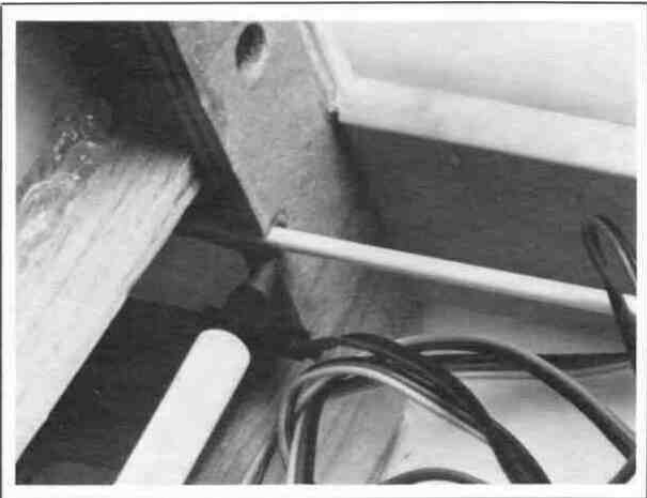




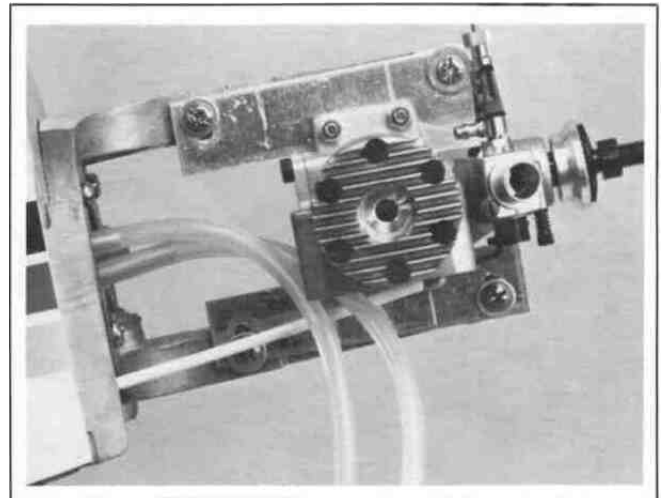
(25) Connect the "Z" bend to the engine throttle arm. It may be necessary to remove the arm from the engine for easier installation.



(28) Next, at the marked point, make another "Z" bend, cut off the excess and attach it to the servo arm. For easy adjustments, an easy connect can be used here. (Dubro #121 E-Z Connectors work well.)

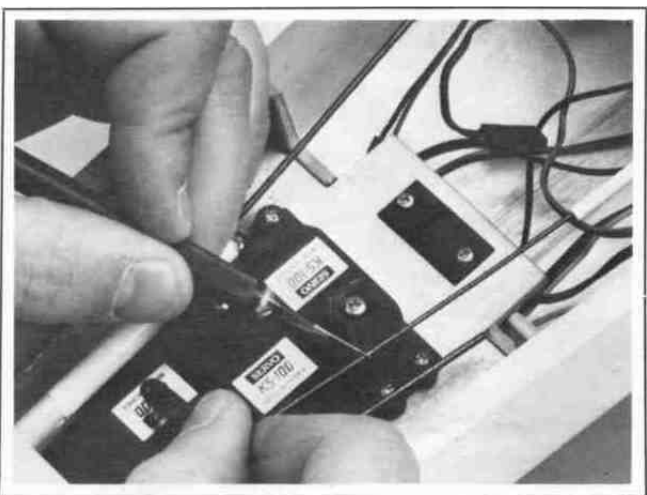


(26) Epoxy the white tube to the tube guide.

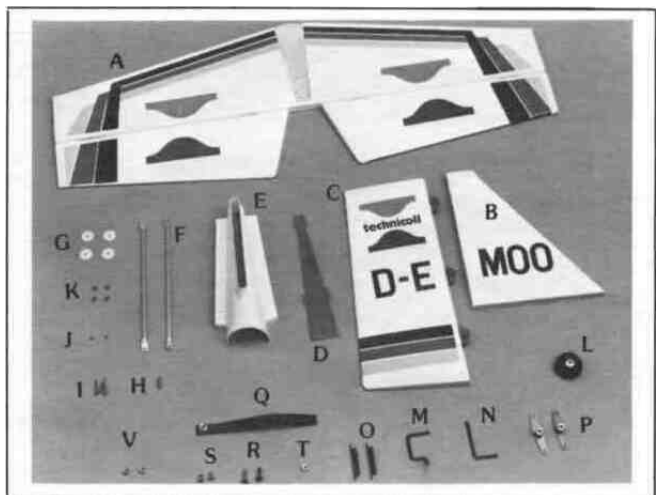


(29) Check for proper radio operation of the throttle. Make sure that the carburetor will move from low to high completely.

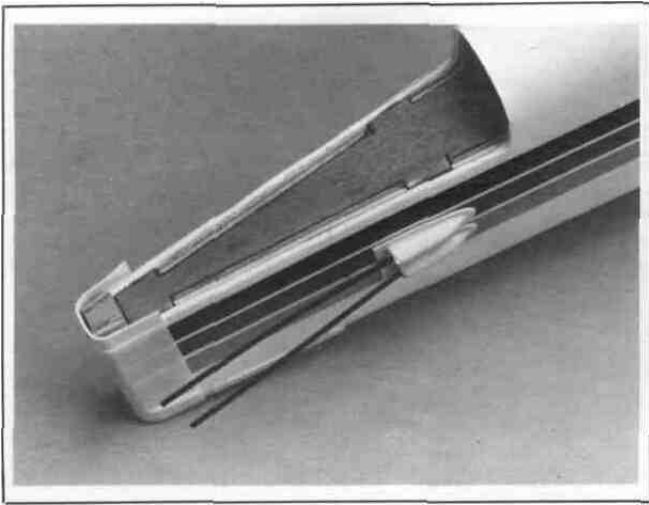
## ASSEMBLY OF THE TAIL SECTION



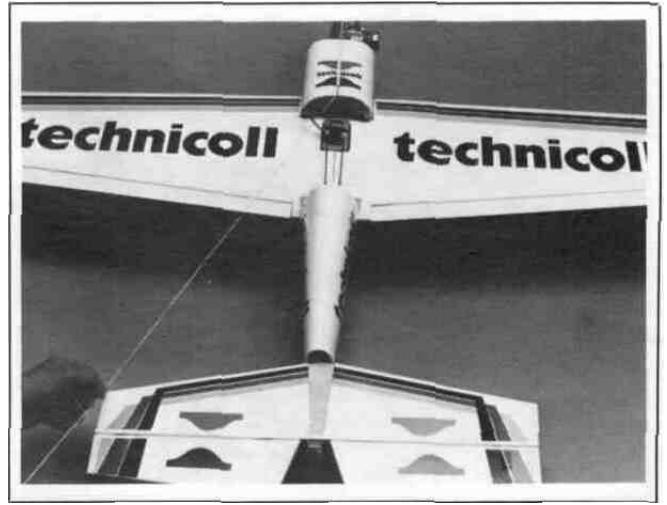
(27) From the inside, pull back the throttle control rod so the carburetor is closed. Now, mark the rod where it crosses the throttle servo horn (in low position).



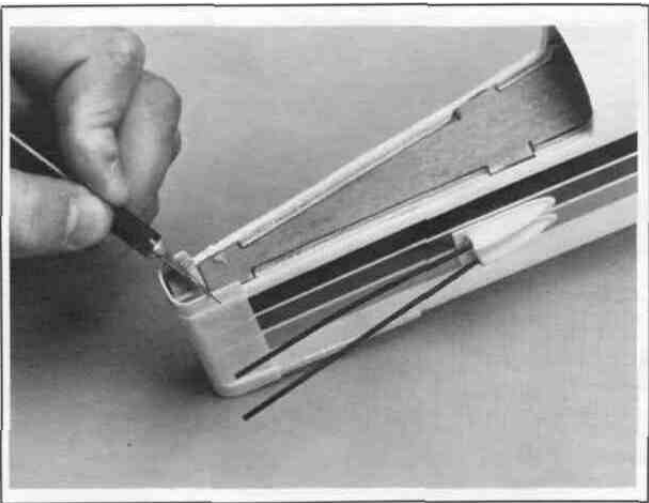
(A) Horizontal Stabilizer (Stab) . . . . .	.1	(L) Tail Wheel . . . . .	1
(B) Vertical Fin . . . . .	.1	(M) Tail Gear . . . . .	.1
(C) Rudder . . . . .	.1	(N) Tail Control Arm . . . . .	.1
(D) 1/8" Plywood Wedge . . . . .	.1	(O) Springs . . . . .	.2
(E) Stab Root Cover (Plastic) . . . . .	.1	(P) Brass Arms . . . . .	.2
(F) Stab. Supports . . . . .	.2	(Q) Spring Steel Strip (Long) . . . . .	.1
(G) Plastic Disc . . . . .	.4	(R) 3mmx12mm Self Tapping Screw . . . . .	.2
(H) Brass Sleeve . . . . .	.2	(S) 3mmx5mm Screw . . . . .	.2
(I) 2mmx15mm Screw . . . . .	.2	(T) Wheel Collar . . . . .	1
(J) 2mm Nut . . . . .	.2	(U) Wheel Collar Screw . . . . .	1
(K) 2mm Washer . . . . .	.4	(V) Brass Collars . . . . .	2



(1) Test fit the 1/8" plywood wedge into the tail end of the fuselage. If there is a good fit, epoxy it in place making sure that it is even with the fuselage sides. **NOTE:** It may be necessary to trim away some wood or glue to make the wedge fit flush.



