LANIER R/C MARINER .120

Wingspan....80” **Wing Loading…**24 - 28 oz./sq. ft.
Fuselage Length…65” **Wing Area…**1140 sq. in.
Engine Required ... 2-Stroke .91 to .120 Four stroke .120 to .180
Weight……..12 - 14 lbs.

WARRANTY ……. Lanier R/C is proud of the care and attention that goes into the manufacture of parts for its model kits. The company warrants that for a period of 30 days, it will replace, at the buyers request, any parts or material shown to the company's satisfaction to have been defective in workmanship or material at the time of purchase.

No other warranty of any kind, expressed or implied, is made with respect to the merchandise sold by the company. The buyer acknowledges and understands that he is purchasing only a component kit from which the buyer will himself construct a finished flying model airplane. The company is neither the manufacturer of such a flying model airplane, nor a seller of it. The buyer hereby assumes the risk and all liability for personal or property damage or injury arising out of the buyers use of the components or the finished flying model airplane, whenever any such damage or injury shall occur.

Any action brought forth against the company, based on the breach of the contract of sale to the buyer, or on any alleged warranty there under, must be brought within/ year of the date of such sale, or there after be barred. This one year limitation is imposed by agreement of the parties as permitted by the laws of the state of Georgia.

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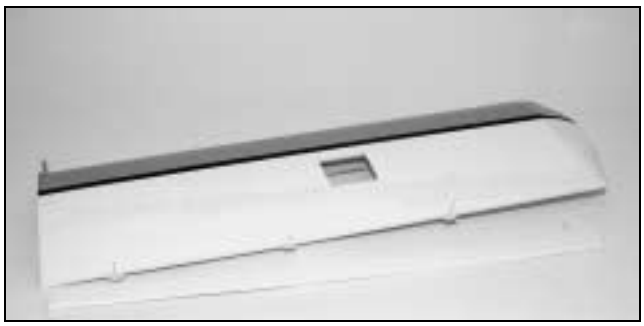
INTRODUCTION

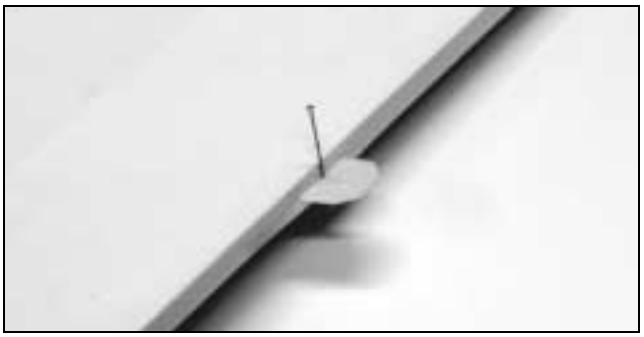
Congratulations and thank you for purchasing the Lanier Mariner 120. We are sure you will be happy with the quality of this kit and just as eager to fly it as we were the prototypes. We have spent many hours perfecting the Mariner 120 so that you can be assured its performance will be what you have come to expect from a Lanier kit.

Clear off the workbench and gather up your tools and get ready for a cosmic experience. You are about to begin fun with a seaplane. See last page for tools required.
…….Please keep on reading

WING ASSEMBLY

Start with one wing panel. So many of the ARF's you have assembled have you glue the wing panels together as the first step in assembly. We do it different. When all the parts are assembled on both wing panels, then join them. You will find this method much easier.





1. Begin with one wing panel. Remove the aileron and hinges from wing and aileron. Fold each hinge in half and stick a pin in the fold. Trial fit each hinge in the slot to check for depth. Some slots need to be cleaned out, use a #11 Exacto blade to clean them out.

2. Push each hinge in the slot in the trailing edge. Now align the aileron with the hinges and push in to the pins. Remove all the pins and close the gap. Align end of aileron with wing tip.

3. Fold the aileron down and apply 3 drops of thin CA to each hinge placement. Turn the wing over and repeat the process. Do not use any type of accelerator to speed up the curing process; this will make the hinge brittle.

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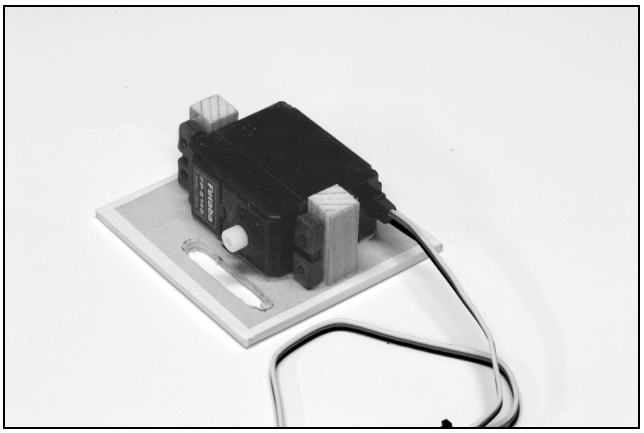
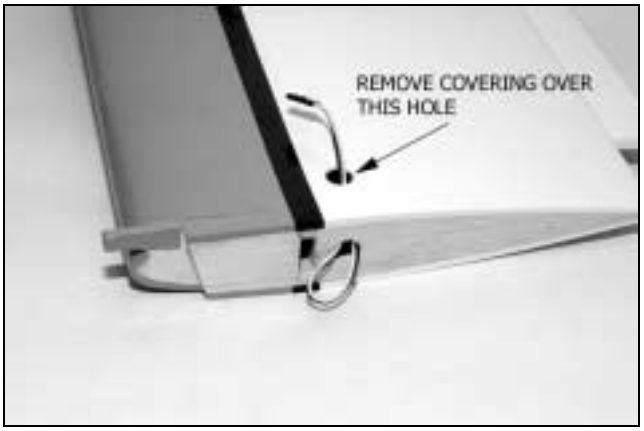
4. Locate the servo mounting plate and remove the covering over the slot with a micro tip soldering iron. Not only does this remove the covering easily but it seals the edge. Do both servo mounting plates.

5. Position the servo on the mounting plate with the output arm centered in the slot. Apply a small square of double sticky sided tape (not supplied) to the servo case to hold it in position. Cut 4 pieces of 3/8" sq. hardwood, 2 for each servo. Square up the ends. Epoxy one mount under each servo mounting rail, at each end. Be careful not to glue the servo in place. When cured install the servo mounting screw. (not supplied) Now do the other servo mount. Make sure you have a LH and a RH mount.



6. Using the micro tip soldering iron again, remove the covering over the hole adjacent to the hole in the end root rib on the bottom side of the wing. Do both wing panels.



7. You will need two 12" servo lead extension for this next step. (not supplied), one for each wing. The extensions must be compatible with your radio system. Plug the extension into the servo and secure the connection with tape to make sure it doesn't come apart.

8. Push a long thin wire thru the wing from the hole in the end root rib. Tie or tape on the servo connector and pull it through the wing panel. Now push it up through the hole in the bottom of the wing. Tape the end of the lead to the

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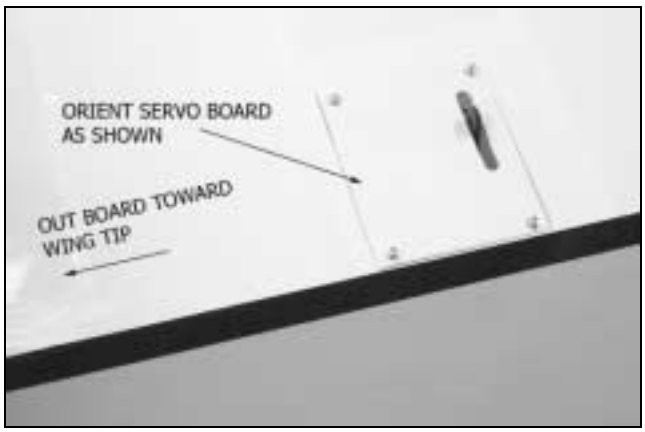
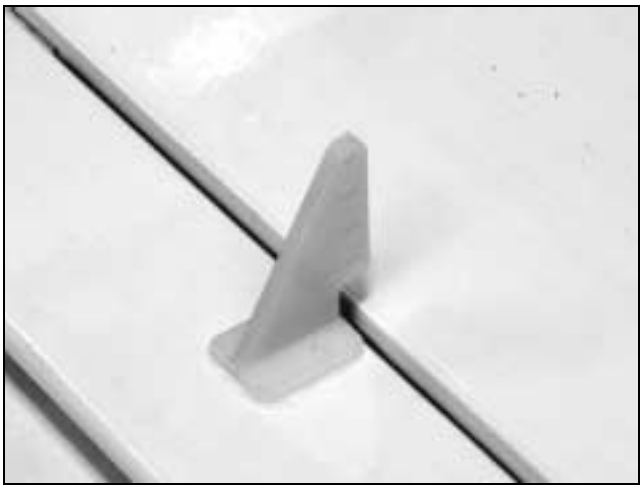
wing to prevent it from falling back into the exit hole. Now do the same to the other wing panel.

