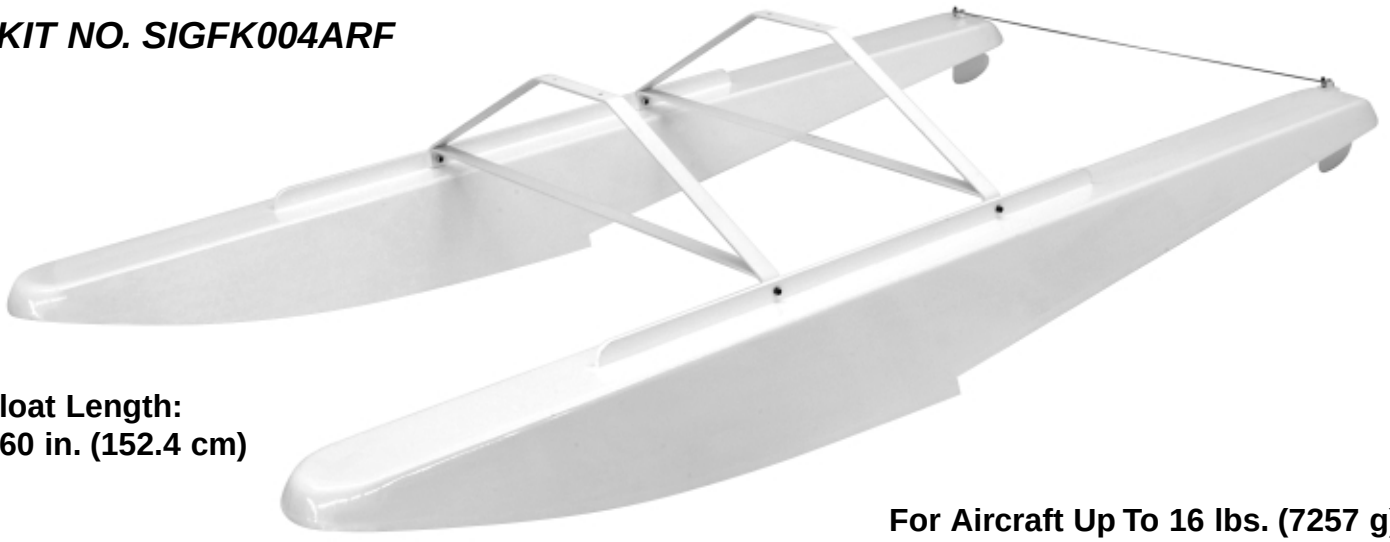
120-Class Wood

RTF FLOATS

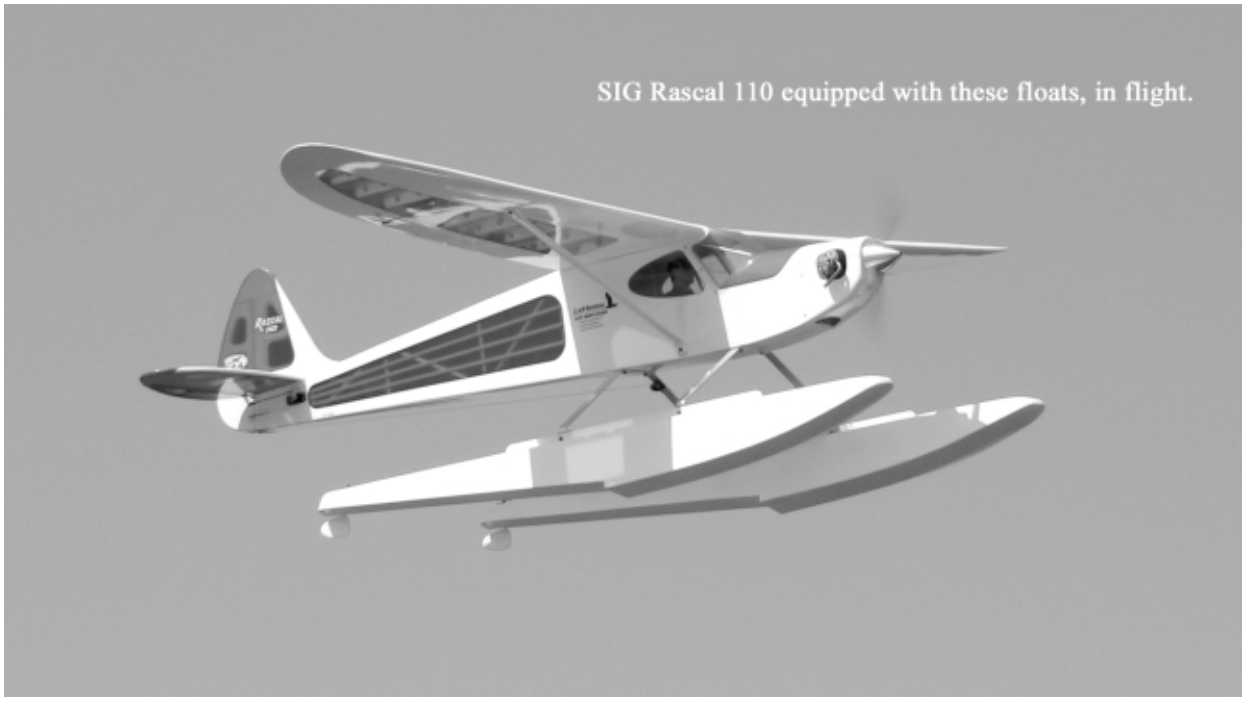
KIT NO. SIGFK004ARF



Float Length:
60 in. (152.4 cm)

For Aircraft Up To 16 lbs. (7257 g)

ASSEMBLY MANUAL



SIG MANUFACTURING CO., INC. 401-7 S. Front St. Montezuma, IA 50171
Ph: 641-623-5154 www.sigmfg.com

ASSEMBLY MANUAL

60” Long

120-Class Floats

#SIGFK004ARF

INTRODUCTION:

Welcome to the world of flying R/C model airplanes off water! If you have never done it before, you are in for a thrill. Flying off water is no more difficult than flying off land - only different.