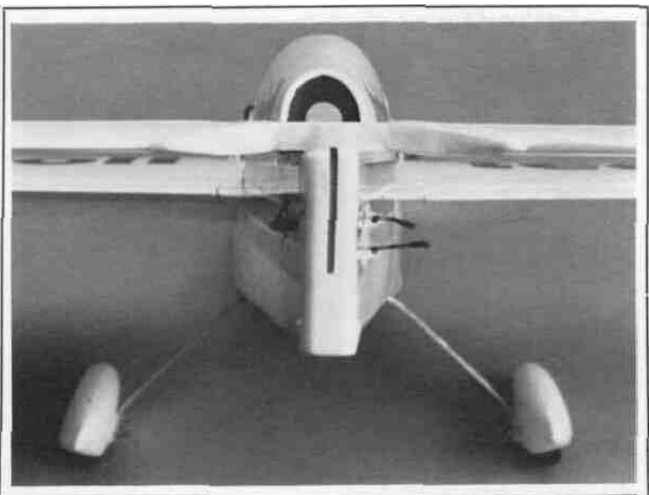
(4) Next take a piece of string and attach it with a pin to the top center of the fuselage. Make sure that the stabilizer is centered and stretch the ring to the corner of the elevator. Adjust the positioning of the stabilizer so that both corners are the same length when moving the string from side to side.



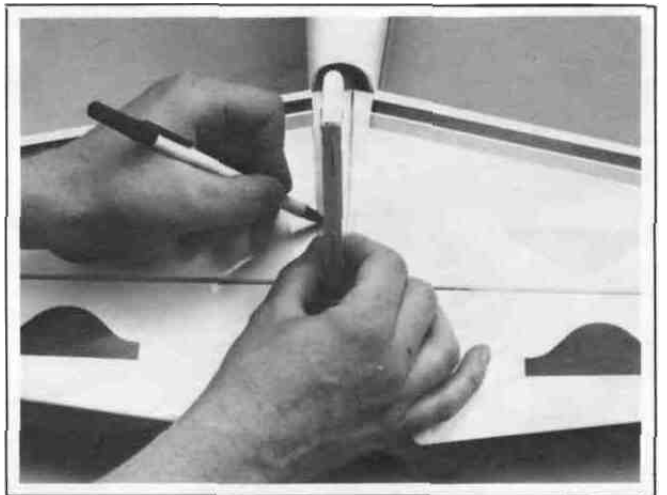
(2) Trim away part of the plastic rear cover to allow proper fit of the horizontal stabilizer.



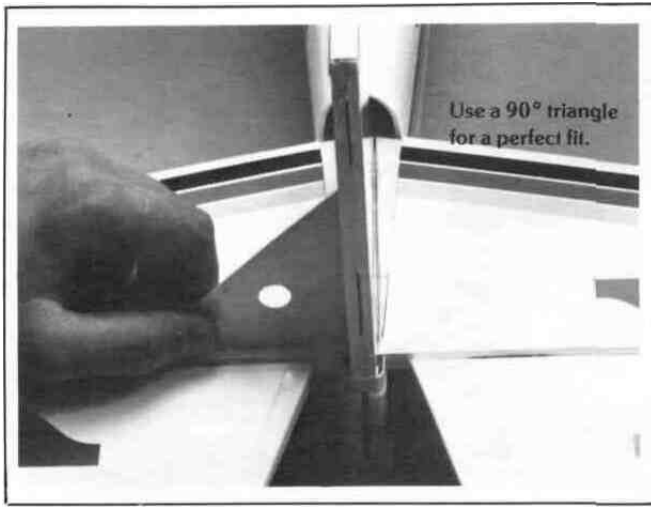
(5) Next, remove the stabilizer and apply epoxy to the wedge. Reinstall the stabilizer and re-center like before.



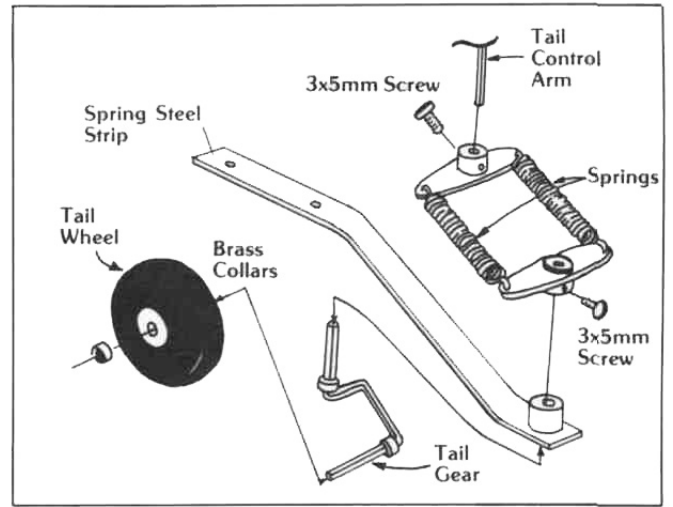
(3) Install the main wing. Next place the horizontal stabilizer onto the tail. Hold it on and visually see if the wing and stabilizer are parallel. If not sand the higher side of the stabilizer mount until the stabilizer is parallel.



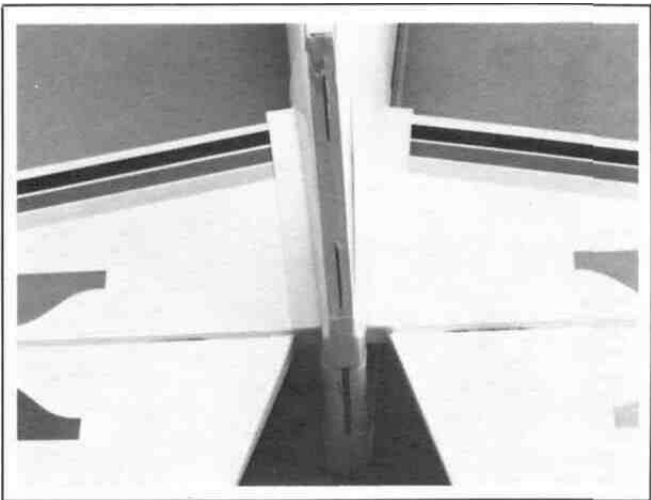
(6) Once the horizontal stabilizer epoxy has cured trial fit the vertical fin (without the rudder) on top of the horizontal stabilizer. Center the fin so it is straight in line with the fuselage and 90° to the stabilizer. Draw a line on both sides of the fin as shown.



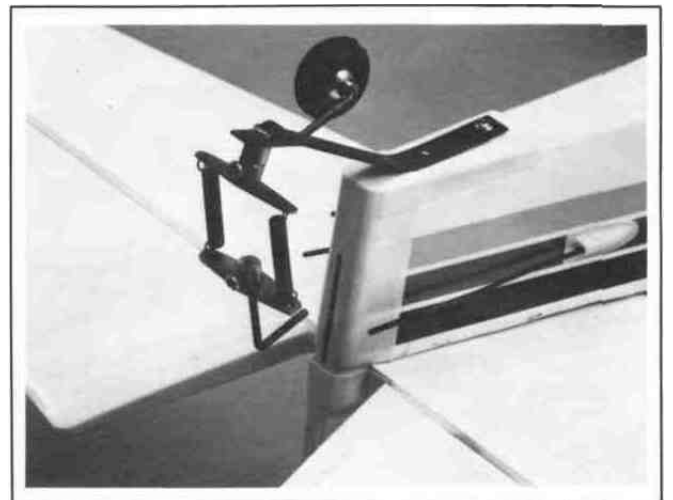
(7) Next, apply epoxy to the top of the horizontal stabilizer and re-position the fin between the lines. Make sure that the fin is still 90° to the stabilizer. Do the next step before the glue sets.



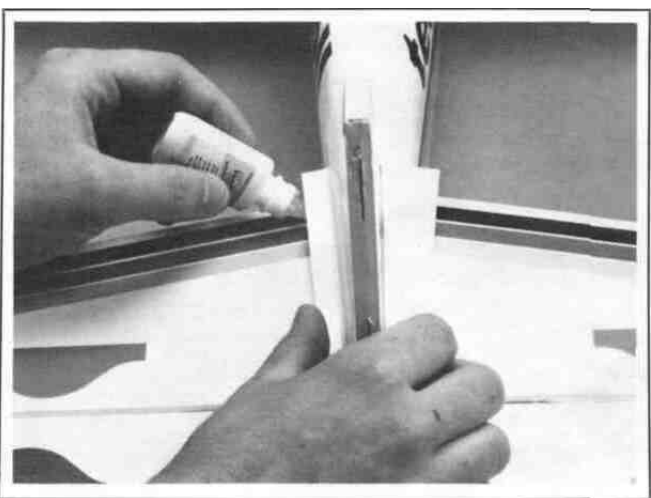
(10) After the glue has completely set, assemble the tail wheel section shown. The wheel should be straight in line with the strip as should be the tail control arms. Attach the wheel collar to hold the wheel on.