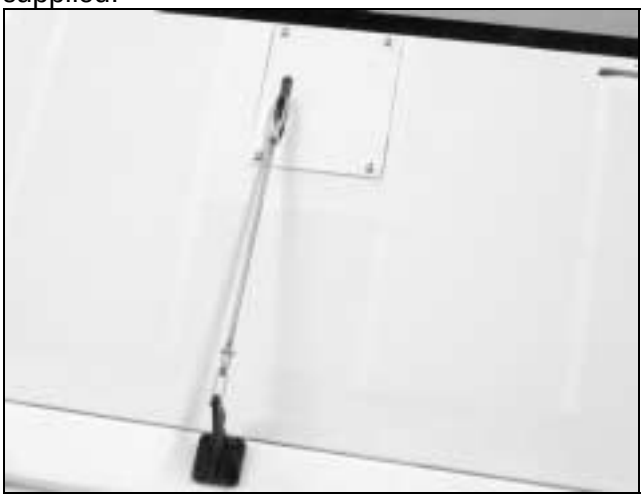


9. Place the servo board in the wing opening. Drill four 1/16" holes in each corner 1/8" in from each side. Use the #2 x 3/8" screws provided. Note: hardware may vary in looks from that shown.

10. Using a straightedge, place a mark on the aileron to locate the control horn. The holes in the horn must be in line with the hinge line.



11. Place the control horn on the mark and CA it in place using thin CA. Block sanding the base will help it adhere better. When cured, match drill the holes with a 3/32" drill. This will give better screw alignment to the nut plate on the far side. Now fasten in place with the hardware supplied.



11. Temporarily plug the servo into the receiver. Turn on the radio and allow the servo to center. With the servo centered, make sure the servo is installed as shown in the photo.

12. Locate a 4-40 x 5-1/2" wire pushrod threaded on both ends. Install the metal clevis,

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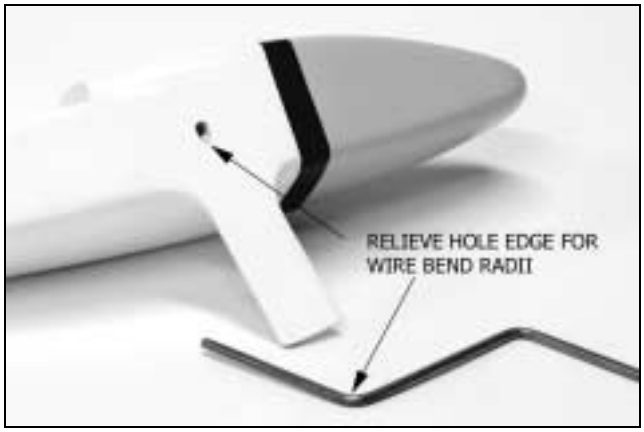
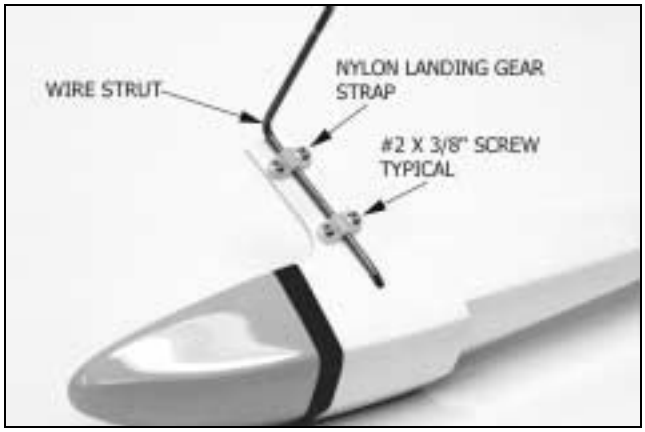
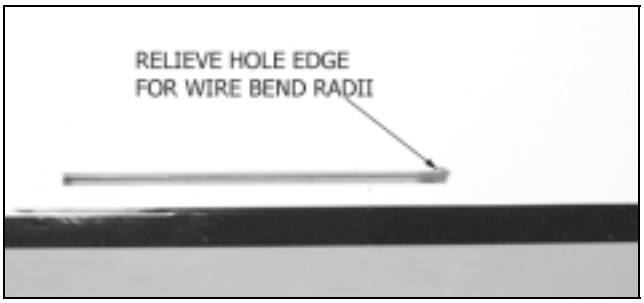
with lock nuts, on both ends of the pushrod. Install the clevis on the control horn and the servo arm.



13. Before pushing the wire through the hole in the float, relieve the edge of the hole with a burring tool, or #11 Exacto blade, so that wire will lay flat against float strut.

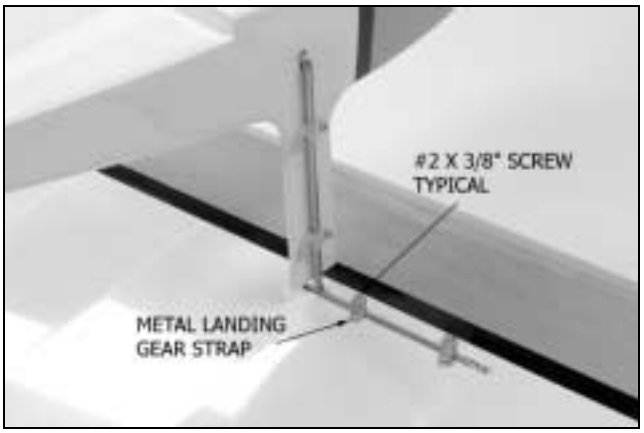


14. Install the wire strut in the float and fasten in place with the hardware shown in the photo. The long leg of the wire strut will protrude through the float slightly.



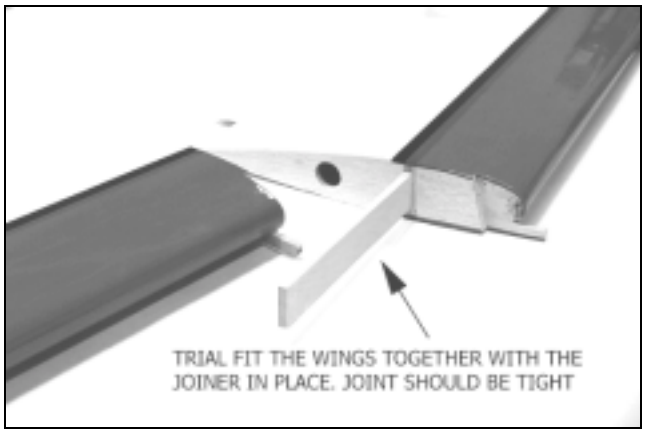
15. In order for the wire strut to fit snuggly in the slot relieve the edge of the hole with a burring tool or # 11 Exacto blade.

16. Install the float assembly in the slot provided and fasten in place with the hardware shown in the photo.

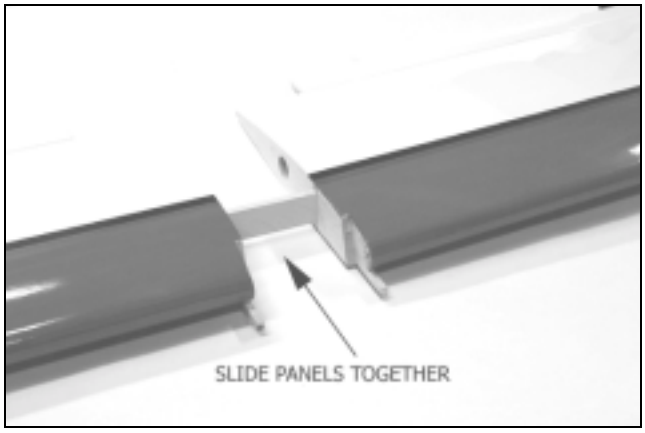


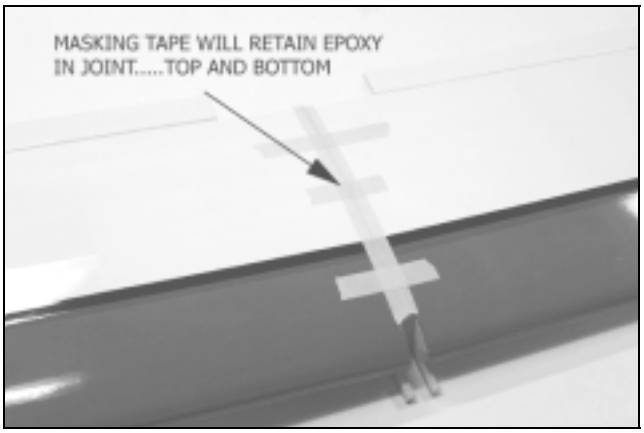
17. Secure the float assembly in place with the hardware shown. Be sure to place the metal straps at an angle for secure mounting of screw.

18. Now mount the float assembly on the other wing panel as stated in the above steps.

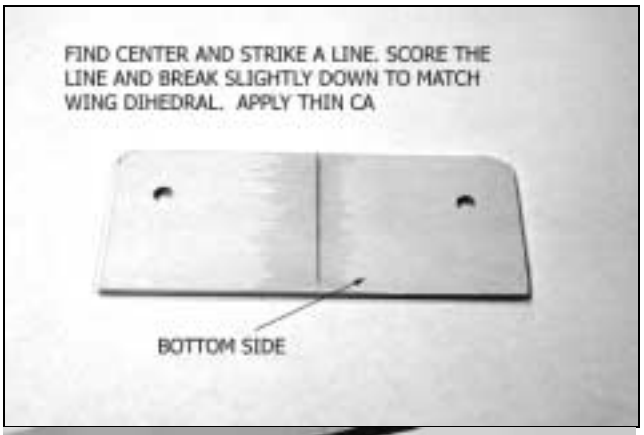


19. Mix 2 oz. of 30-minute epoxy in a mixing cup. Apply a liberal amount of epoxy into the wing joiner box in the wing. Apply epoxy to the root rib. Finally, apply epoxy to both sides, the top and the bottom, of the wing joiner. Insert the joiner into the wing. Slide the wing panel onto the joiner. Wipe any excess epoxy from the wing joint and clean any glue residue with rubbing alcohol. Hold the wing together with masking tape. The masking tape will retain the epoxy in the joint. Set the assembly aside until the epoxy has cured.





20. Locate the wing bolt plate and prepare it as described in the photo below.



21. Lay it on the wing. Trace around it and remove the covering inside the line. Remove ink

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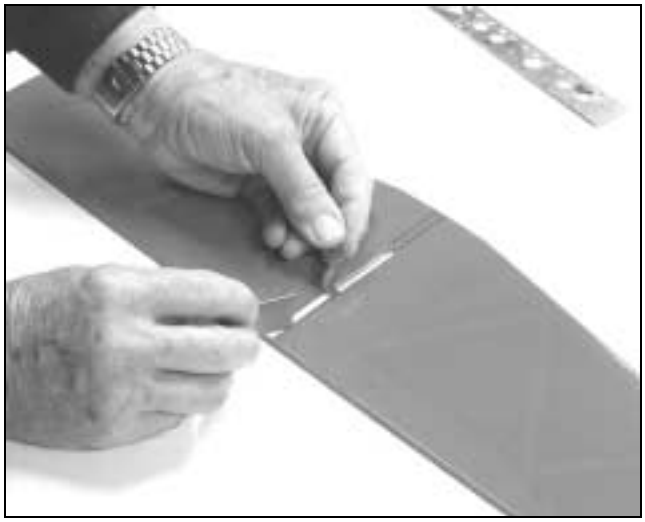
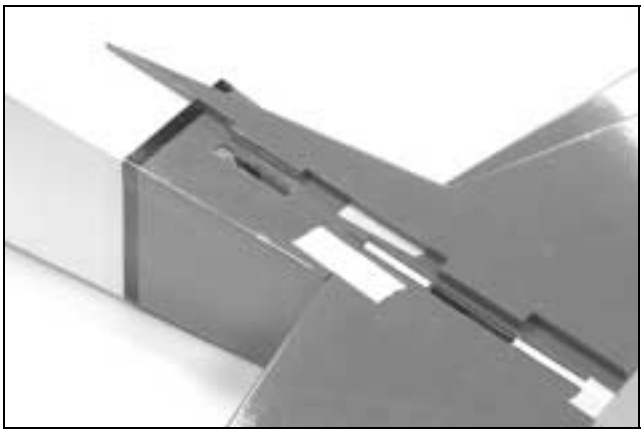
line with paper towel and alcohol. Glue in place with 5 min. epoxy.

TAIL ASSEMBLY

First it will be necessary to remove covering over the wood gluing surfaces. This can be done as stated before, that is, with a micro tip soldering iron or by carefully cutting it with a sharp razor. Be sure to cut inside the lines so that the bare space will not show when the parts are assembled

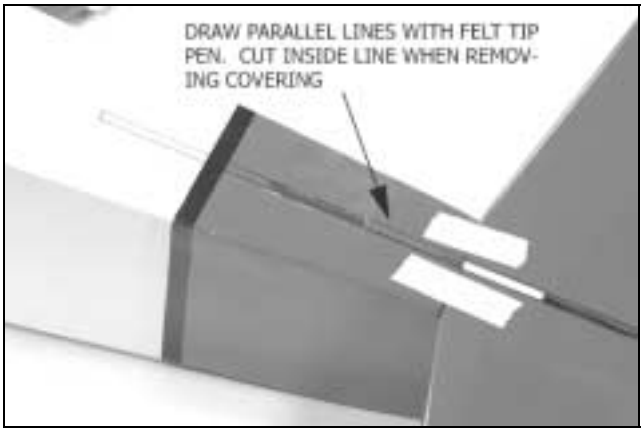


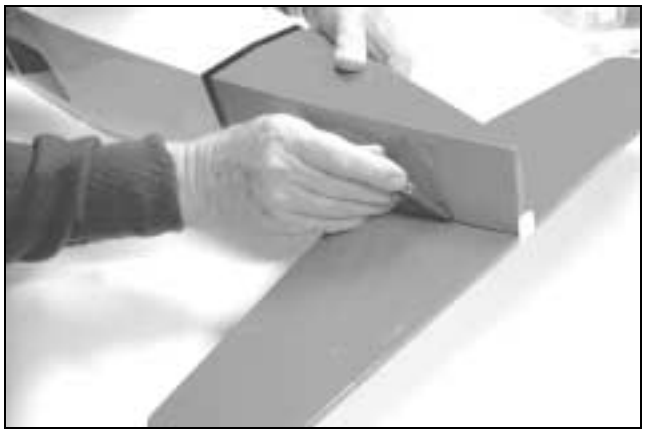
1. Draw two parallel lines with a felt tip pen using the slot as a guide.



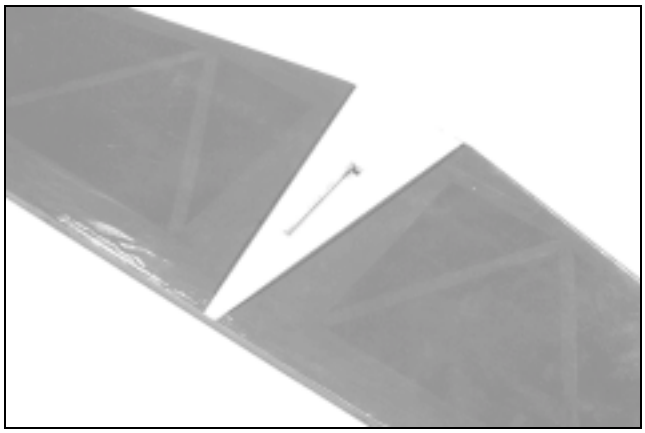
2. Place the stab on the fuselage and center it. Hold it in place with masking tape. Hold the vertical fin in position and mark the end of the dorsal fin on the fuselage.

3. Extend the parallel lines from the stab to the mark on the fuselage. Now remove the covering in between the lines. Careful, do not remove beyond the end of the dorsal fin mark.

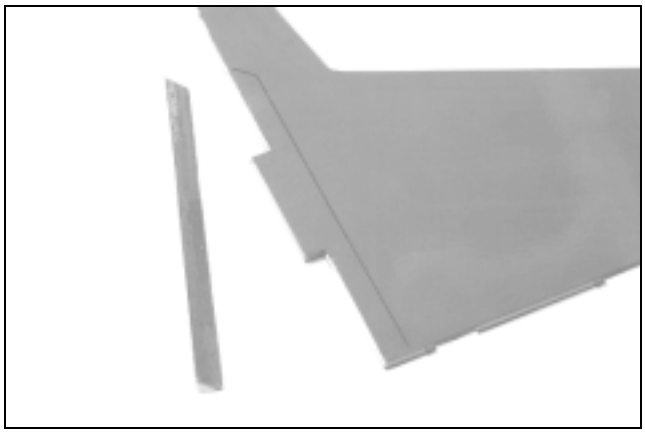




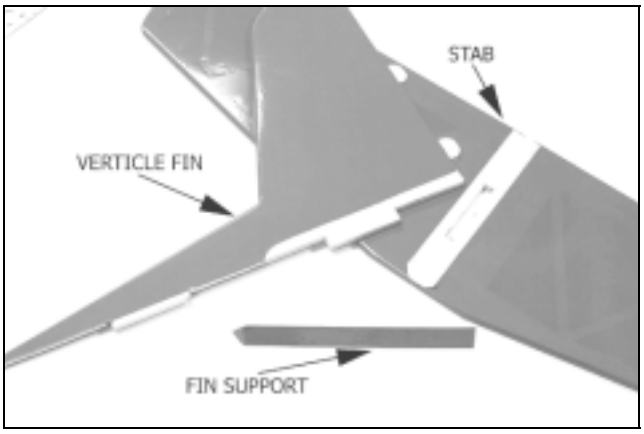
4. Turn the fuselage over and mark the outline on the bottom of the stab with felt tip pen



5. Remove the covering between the lines.



6. Lay the fin support in position and draw a line around the top edge. Turn the fin over and do the same thing.



7. Remove the covering inside the lines you have drawn. The fin support also rests against the stab. Remove the covering there for wood to wood glue joint. The tail components are ready to mount on the fuselage.