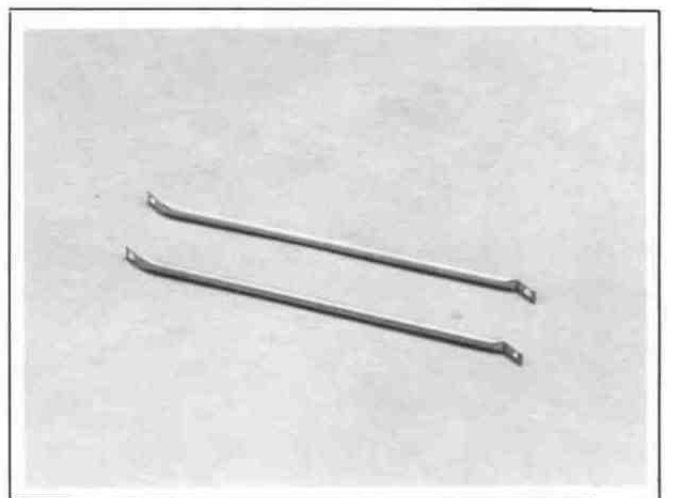
(8) While the epoxy is still wet, position the plastic stabilizer root cover over the fin. Double check the positioning of the fin after doing this.



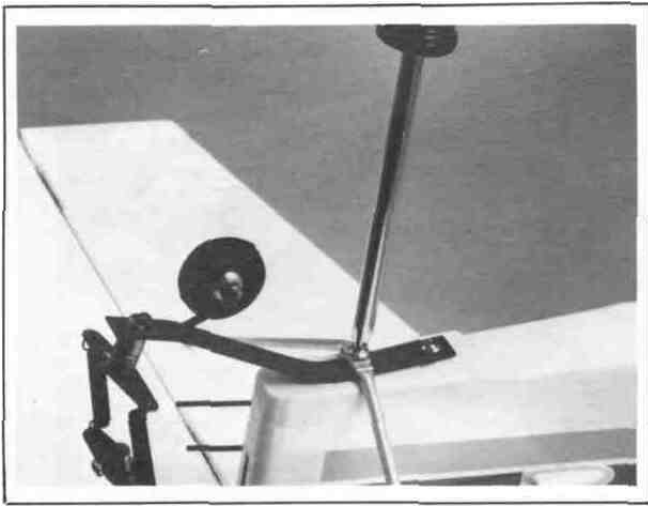
(11) Carefully turn over the airplane and attach the 3mmx12mm self-tapping screws into the center of the fuselage so that the end of spring steel strip is 2 1/2" from the end.



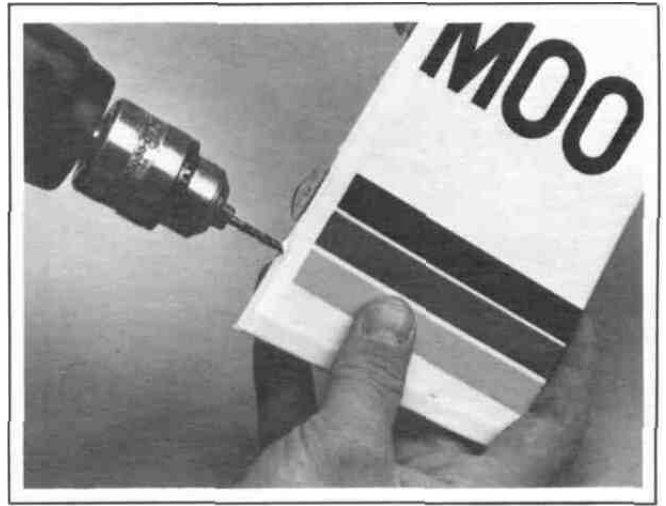
(9) When satisfied with the fin positioning, apply Cyanoacrylate glue to the underside edge of the stabilizer root cover and install in place.



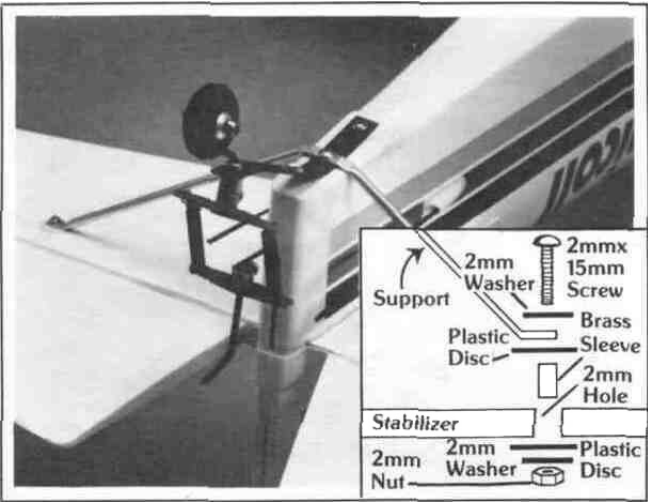
(12) Now take the stabilizer supports and bend the ends as shown above.



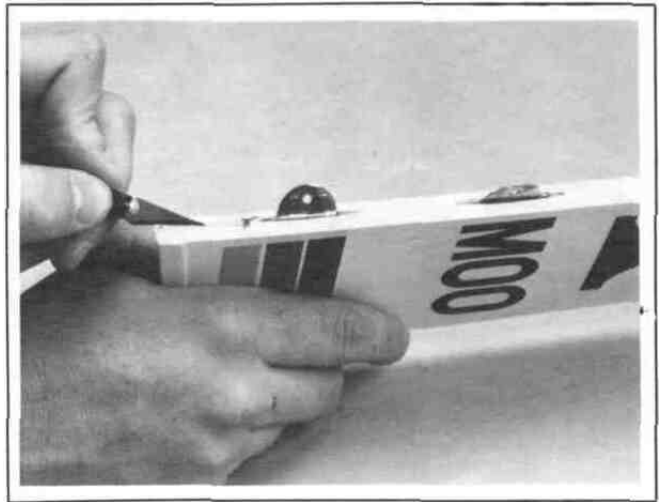
(13) Attach the two supports onto the fuselage with a 3mmx12mm self tapping screw. Make sure that the tail wheel assembly is straight.



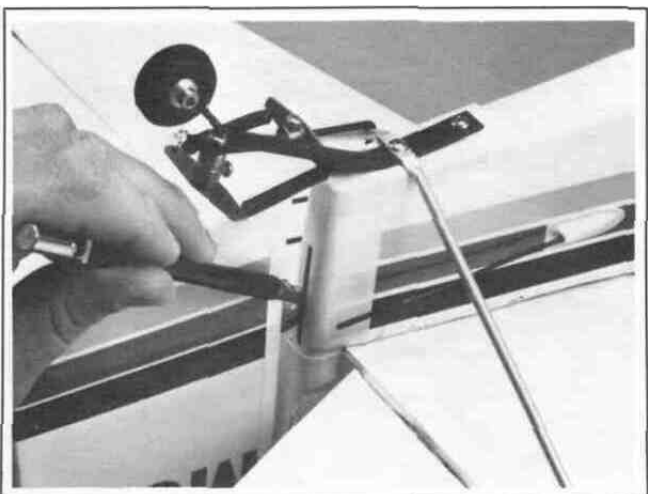
(16) Next, drill a 2mm hole about 1" deep at 1 1/8" from the bottom of the rudder. The hole should be straight in from the front edge.



(14) Position the supports straight out (90°) to the fuselage and attach. Use the included hardware and drill 2mm holes for mounting.



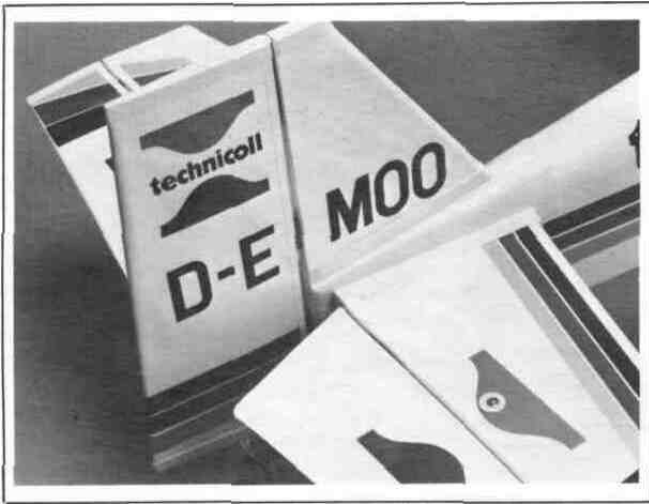
(17) Notch a small groove (1/8" deep) from the hole down to the bottom for the tail control arm.