8. Glue on the stab first using 5 min epoxy. Tape a long straightedge on the wing saddle. After gluing site from back of fuselage to make sure stab is parallel with the wing.

9. Glue on the fin using 5 min. epoxy. Make sure it is perpendicular with the stab. Use a square and tape the fin in place. Now glue on the fin supports on either side of the fin. Wipe off the excess epoxy with alcohol and a paper towel and allow to cure. Note: Do not glue on bottom dorsal fin yet.

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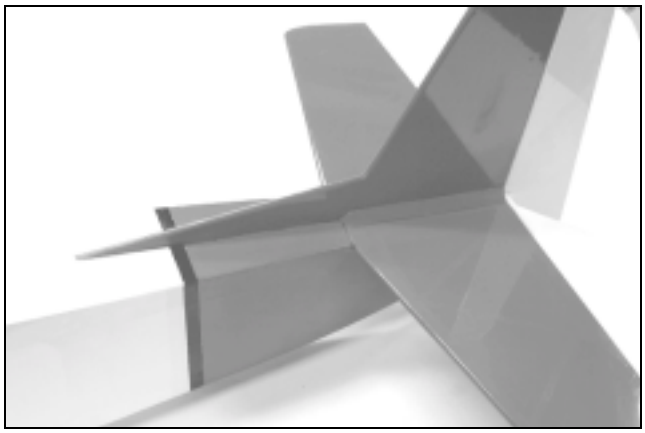
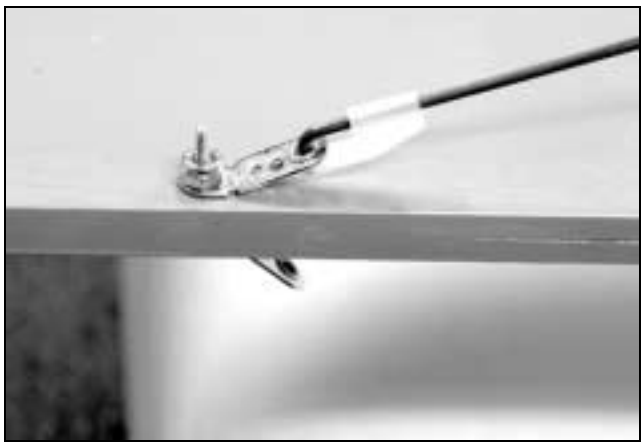
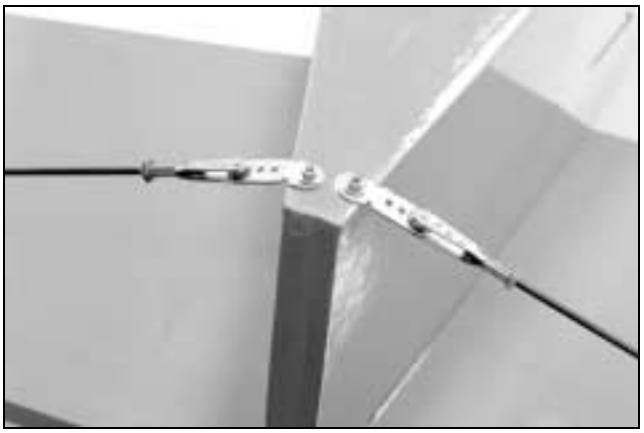


10. Hinge the rudder and elevator according to the method described in Wing Assembly, steps 1, 2, and 3.

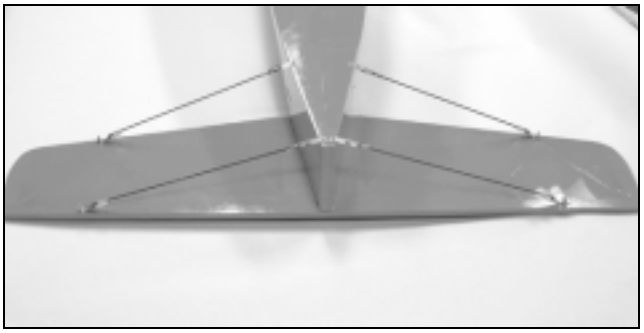
TAIL STRUT INSTALLATION



11. Locate the tail strut hardware. There are hard points in the stabilizer and vertical fin. Remove the covering over these holes with the soldering iron or a sharp knife. Mount the hardware, shown in the photo, in each of the 6 holes. Bend the tabs at a slight angle to facilitate connecting the strut.



12. Fasten the straps for the lower struts to the fuselage with the screws provided.



13. Locate the long rods, threaded on one end, and install a #2 hex nut and a clevis on the end of each. Turn the clevis on the threads until they, the threads, are through the clevis body. Mount the clevis in the strap and carefully measure and mark the distance to the other retaining hole. Make a 90 degree bend and cut off the excess leaving a ¼" leg. Install the keeper supplied. Final adjustment can be made by removing the clevis from the strap and rotating it in either direction. When satisfied be sure to tighten the hex nut against the clevis. Now install the struts on the top side

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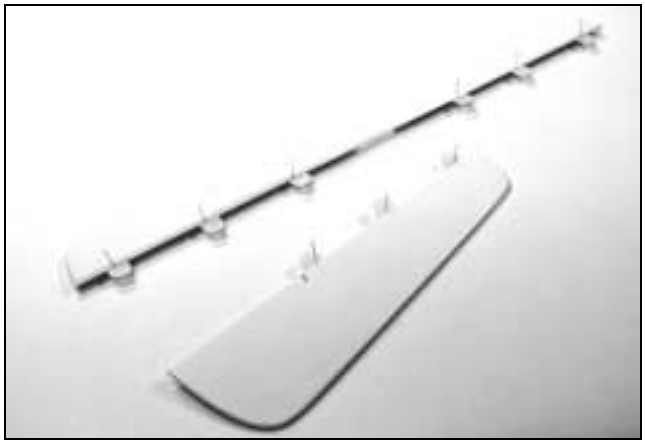
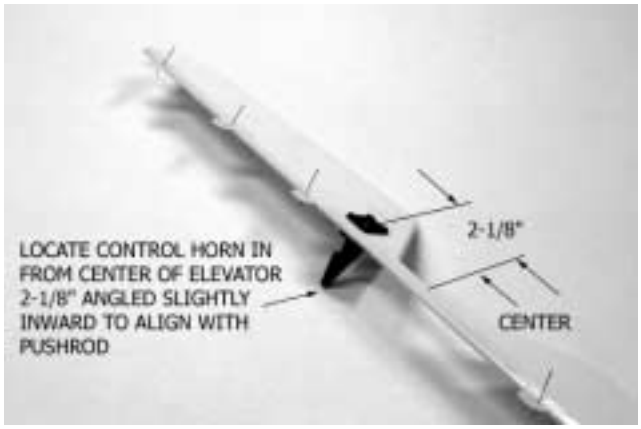
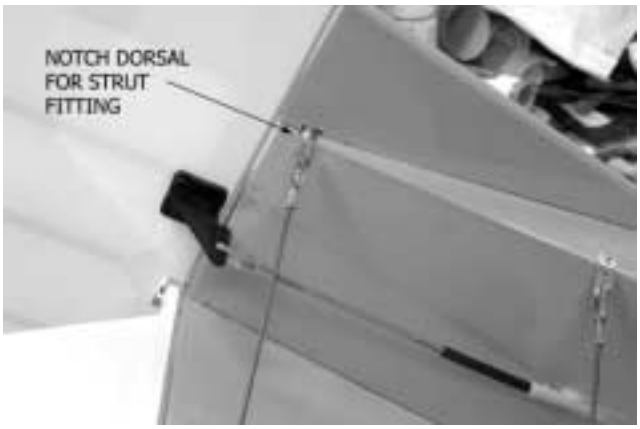
HINGING THE ELEVATOR AND RUDDER



14. Before hinging the elevator and rudder to the stab and vertical fin, locate the control horns and CA them in place with thin CA. Match drill the holes and complete mounting with hardware supplied.



15. Locate the control horn as shown in photo. Locate rudder control horn 4-1/4" from bottom edge of rudder. **Make sure rudder and elevator control horns are on opposite sides.**

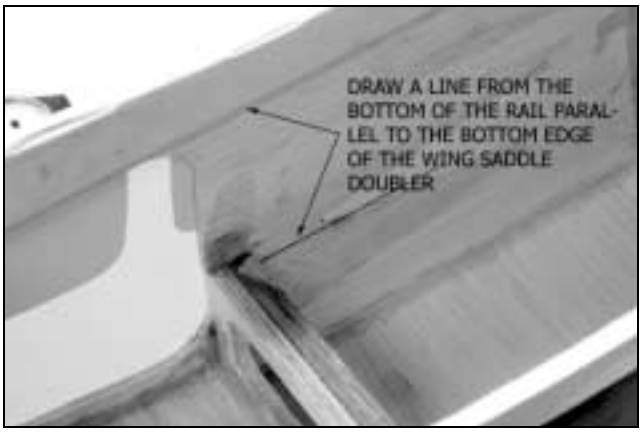


15. Locate the sub-dorsal fin. Draw a center line on the bottom of the hull, remove the covering the width and length of the fin. Install the hinge in the rudder and epoxy the fin in place. The rudder and hinge will keep it vertical. Tape the forward end to maintain alignment. Note: it may be necessary to slot the sub-dorsal fin for the hinge placement.

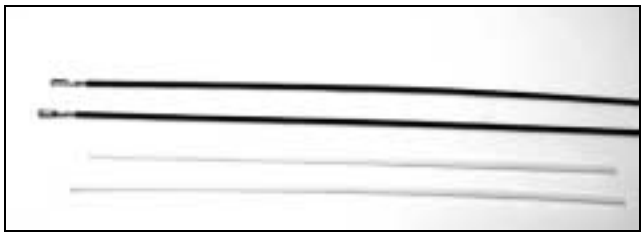
16. Install rudder and elevator and CA, with thin CA, as described when installing ailerons.

INSTALLING SERVOS AND PUSHRODS

1. Locate the 3/8" sq. x 24" pieces of wood. Cut 2 pieces 2-1/2" long. Now cut 2 more pieces 6-3/4" long.



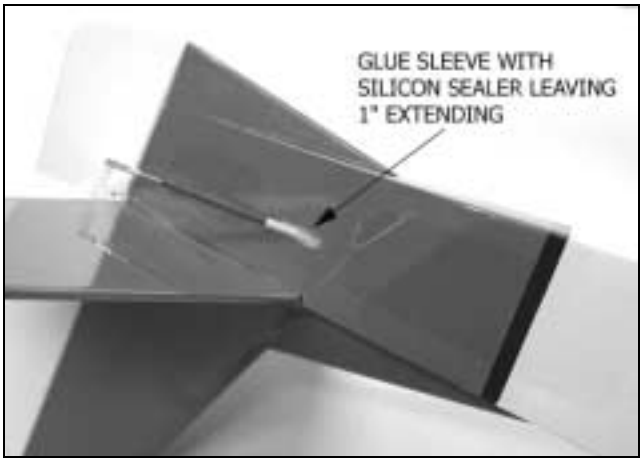
2. Using 5 min. epoxy, glue one long rail against the forward edge of the bulkhead as shown. Glue the two short pieces under the rail, against the sides, and parallel with the bottom edge of the wing saddle doubler. Glue the forward rail in place. Use a servo to get the proper spacing required.



3. Locate the pushrod material. Cut 2 pieces from the outer sleeving 22-1/2" long. Cut the long carbon fiber pushrod into 2 – 24-1/4" pieces. Screw the short threaded rods into one end of the pushrod 3/8". Install the hex nut and screw on a clevis. Do two pushrods.

4. Prepare the other end of the pushrods that will hook up to the servo arms. Locate two 4" x 4-40 rods threaded on both ends. Screw them in 3/8" on both pushrods.

5. Uncover the pushrod exit holes in the aft end of the fuselage. Enlarge them so the pushrod sleeving will fit using a motor burring tool or Exacto blade. Push the sleeving in leaving approx. 1" extending. Using Silicone Sealer, glue them in place both sides.



6. Mount both pushrods in the sleeves and hook up to control horns on rudder and elevator. Place a hex nut and clevis on each.

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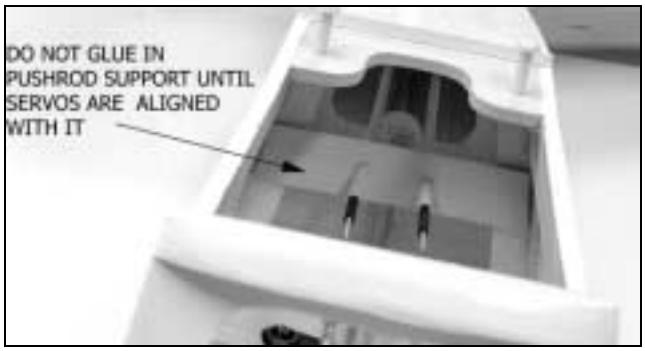
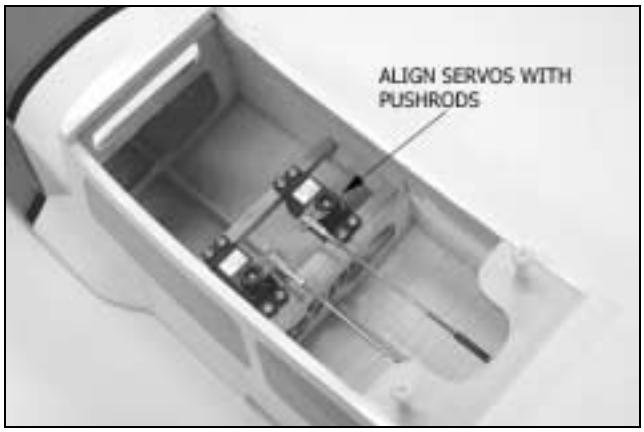
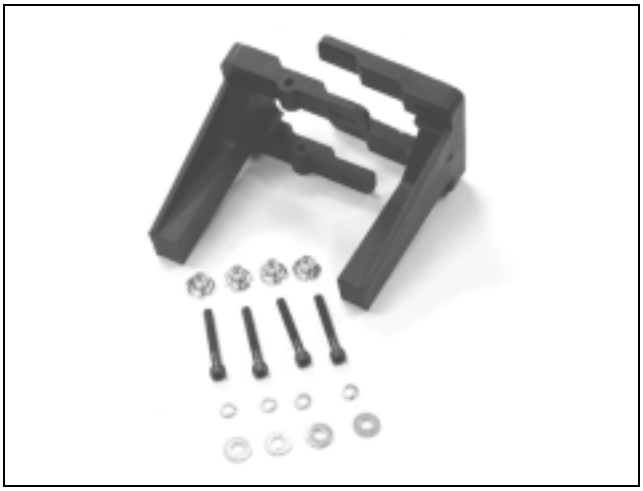


7. Install the pushrod support on the sleeves temporarily for alignment with the servos. Do not glue in place yet.

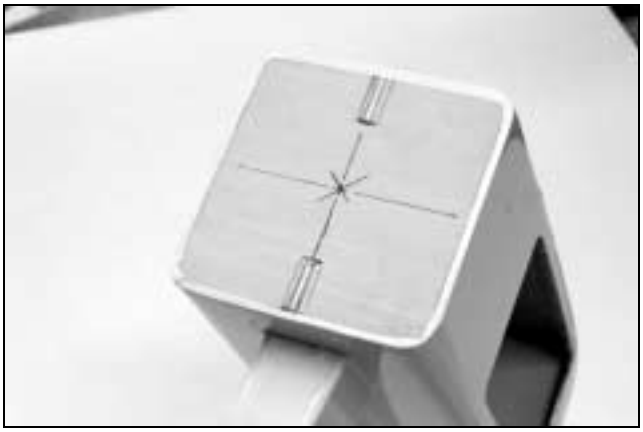


8. Plug the servos into the receiver and electrically center them. Mechanically adjust the linkage so the rudder and elevator are at neutral with the servo centered. Some final adjustment will be required later on.

ENGINE MOUNTING



Engine mount and hardware.



1. Locate the engine pod with mast. Find the center of the firewall by drawing lines from each corner. Now strike a horizontal and vertical line. The engine mount will be centered on the firewall.

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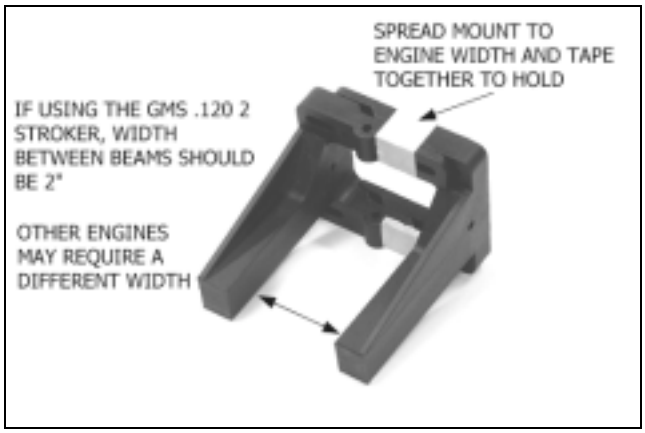
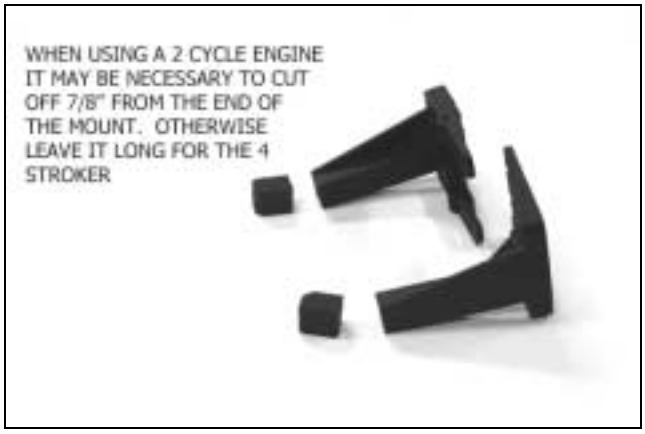


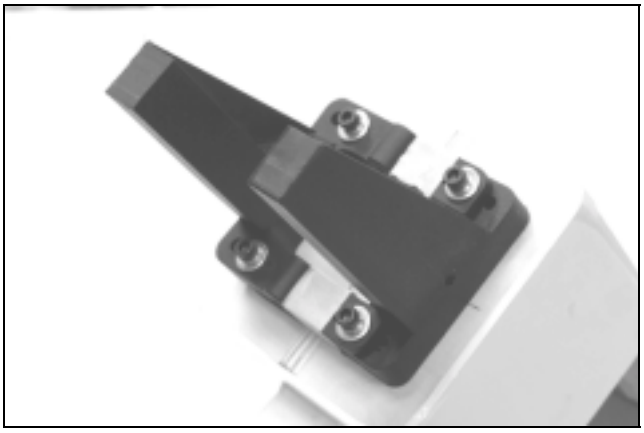


2. The engine mount is adjustable to fit many sizes of engines. Adjust the mount to fit your engine and tape it together.