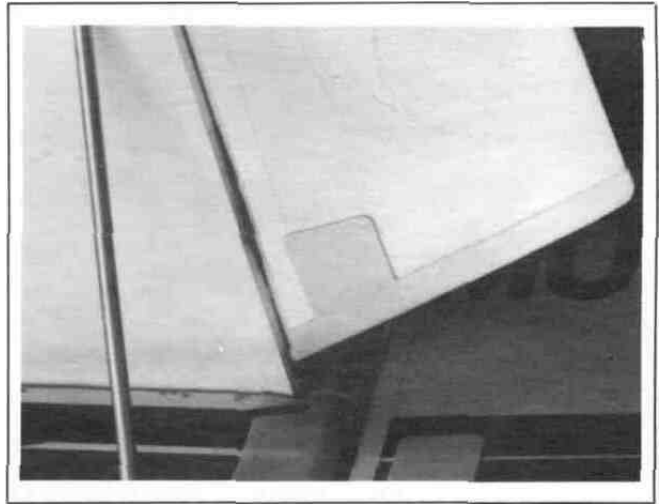
(15) Trial fit the rudder onto the vertical fin. Notice where the bottom hinge meets the fuselage and make a slot in the tail where the rudder hinge needs to be with an X-Acto knife.



(18) Place a small amount of epoxy on the hinges, in the groove and on the end of the tail control arm. (It is a good idea to place some petroleum jelly onto the hinge center joint (point of movement) to keep out any epoxy.)

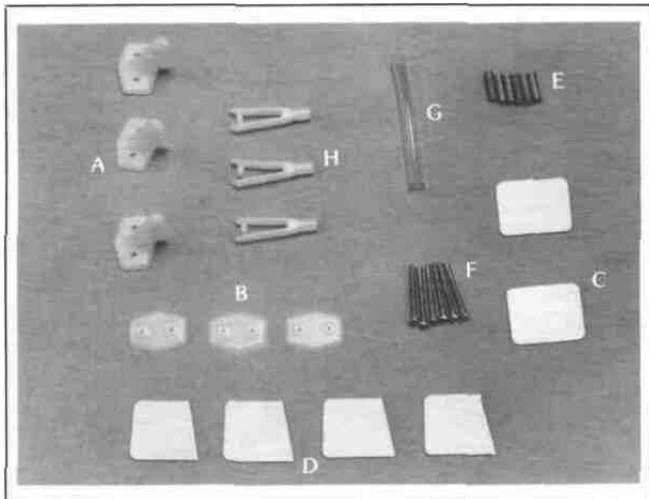


(19) Carefully position the tail control rod into the hole and the groove. Wipe off any excess epoxy and then insert the hinges into the slots. Wipe off any excess epoxy from the hinges and check for free operation. Let cure.

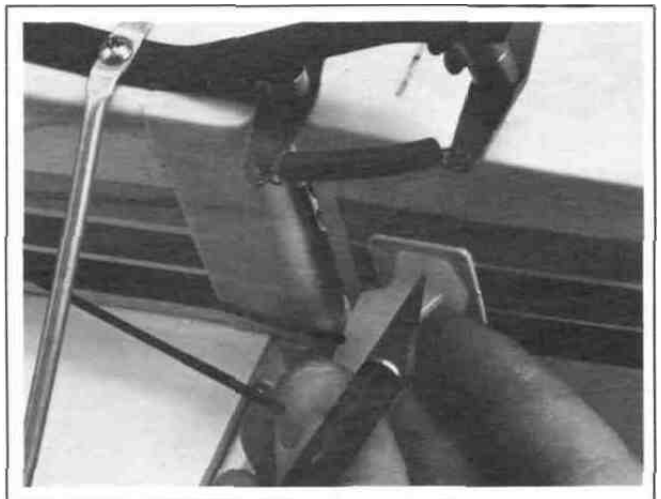


(2) Using PlastiZap again, glue the angled mounting plates, one on each side, on the two elevator halves as shown.

## CONTROL HORN INSTALLATION



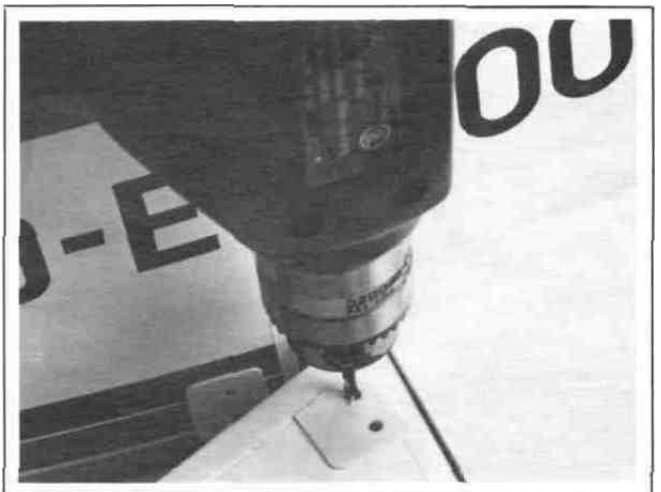
(A) Control Horns	.....	.3
(B) Back Plates	.....	.3
(C) Mounting Plates (Rectangled)	.....	.2
(D) Mounting Plates (Angled)	.....	.4
(E) Brass Tubes	.....	.6
(F) 2mmx20mm Screws	.....	.6
(G) Clevis Retainer Tube	.....	.1
(H) Rod Clevis	.....	.3



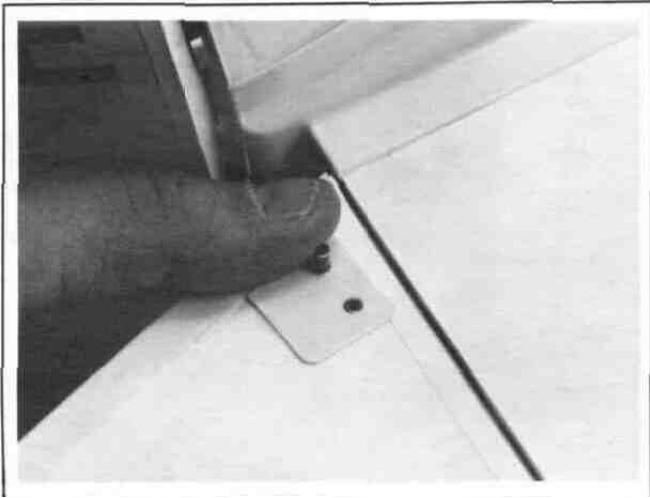
(3) Using the control horns as a guide, center and mark two holes for drilling on all three mounting plates. The horns will then be mounted — two underneath the elevator and one on the right side of the rudder (as viewed from the rear).



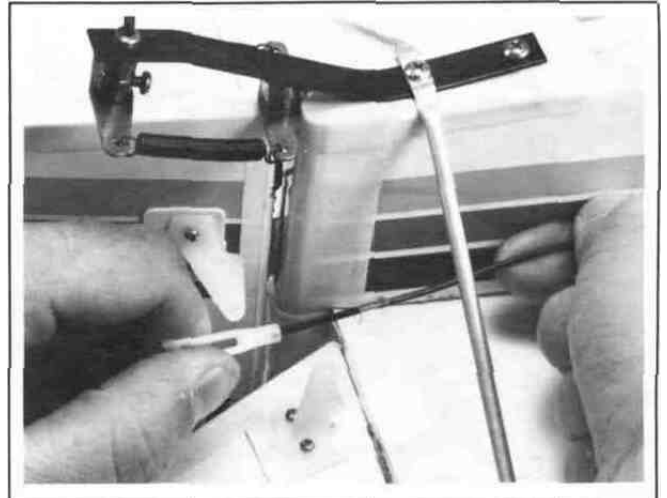
(1) Glue (use PlastiZap) the rectangular mounting plates to the rudder so that they are centered, one on each side, over the tail control arm that is "inside" the rudder.



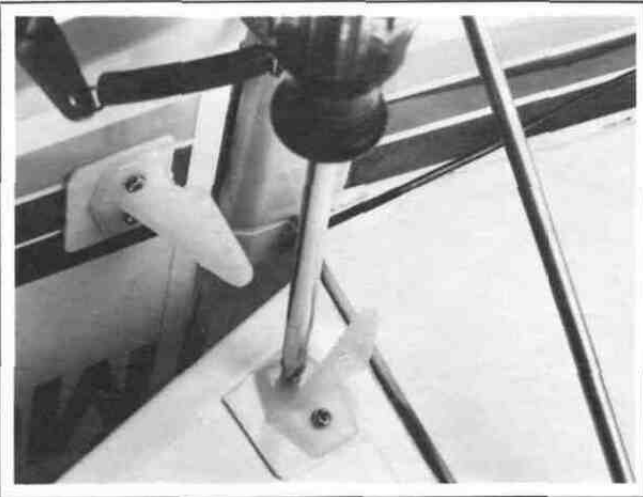
(4) Drill out 3mm holes for the three horns. Make sure that you drill straight through to the other side.



(5) Install the six brass tubes into the holes



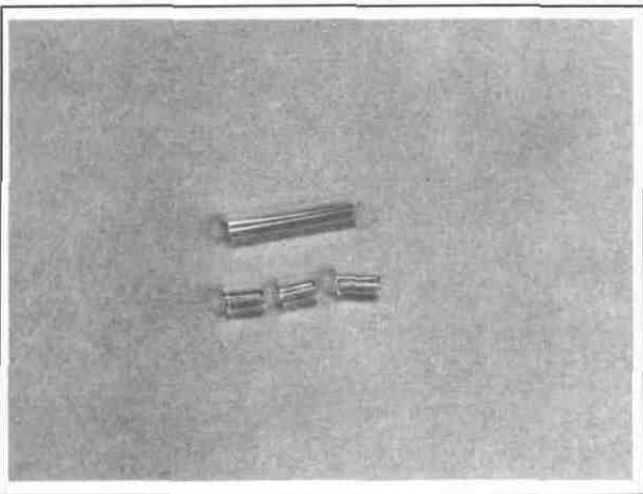
(8) Screw on the plastic snap clevises to the 3 push rods coming out of the fuselage. Screw them on half way up the threads



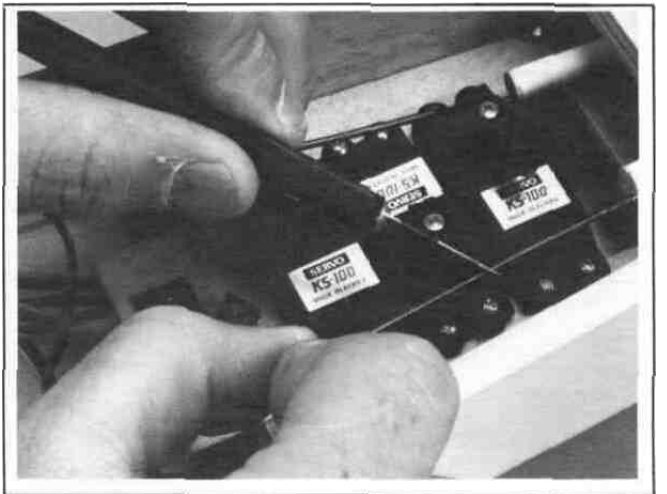
(6) Mount the control horns to the surfaces with the 2mmx20mm screws. Pass the screws through the horn, next through the tubes and finally thread them into the back plates. See the picture for proper positioning



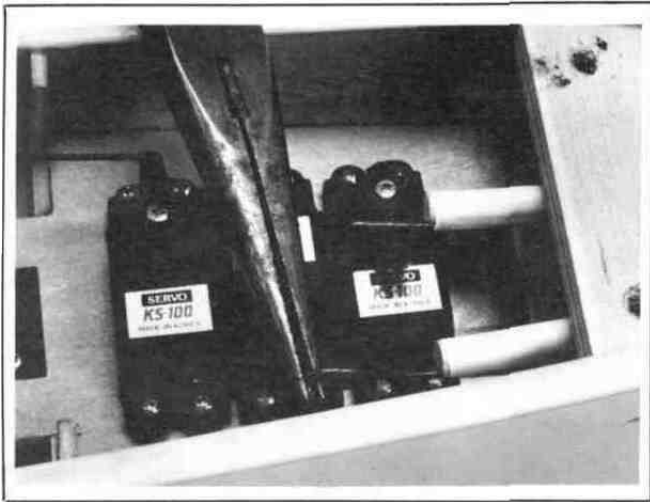
(9) Attach the respective control rods to each horn. Use the middle hole of the horn. Turn on the radio system and adjust the clevises for centered control surfaces



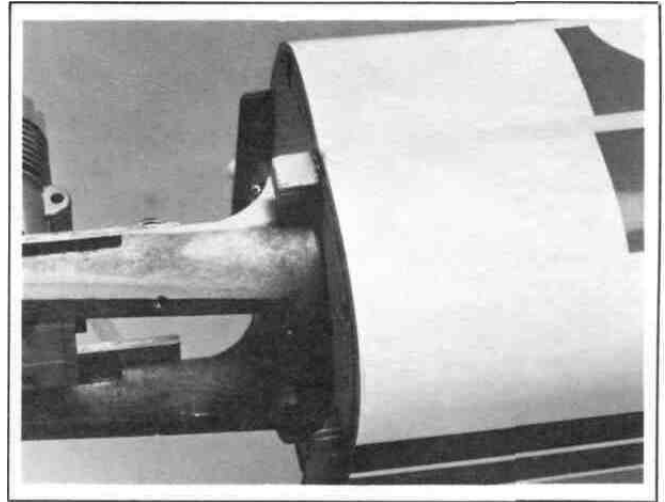
(7) Cut the clevis retaining tube so that you have three 3/16" tubes.



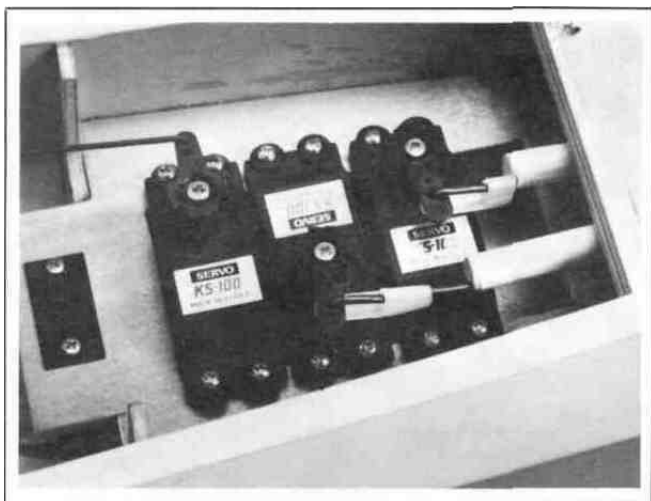
(10) Align the rods over the servo horns and make a mark where they intersect. Make sure that the control surfaces are in neutral (center position) before marking



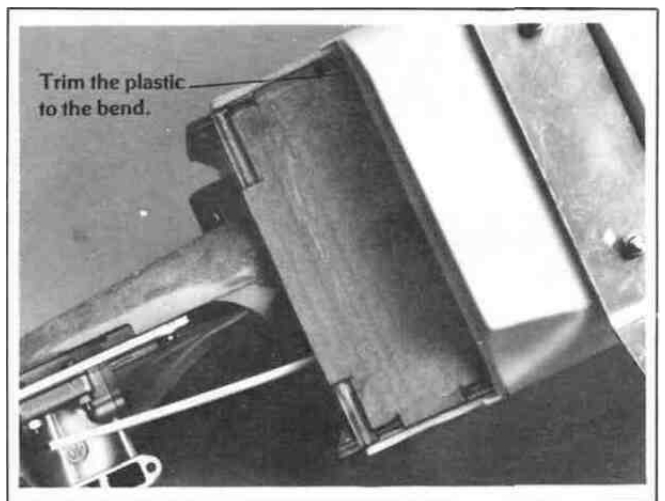
(11) Next, make a 90° bend downwards at the mark and cut-off the excess so that there is only 5/16" of rod after the bend.



(1) Epoxy the small mounting brace to the top of the firewall. Fill any gap with epoxy.

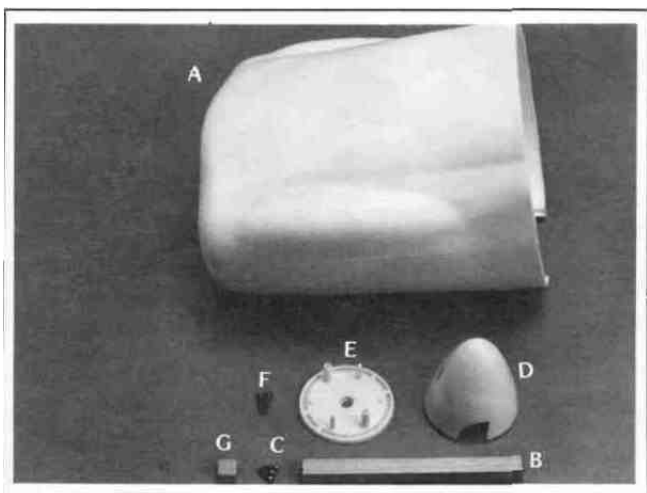


(12) Attach the rods to the servos using the rod clevises as shown in the above drawing. You may need to enlarge the holes.

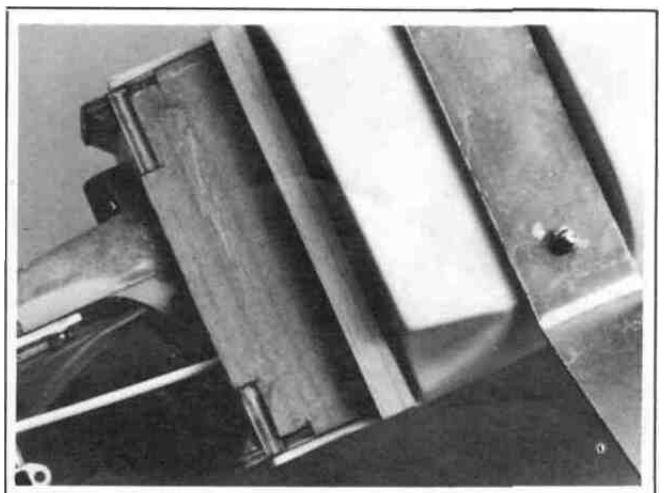


(2) Trim away some of the plastic from under the front of the fuselage where shown.