3. Trial fit the engine in the mount adjusting for width of crankcase.

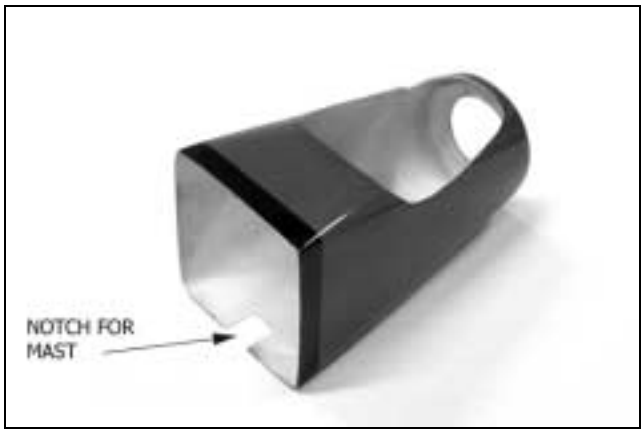
4. Once the fit has been determined, tape the mount to hold it in place.

5. Center the engine on the firewall, mark the holes for the mount, drill, and install the blind nuts. Now install the engine mount with the hardware supplied. Do not install engine yet.

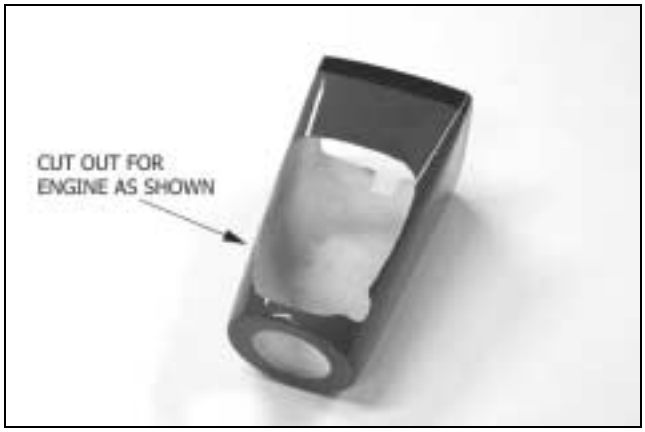


COWL INSTALLATION

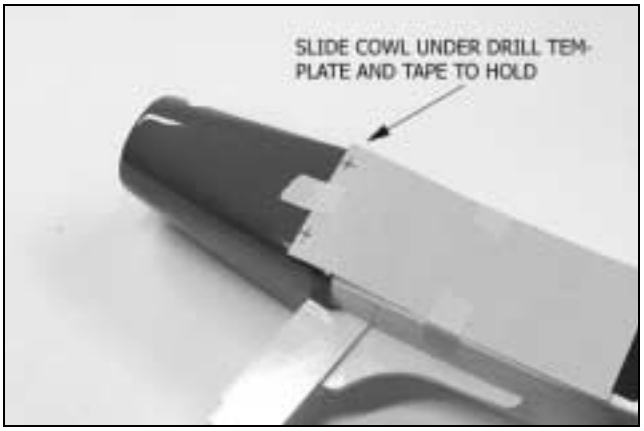
1. Unpack the cowl and cutout the opening for the engine as shown in the photo. Make it large enough so you can access the engine mounting bolts. Use a Dremel drum sander to remove the fiberglass for the engine access hole.



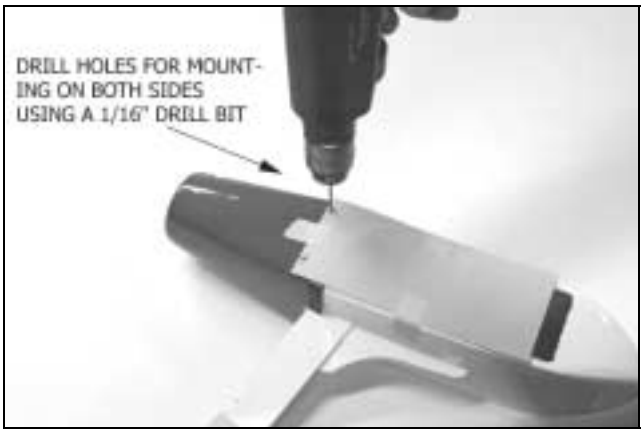
2. Notch out for mast to allow for cowl adjustment fore and aft if necessary.



3. Using a piece of cardboard, the height of the pod, mark two hole, 1/8" in from the front edge and 5/8" from top and 5/8" from bottom. Tape it to the pod with the front edge flush with the firewall. You will also need one for the other side.



4. Slide the cowl on to the pod under the templates. Temporarily set the engine in the mount. Mount the spinner back plate on the engine crankshaft with prop to hold it in place. Adjust the cowl so that you have 3/32" clearance between it and the back plate. Now tape the cowl to the pod.



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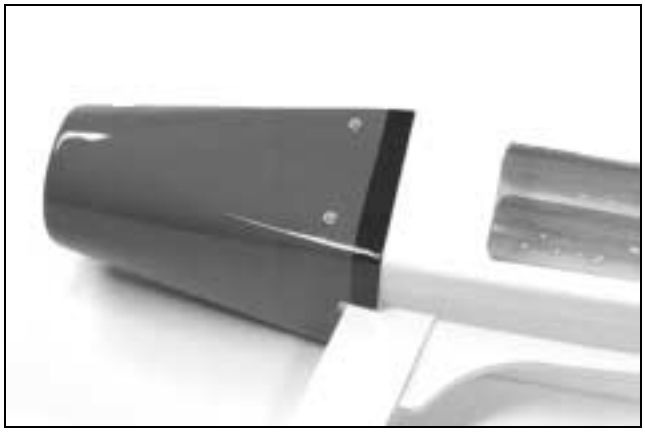
5. Drill four 1/16" dia. holes, two on each side. Use a hand drill however a drill press will ensure straighter holes. Do both sides.

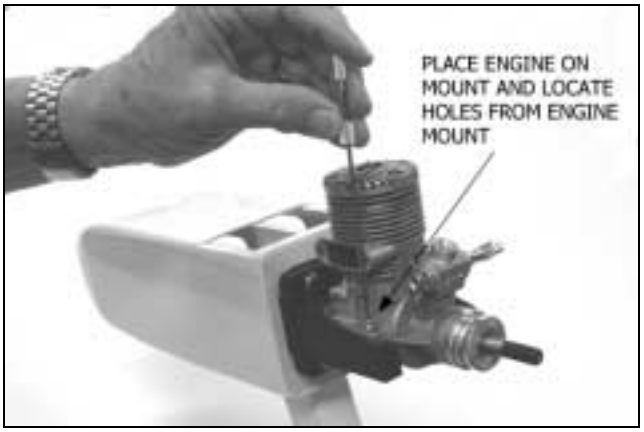
6. Install four #2 x 3/8" sheet metal screws to retain the cowl in place.



7. Place a piece of masking tape on each engine bearer. Temporarily hold engine in mount maintaining proper clearance with spinner back plate and cowl. Mark front edge of engine mount on tape.

8. Remove cowl and engine mount from the pod.

9. Clamp engine to one beam making sure the front edge of the engine mount is on the line you just marked on the tape. Now mark the two holes in the mount. Place in drill press and drill the two holes with a 3/32" drill bit. Now mark and drill the other beam mount as stated above. Enlarge holes to fit mounting bolt.



10. Re-install the engine mount on the pod making sure the width is correct for the engine, tighten up the mounting bolts.

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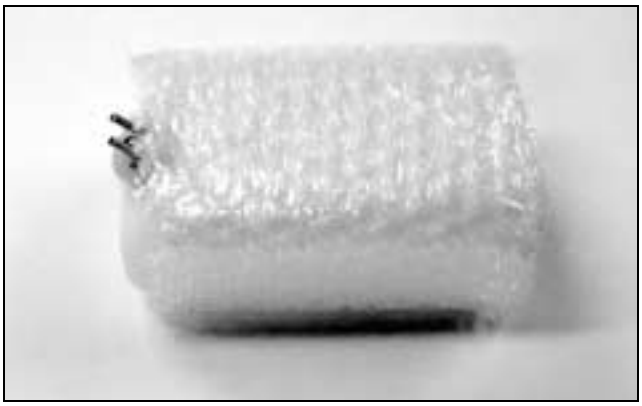
16. Drill three ¼" holes, as shown in the photo.