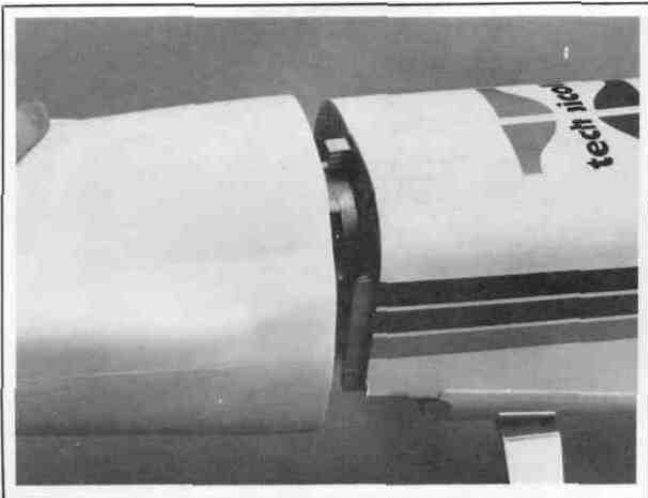
## COWL AND PROP INSTALLATION



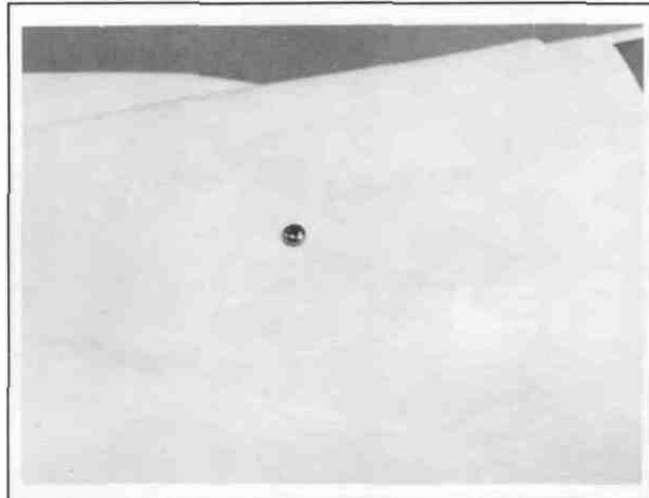
(A) Cowl	.....	.1
(B) Cowl Brace	.....	.1
(C) 3mmx8mm Self Tapping Screw	.....	.3
(D) Spinner	.....	.1
(E) Spinner Back Plate	.....	.1
(F) 3mmx12mm Self Tapping Screw	.....	.2
	(in spinner)	
(G) Mounting Block	.....	.1



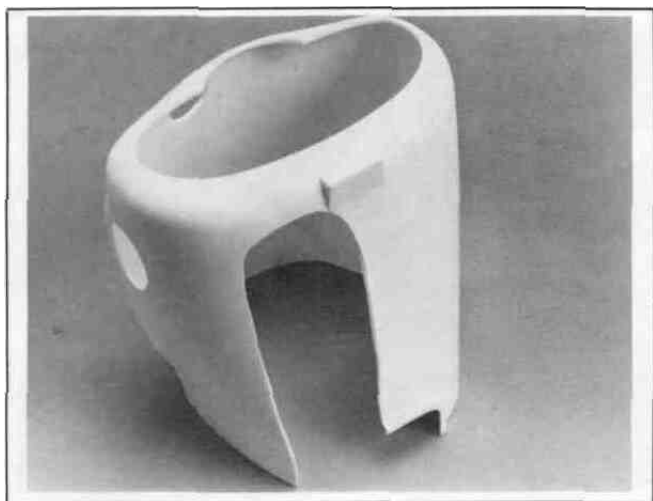
(3) Epoxy the cowl brace onto the front of the fuselage. Make sure that the beveled ends angle down in line with the fuselage. Connect fuel lines.



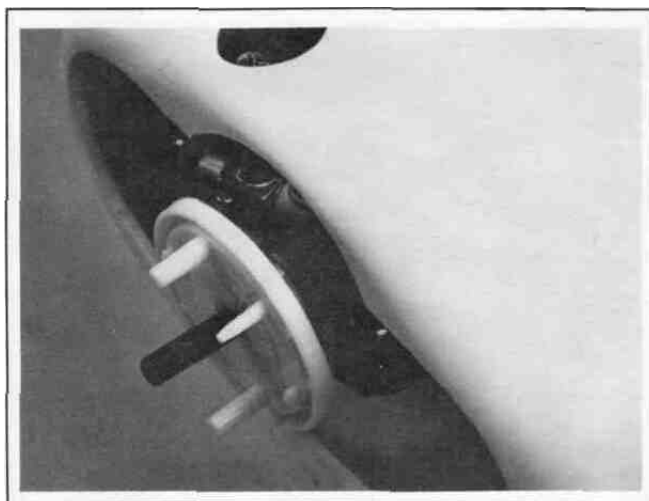
(4) Install the muffler onto the engine. Trial fit the cowl onto the fuselage so that the engine crankshaft and drive washer protrude out of the front.



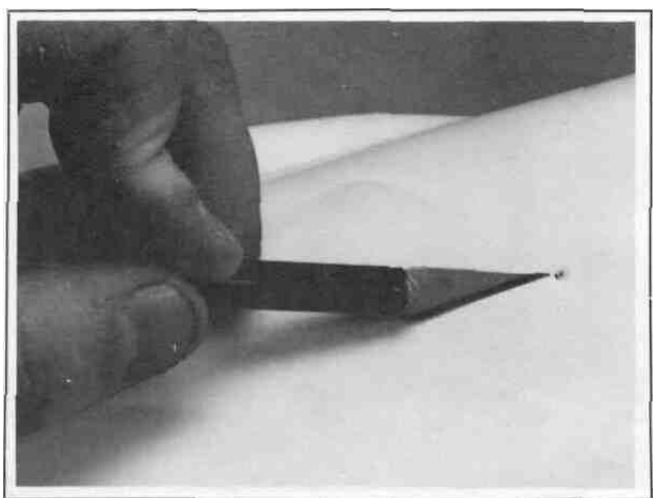
(7) Drill a 2mm hole at each point and attach the cowl using three 3mmx8mm self tapping screws.



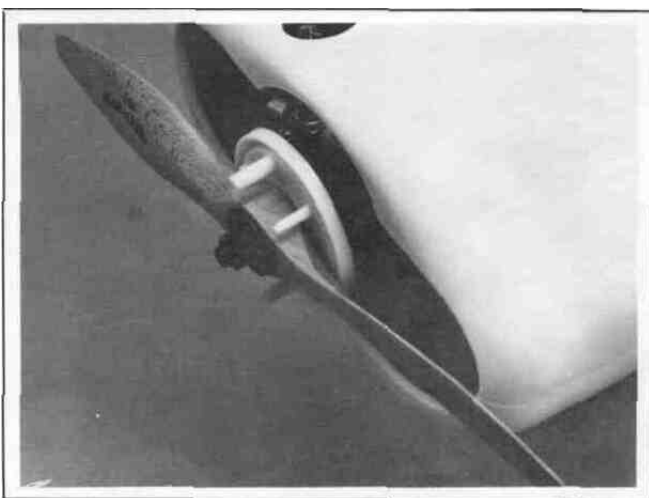
(5) Trim as needed so that the engine muffler will exit. Now make two holes in the side and the top where the cylinder head and needle valve are located for easy accessibility.



(8) Remove the crankshaft nut and washer and install the spinner back plate onto the shaft.

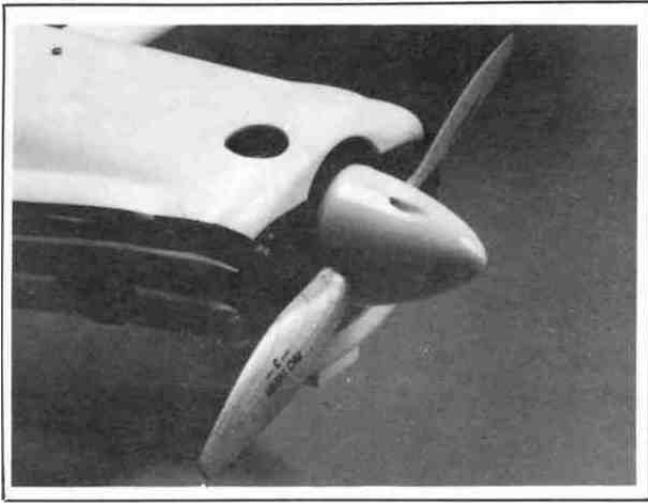


(6) Slide the cowl onto the fuselage and make three holes (1 on top and 1 on each side) where the mounting block and cowl brace are located.