FUEL TANK ASSEMBLY

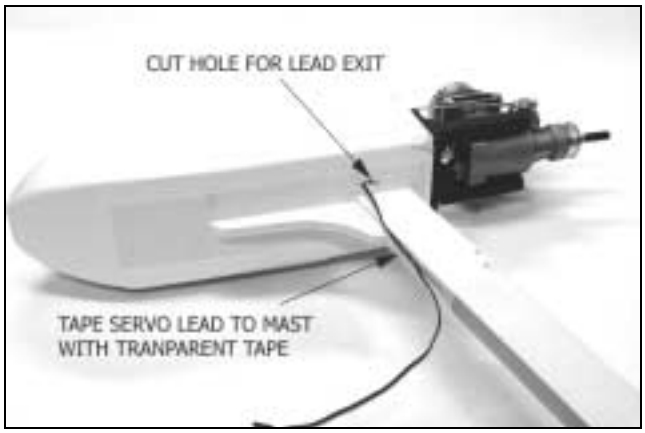
1. Locate the fuel tank and assemble the parts on the stopper. Bend the vent line carefully to avoid kinking. File all sharp corners on tubing end so fuel line will not be cut. Make sure inside of tank is clean before installing stopper on tank.



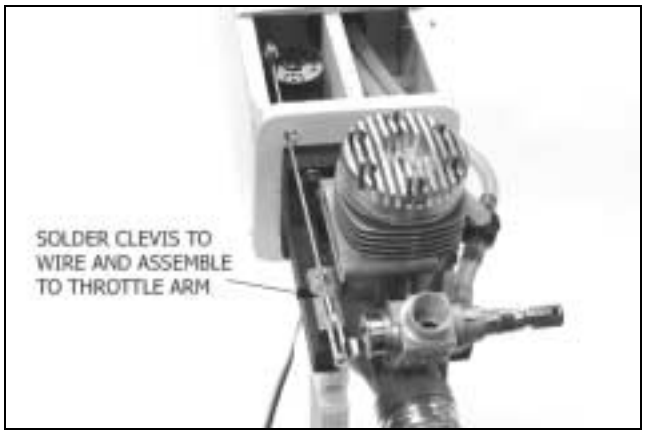
2. Wrap fuel tank with bubble wrap (not supplied) to cushion it. Hold it in place with cello tape. Do not use foam, it will absorb water.

3. Cut two lengths of medium fuel line 7" long. Install them on the vent and supply tubes coming from the tank. Slide the tank in place as shown. Feed the lines through the two holes in the firewall.

19, Install the throttle servo on the mounts in the pod. It may be necessary to shim the servo up so the pushrod will align better with the throttle arm. Remove the servo output wheel and assemble an EZ Connector on it. Cut a small hole in the bottom of the pod, next to the mast, to exit the throttle servo connector. Tape the connector lead to the mast.

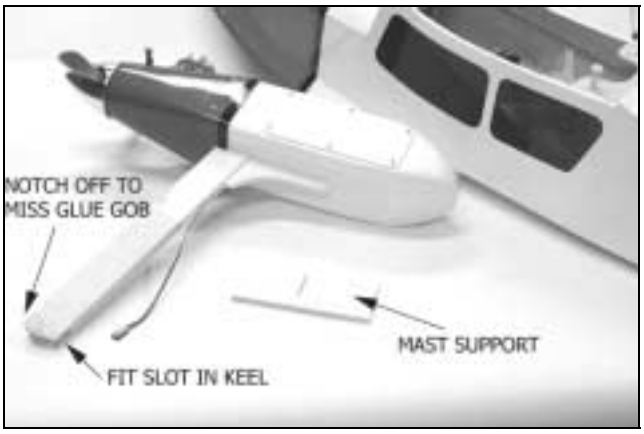


20. Locate the 6" wire and mount a nylon clevis on one end. Push the plain end through the hole in the firewall and attach to the EZ Connector on the servo arm. Fasten the clevis on the throttle arm. Adjust servo for proper direction and open/close position.



21. Remove the engine from the mount. Install the cowl and align the spinner back plate with the cowl leaving 1/16" to 3/32" clearance between them. Center the fuel tank cover over the cut out and tape in place. Drill 1/16" holes through cover and pod and install six #2 x 3/8" screws. Slide the throttle servo cover under the cowl and install two #2 x 3/8" screws to retain it. Now reinstall the engine, hook up the throttle linkage and fuel line. The engine pod is now complete.

INSTALLING THE ENGINE POD



1. Locate the mast support. Notch off the forward lower edge of the mast to miss possible glue gob at the bulkhead/keel joint.

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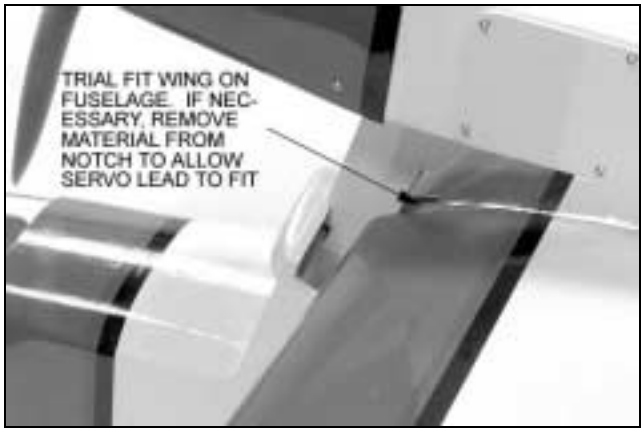
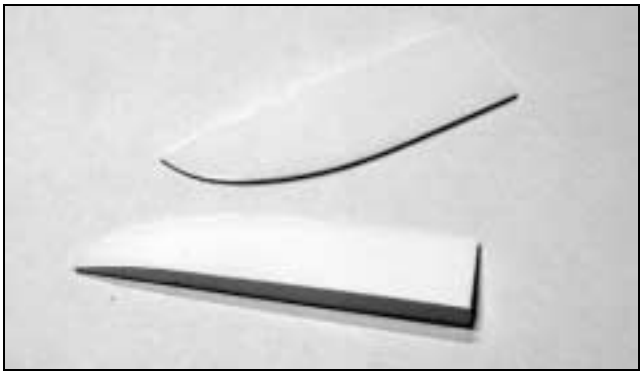
2. Trial fit the engine pod assembly to be sure of the fit. The mast should be against the bulkhead top and bottom. The slot in the bottom should be firmly placed in the keel and against the bulkhead. When satisfied, apply 30 min. epoxy to all joints and allow to cure over night. Apply more epoxy if necessary to edges of mast support, at sides, and around the mast.



3. Trial fit the wing on the fuselage. The leading edge should fit snug against the front former. It may be necessary to increase the notch depth in the wing to accommodate the servo lead. Do this with a Motor Tool with a burring bit. If any, very little will have to be removed to allow it to fit.

INSTALLING THE HULL LIFTERS

1. Locate the hull lifters and note that you have a LH and a RH.

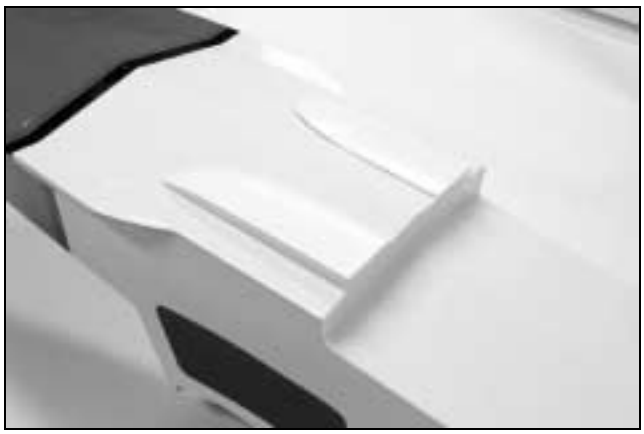


2. Place them on the hull with the back edge flush with the step. Center them on each side. While holding in place draw a line around each of them. The curved end to the inside.

3. Using a sharp Exacto knife, cut inside the line remove the covering as shown. Use a paper towel and alcohol to remove the ink lines.

4. Mix up some 30 min. epoxy and glue each lifter in place. Make sure you have a good fillet of epoxy all around the edges to seal them. The

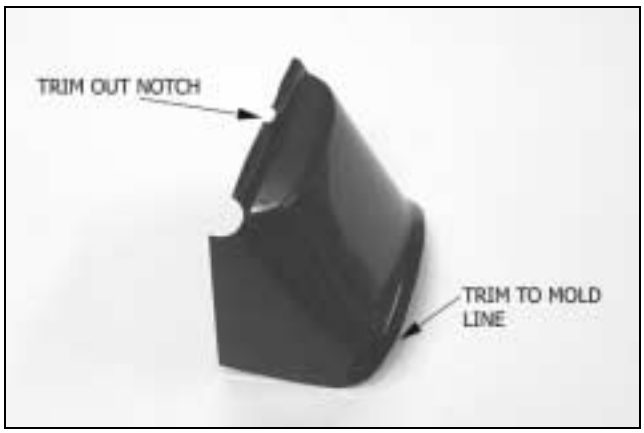
lifters are necessary to help break the vacuum sometimes occurring at the step.



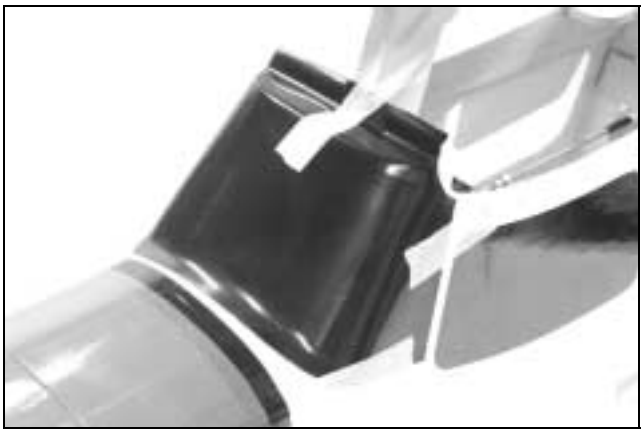
5**. Please do not omit the lifters from the hull**!

INSTALLING THE WINDSHIELD

1. Trim the windshield on the mold lines. They are quite faint but if you look closely, you will see them. Once trimmed sand the edges smooth. Be sure to cut out the notch for the mast, located in the center.



2. Trial fit the windshield on the fuselage. It may necessary to do some extra trimming on the sides to match the side windows. Once satisfied, tape the windshield in place.



3. When positioned and taped, use thin CA glue (carefully) several places to tack it in place. Now apply a bead of Pacer Formula 560 Canopy Glue all around the edges and let cure over night. It may be necessary to do this again for a good seal to keep the water out.

INSTALLING THE RADIO

1. We recommend putting the radio receiver is a plastic bag and then wrapping it with bubble wrap. If you use foam to wrap it, it will soak up the water and will more likely let it migrate into the receiver. Mount the receiver just ahead of the servos and route the antenna out the side, close to the wing saddle, and up to the vertical fin. Thus keeping it out of the water

Mount the receiver switch inside, up close to the wing saddle, using the DuBro Kwik-Switch and Charging Jack No. 207. Coat the pushrod and connector door on the outside of the switch with Vaseline to keep the water out.

2. Standard servos may be used. They are somewhat water resistant but **not water proof.** Futaba does have a servo that is more **water resistant and is called Water Resistant** however, expect to pay more money. Of course, if they are submerged, forget it. If the receiver gets wet and fails to operate, dry it out before trying to operate it again.

GETTING YOUR MODEL READY TO FLY

NOTE: This section is **VERY** important and must **NOT** be ornitted! A model that is not properly balanced will be unstable and possibly crash. You want a first successful flight!

1. Accurately mark the balance point on the bottom of the wing, on both sides, next to the fuselage. The balance point is 3-7/8" (28% of the wing chord) back from the leading edge of the wing. This is the balance point at which your model should be balanced for your first flights. Later, you may experiment by shifting the balance up to 1/4" forward or back to change the flying characteristics. If you move the balance point forward it may improve the smoothness and tracking, but your Mariner may require more speed for takeoff and become more difficult to slow and flare when landing on the water. If you move the balance aft it will make it more agile with a lighter feel and allow you to perform more aerobatic maneuvers. Please start at the location recommended.

2. All components should be in the model and it should be ready to fly when balancing, the fuel tank should be empty.

3. With the wing installed on the fuselage and the fuel tank empty, lift the model at the balance point mark on the bottom of the wing. The model should hang with the nose down at a 10 degree angle. You will find the Mariner inherently tail heavy and will have to add weight in the forward hatch compartment. As much as 8 - 10 ounces, assuming the receiver battery is 4 – 5 ounces. The amount of weight required will depend on the engine size, and how heavily or lightly the tail was built. You will have to experiment.

FINAL HOOKUPS AND ADJUSTMENT

1. Remove the servo arms from the servos, turn on the transmitter and center all the trims. Now reinstall all the servo arms and secure them safely.

2. Double- check all servos and make sure the servo arms are secure and that all clevis are secured with a retainer.

3. Make sure the control surfaces move in the proper direction and the throttle is not reversed.

4 –CHANNEL RADIO SETUP

Aileron	3/8" up	3/8" down
Elevator	3/4" up	3/4" down
	Measured at widest part	
Rudder	1-1/2" left	1-1/2" right
	Measured at widest part	

4. Adjust the pushrod hookups and set up the radio to provide the above control travels. Please use the CG location and control surface travels listed in this manual for your initial test flights.

GETTING READY TO FLY

1. Before flying the Mariner, it is necessary to consider water proofing the wing saddle, forward hatch and hatches on the engine pod. It is impossible to completely waterproof it but at least cut it down to a minimal, keeping out as much as possible.

2. Spread a bead of GE Silicone Sealer on the edges of the wing saddle. Lay a piece of wax paper on it and install the wing, bolting it down. When cured, remove the wing and wax paper and trim the wing saddle edges with a sharp razor.

3. All of the hatches can be waterproofed by placing transparent cello tape over all the joints, sealing them. This will keep them in place and you may not choose to use screws to hold them. Just use the tape.

BALANCE THE PROPELLOR

1. Carefully balance the propeller before you fly. An unbalanced prop is the single most significant cause of vibration and can cause damage to your model. Not only will engine bolts loosen with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause fuel to foam, which in turn will cause your engine to get hot or quit.

CHARGE THE BATTERIES

1. Follow the battery charging procedure recommended in the radio instruction manual. It is best to charge all the batteries the night before you intend to fly.

RANGE CHECK THE RADIO

1. Ground check the range of your radio before the first flight of the day. Make this a practice. With the transmitter antenna collapsed you should be able to walk 100 feet away from the model and have solid control. Repeat this test with the engine running.

FLYING

Get ready for some fun! Flying off water will be a new experience for some of you and others it will be “old hat”. We have spent considerable time with the Mariner, tuning it up for great water handling, and ease of lift off.

Our prototypes were powered with a GMS .47’s and they proved to be plenty of power to fly the Mariner. You will find the water handling characteristics superb with the rudder hanging down in the water becoming the water rudder making steering very easy.

With engine properly tuned, slide the Mariner in the water. Advance the throttle and it will come up on the step with no use of the elevator. This is due to the generous spray rails and the special hull lifters mounted on the step. The 3-1/2 degrees up-thrust in the engine also promotes positive help to accommodate getting up on the step.

The flight characteristics of the Mariner are very good at all ranges of the flight envelope. The full symmetrical wing promotes some aerobatic maneuvers such as loops, rolls and spins. Maybe a few others we have not tried. The Mariner displays no bad habits in the air.

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Landing on water is pure joy! Maybe because it is one of the flattest landing surfaces you could ever hope to have. That is, without waves. When it comes time to land, reduce the throttle to half and let it sink down toward the water. Just above the water start to flair and hold it off in the ground effect, or is that water effect? Keep the air speed up, no stall landing here, and let it settle on the step. Then slowly retard the throttle and taxi back to shore. Oh, the engine quit? You had better have a boat, which is a good idea. Have a ball! However, always stay in control.

No matter how hard you try, it is always a problem to keep water out of the hull. This is all part of flying off the water. Keep the Silicone Sealer handy and apply a thin coat to all joints where water might enter. We say this lastly because it will always remain a problem when ever you fly.

We hope you enjoy the Mariner as much as we did bringing it to you. Flying off the water is different. And different is what keeps us interested in our hobby. Good Luck…….and keep it dry.

EQUIPMENT NEEDED TO COMPLETE THE MARINER

Plastic propeller suitable for engine
to be used.
4 channel radio with 5 servos
three 6" servo extension leads
Receiver switch mount (DuBro No. 207)
Fuel line
3" spinner

Tools and Supplies Needed (Not Included in Kit)

Adhesives
Thin CA (cyanoacrylate) glue
Medium CA (cyanoacrylate) glue
Thick CA (cyanoacrylate) glue
CA remover/debonder
6-minute epoxy
30-minute epoxy
Z-42 Threadlock

Tools

Drill
Drill bits: 1/16", 1/8", 5/32", 1/4", 3/8"
Medium Phillips screwdriver
Pliers (needle nose)
Small round file
Hobby knife with #11 blade
Mixing sticks
Epoxy brush(es)
90-degree triangle
Medium sandpaper
Masking tape
Straight edge
Measuring device (e.g., ruler, tape measure)
Scissors
Paper towels
Wax paper
Rubbing alcohol
Felt tipped pen/pencil
T-pins
Toothpicks (optional)
Moto-tool with cut-off wheel
Tube: GE Silicone Sealer
Lead weight

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