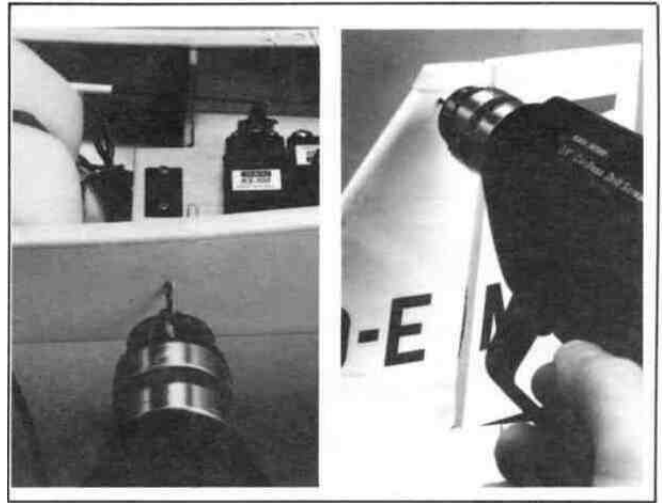


(9) Install a 10x6 prop and washer onto the shaft and tighten the nut. Make sure the prop is positioned so the spinner will line up over the prop.



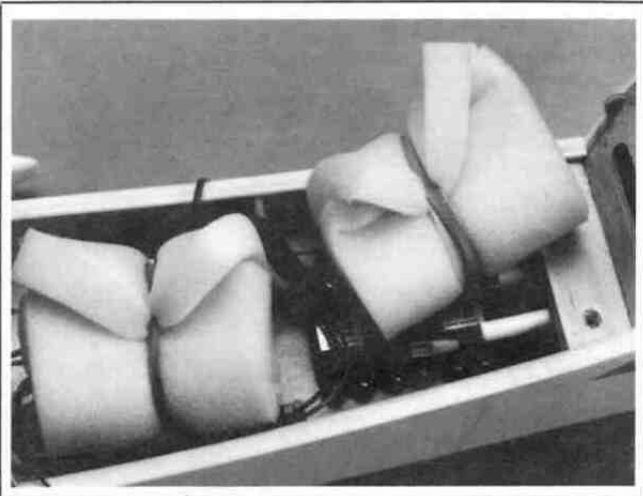


(10) Install the spinner with the two 3mmx12mm self tapping screws. Attach the cowl decals to each side

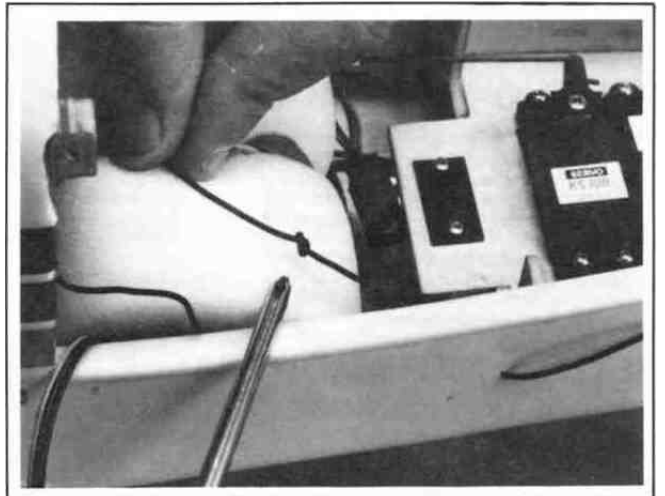


(3) Drill a small (1/16") hole into the left side of the fuselage under the wing and drill a hole at the top of the vertical fin

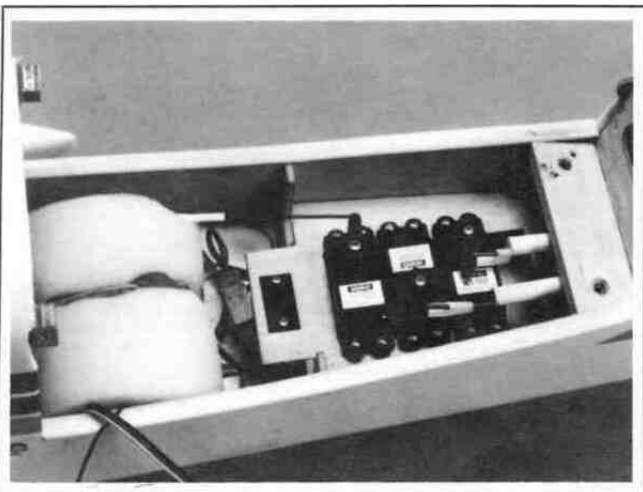
## RECEIVER AND BATTERY INSTALLATION



(1) Hook up the servos and wrap the receiver and battery in natural foam rubber to protect it from vibration (Goldberg #481 Foam Rubber 1/4" works well) Use the aileron extension for Channel 1



(4) Make a small knot 6" from the receiver and route the antenna wire out through this hole and up through the hole in the tail

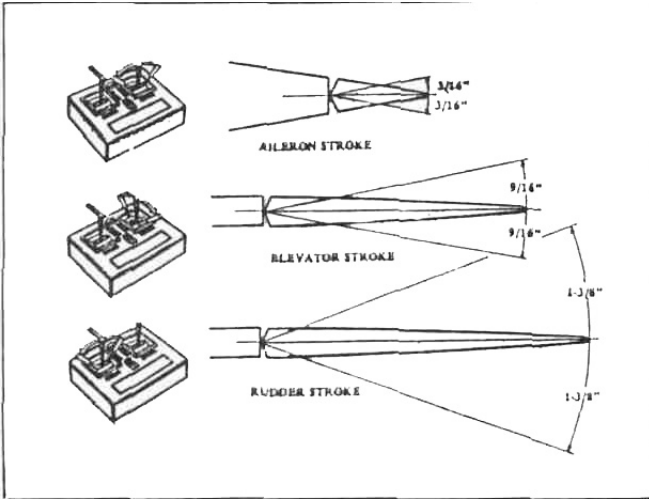


(2) Install the (battery first) into the front of the fuselage as shown and then the receiver on top



(5) Use the Antenna retainer and secure the wire to the tail

## SERVO THROWS



The amount of throw that the control surfaces have is critical if you want a properly responsive plane. Measure the throws as shown above. They should be:

	Each way	Total
Ailerons	3/16"	3/8"
Elevator	9/16"	1-1/8"
Rudder	1 3/8"	2 3/4"

If not, move the clevis to a different hole or use a larger servo horn.

## CENTER OF GRAVITY



Balance the plane using the mark on the side of the fuselage. It should balance at this point. See below.

### CENTER OF GRAVITY (C.G.)

The center of gravity is a very important aspect of setting up the airplane properly. It will control a large part of what type of flying characteristics your plane will have. If it's nose heavy, the airplane will try to dive, and the elevator will be sluggish to respond to your control inputs. If the plane is tail heavy, the airplane will be very sensitive to the elevator and possibly very uncontrollable. The center of gravity should be checked with an empty fuel tank to be accurate. The range in which the airplane should balance is marked with a black dot on the side of the fuselage. With standard radio equipment, the plane may balance within this range. If it does not balance within this range, feel free to add weight to the nose or tail as you need to obtain a proper C.G.

## PRE-FLIGHT CHECK

- 1 Clean the dust, dirt, and oil off of the surface of the airplane.
- 2 Check to make sure all nuts, bolts, and screws are securely fastened.
- 3 Check all control surfaces to see if they are properly attached.
- 4 Check the range of the radio system as the manufacturer recommends.
- 5 Check that all controls move smoothly and in the proper directions.
- 6 Check the level of charge in the transmitter and receiver batteries.
- 7 Check that the area being used is free of obstacles and debris.
- 8 Check the frequencies currently in use at the field and in your area.
- 9 Check the level of the fuel tank to be sure it is full.
- 10 Double check the radio operation.

## AFTER-FLIGHT MAINTENANCE

- Remove all excess fuel from the fuel tank, as this fuel can become jellylike and cause clogging of fuel lines, as well as clogging the engine's carburetor valves.
- Always use after run oil in the engine to prevent corrosion.
- Check and double check that the transmitter and receiver switches are switched to the off positions.
- Wipe off the excess oil that will collect on the wing and fuselage. Use a light duty cleaner to help cut through the oil.
- Remove fresh fuel from the surface of the plane immediately, as different brands can cause clouding of the surface.
- Replace any bent, marred, or dinged props as they can fly apart at any time when the engine is running.
- Completely check the airplane for damage to the wings, landing gear, covering, and repair as needed before your next flight.

## REPAIR

If damage should occur, wipe the broken area clean with a clean rag to remove all debris. Use epoxy glue to repair. Do not use Cyanoacrylate adhesive near any foam parts as it will deteriorate the foam.

## TRANSPORTING CHECKLIST

Before leaving for the flying field, go through the checklist. This will help prevent you from forgetting to take things with you.

- Make sure radio batteries are all charged.
- Make sure the transmitter and receiver are on the same frequency.
- Glow plug clip and fully charged 1/12 volt battery.
- Fuel and fuel pump or fuel bulb.
- Extra props and prop wrench.
- Screw drivers, knife, pliers, and wrenches.
- Epoxy and something to mix it on.
- Papertowels.
- Cleaner to remove residue on the plane.
- 10 Extra glow plugs.
- 11 Electric starter or chicken stick.

## IMPORTANT SAFETY MEASURES

### Receiver Battery

- 1 Always make sure the receiver battery pack is fully charged before flying.
- 2 Wrap the receiver battery in 1/2" soft foam rubber to protect it from engine vibration and shock. A rubberband may be used to hold the foam around the battery pack. It is also suggested to place the battery pack in a plastic bag to protect it from fuel.
- 3 If using NiCd batteries, follow the instruction that came with your radio for charging and care of the batteries.
- 4 Before the first flight of the day, check all the wires on the battery pack and switch for corrosion or broken wires.
- 5 Do a pre-flight check (page 28) of your radio system each flying session.

### Receiver

- 1 Do not cut the receiver antenna. This may affect the sensitivity of the receiver.
- 2 Carefully wrap the receiver in foam and a plastic bag like the receiver battery.
- 3 Make sure that all the servos are plugged into the correct receiver terminal.

### Servos

- 1 Make sure that all the control surfaces move smoothly without binding. When installing the push rods, the servo must be able to move through its complete range of rotation.
- 2 If the servo buzzes when the transmitter stick is moved to its limit, the servo still has some movement left. This can damage the servo and drain the battery, which may cause loss of control of the plane and a crash.

## FLIGHT SAFETY

- If this airplane happens to be your first radio controlled airplane, we strongly suggest that you ask a skilled pilot to help you fly it. You should also suggest to him to take the maiden flight to see what problems (if any) that need to be worked out. There will be enough to worry about on your first flight without having to worry about whether or not it is properly set up.
- Fly in an open field without any obstructions. For example, trees, power lines, buildings, crowds, or people, etc. are obstacles that the plane may hit and cause damage.
- Fly the model at a reduced throttle until you get to know the flight characteristics.
- When adjusting the needle valve just prior to flight, hold the plane at a 45° nose up attitude, full open throttle, and adjust the throttle for top performance as the manufacturer's instructions suggest.

# STARTING ENGINE

## Engine Maintenance

Always check the engine mounting bolts, muffler, glow plug, propeller and spinner, etc., before attempting to start the engine. Check for loose bolts, nuts or screws which may come off when the engine is running and cause serious damage. Always check the area in which you will be flying or just running the engine. Check for possible hazards, such as loose rags, rocks, tools, etc., lying on the ground which may get caught in the prop.

If you intend on starting the engine by hand flipping the prop, always use a chicken stick, and be sure to check the position of the prop. It is most comfortable when it is at the 2 o'clock position when starting the compression stroke. When you are using an electric 12V starter, the position of the prop is of no concern.

## Engine Break-In and Starting

Most manufacturers recommend that the engine be broken-in on a test stand. We also recommend that this be done according to manufacturer's instructions. If a test stand is unavailable the engine may be broken-in on the plane. Breaking-in the engine allows the parts to "seat" next to each other.

1. Remove the carburetor fuel line and the muffler pressure line from the muffler.
2. Fill the fuel tank through the carburetor fuel line. When the tank is full the fuel will come out of the pressure line.
3. Reconnect the tubing.
4. Follow your manufacturer's instructions according to needle valve settings.

5. Turn the radio on and open the throttle to full open. Place your finger over the air intake on the carburetor while turning the prop counter-clockwise a few times. Notice the fuel line. If any fuel is being sucked into the carburetor, turn the prop a few more times. If no fuel is reaching the carburetor, recheck the fuel line plumbing.
6. Reduce the throttle to 1/4 or 1/2 throttle for starting.
7. Using a starting stick (chicken stick) and holding the fuselage firmly, quickly flip the prop in the counter-clockwise direction. Do not attach the glow plug clip in this step. This will prevent the engine from being flooded and will make starting much easier. Do not use bare hands/fingers for starting, as the kick back from a model engine can be strong enough to cause severe injury.
8. Attach the glow plug clip at this time.
9. With quick flipping movements, flip the prop in the counter-clockwise direction. If the engine does not try to start in the first few tries, double check your procedure and keep trying.
10. Once the engine has started, listen carefully to the sound of the engine. The sound of the engine will tell you how the engine is running, if you know what to listen for. A lower-tone, popping sound is the sound of a rich running engine. As you turn the needle valve in, the popping sounds should decrease and the pitch of the engine should rise. The optimum needle valve setting will depend on your engine. Again check with the manufacturer's recommendations for engine break-in procedures and valve settings.
11. If you continue to have problems with the performance or starting of your engine, refer to the engine trouble shooting guide shown below.

## ENGINE TROUBLESHOOTING GUIDE

SYMPTOM	POSSIBLE CAUSE	SOLUTION
The engine does not start	Glow plug battery is making poor contact.	Check to see if the battery is wired correctly and to see if the clip is making good contact with the plug.
	Battery is dead or has a very low voltage	Replace or recharge the battery and check to make sure the battery can glow the plug red hot prior to starting.
	Bad glow plug (burned up or deteriorated filament)	Replace the glow plug.
	Improper air/fuel mixture intake.	Prime the engine through the carburetor air.
	Engine is flooded with fuel.	Close the needle valve completely and try to start the engine. It should start and then quickly stop. Reset the needle valve and continue starting.
The propeller is difficult to rotate.	Engine may be flooded.	Remove the glow plugs and rotate the engine until only a mist of fuel remains in the cylinder. Replace the plug and continue.
The engine fires but does not start.	Fuel is not reaching the carburetor.	Check the level of fuel in the tank. Recheck fuel. Open the needle valve a half turn or so and continue.
	Improper break-in procedures	Check the break in procedure and repeat.
The engine starts but does not sound or run good	Loose plug or bad plug.	Replace the plug and/or tighten the old plug.

## YOUR FIRST FLIGHT

Before starting the engine check and make sure all screws are tight that the hinges have not come loose, the control surfaces move in the right directions according to your input on the transmitter, and nobody is on your frequency

- 1 Start the engine and set the needle valve following the engine manufacturer's instruction
- 2 Hold the plane tightly and move the throttle to full speed. Pick the plane up and hold it at a 45-60° nose up for 10-15 seconds. The engine should run smoothly. If it starts to die the engine is too lean and the needle valve needs readjusting.
- 3 Taxi the plane to the end of the runway and point the nose into the wind.
- 4 Check that the control surfaces respond to the transmitter commands.
- 5 Gently advance the throttle to full power.
- 6 Gently steer left or right as necessary to obtain a straight take-off.
- 7 After the plane has gained speed, gently pull back on the elevator stick. Do not allow the plane to climb too steeply.
- 8 Keep the wings level and reduce the throttle some to obtain a gentle climb.
- 9 To turn gently move the aileron stick to the side and pull back on the elevator. If too much aileron is used the plane will bank too steeply. Make a wide gentle turn. When the turn is completed return the sticks to the center.
- 10 After the plane passes by you make another wide 180° turn.
- 11 When learning to fly it is easier to control the plane by facing the direction the plane is going and looking over your shoulder at it.
- 12 Fly in a figure eight making left and right turns at the end of the straights.
- 13 Decide where you are going to land and gently turn into the wind 500-800 feet downwind.
- 14 When you know you can reach the landing area, reduce the throttle. You want the plane to gently descent towards the landing area. Keep the wings level and do not allow the nose to rise. This can produce a stall (a lack of lift) and the plane will dive steeply.
- 15 If the plane is going to be short of the landing area apply some power to reach the landing area. If the plane is too high apply power and climb back up to some altitude and set up to land again. With practice you will be flying with more confidence and able to make nice smooth landings on a runway. The only way to become a good pilot is to practice.

## WHERE TO FLY

If you are a novice pilot local area clubs have been formed and are very willing to help you with any questions you may have. Many of the clubs even have club trainer airplanes that they will actually teach you to fly with. This helps prevent disappointing crashes on your first flights. Addresses of local area clubs can be located from your local area hobby shop and/or by writing to Academy of Model Aviation, 1810 Samuel Morse Drive, Reston, VA 22090.



**Assembled Diabolo .40**

## PRE-FLIGHT RADIO CHECK

With the batteries fully charged, turn on the transmitter and receiver. Move the control sticks a few times to make sure the control surfaces move freely and proportionally with the movements of the control stick. Check that all the control responses are correct. When viewed from behind move the aileron control stick to the right. The right aileron should go up. move the elevator stick down the elevator should go up. When the rudder control stick is moved to the left the tailwheel should move to the left. Also check that the throttle opens up to full power when the throttle control stick is moved up or forward.

Before flying each day perform a range check of your radio equipment as specified by the radio manufacturer. As a general rule for testing, follow the guidelines to the right.

- Do all testing in an open area away from cars and buildings. They may cause signal interference.
- Collapse the transmitter antenna so it is 6" to 8" long.
- Set the plane so that the rudder is facing you.
- Turn on the transmitter and receiver.
- Walk away from the plane while moving the control sticks while watching the control surfaces. The surfaces should move when the control stick is moved.
- Most radios should have a range on the ground (antenna collapsed) of 50 to 100 feet (see radio owner's manual). If the radio does not pass this test the plane should not be flown and the radio sent for repair.