Most typical 90-120 size R/C models with average to above average wing area (aka: SIG Rascal 110 and Four Star 120) and weighing under 16 pounds should perform well flying off water with these floats. Typically the changeover from wheel landing gear to floats will add significant weight to the airplane, thus airplanes with a light wing loading make the best candidates for conversion to float flying. Overweight airplanes, or airplanes with small wing area (like WW2 fighters), do not make good float planes! This float kit has been designed to provide an optimum setup for float flying with a suitable size R/C airplane.

This entire float system is simple, lightweight, and very sturdy. The floats themselves have a optimized hull design that enables them to get on top of the water quickly with minimal spray. The hardened aluminum struts are very lightweight yet amazingly strong. Properly mounted to your model this float system should provide you with many successful seasons flying off water.

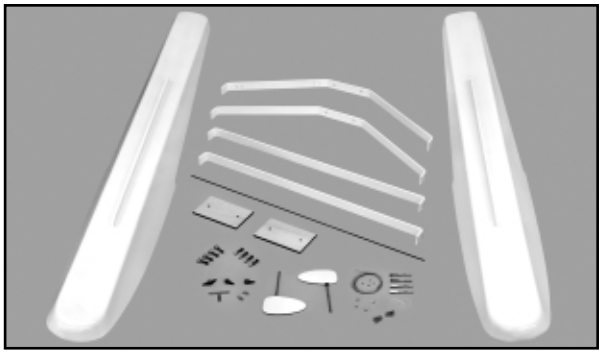
Producing a float kit that provides absolutely everything needed for every conceivable airplane installation is virtually impossible. Because of different fuselage shapes and structures, some installations may require different size struts or different mounting hardware. This kit provides everything you will need to mount these floats to a SIG Rascal 110 ARF. If you intend to mount these floats on a different airplane, study the instructions carefully for ideas you can apply to your custom installatin. In most cases you will find that the struts and hardware provided can be adapted to your project. However there could be some custom installations where you may need to purchase some additional mounting hardware.

Metal bearing tubes for mounting steerable water rudders have been built into the rear of each float. Using dual water rudders provides the utmost in positive water-handling, even in relatively windy conditions. As you will see further on in the instructions, the twin water rudders can be steered directly off of the model's flying rudder using the supplied pull-pull cable system and a wire interconnect pushrod.

IMPORTANT: Flying an R/C model aircraft from water is not difficult. However, flying an R/C floatplane without previous R/C flying experience will likely be very difficult and is definitely not recommended or suggested. If you are not comfortable landing and taking off your R/C model from land, we strongly suggest that you gain more time and experience before attempting to fly the airplane off of water. These instructions assume that you are a experienced R/C pilot.

COMPLETE KIT PARTS LIST:

The following is a complete list of all parts supplied with this kit. Before beginning assembly, we suggest you take a few moments to inventory the parts in your kit.



KIT PARTS:

- ❑ 2 Pre-Built Floats
- ❑ 1 Aluminum Front Float Strut
- ❑ 1 Aluminum Rear Float Strut (w/ 8 tapped holes in one leg)
- ❑ 2 Aluminum Spreader Bars
- ❑ 1 2 mm dia. x 650 mm Music Wire Interconnect Pushrod

Bag #1

- ❑ 2 1/4" Plywood Float Mount Doublers
- ❑ 8 M4 x 20 mm Socket-Head Bolts
- ❑ 4 M4 Lock Nuts
- ❑ 4 M4 Lock Washers
- ❑ 4 M4 Flat Metal Washers
- ❑ 4 M4 Blind Nuts

Bag #2

- ❑ 2 Fiberglass Water Rudders
- ❑ 1 2-sided Plastic Steering Arms
- ❑ 2 1-sided Plastic Steering Arms
- ❑ 1 Metal “T” Horn
- ❑ 2 Pushrod Connector assemblies, consisting of:
  - ❑ 2 each Metal Body
  - ❑ 2 each M3 x 4 mm Bolts
  - ❑ 4 each M2 Hex Nuts
  - ❑ 2 each M2 Flat Metal Washers

Bag #3

- ❑ 2 Coated Steel Cables
- ❑ 2 Nylon Tube Cable Guides
- ❑ 4 Metal Landing Gear Clips
- ❑ 8 M2.5 x 14 mm Bolts
- ❑ 4 Rigging Couplers w/ Steel Clevis & Lock Nut
- ❑ 4 2 mm od x 4 mm Metal Swage Tubes

REQUIRED TOOLS & MATERIALS:

For assembly, you will need the following tools and materials:

Small Bubble Level
Carpenters Square or 90° Triangle
Screwdriver Assortment
Small Allen Head Wrench Assortment
Pliers
Power Drill With Selection of Bits
Dremel® Tool With Carbide Cut-Off Wheel
Soldering Iron and Solder
Threadlock Compound (Locktite® Non-Permanent Blue)
Scrap Wood Blocks For Shimming Fuselage
Tape
Non-Permanent Marker Pen
Pencil

THE CORRECT ALIGNMENT:
For good performance, both on the water and in the air, the following guidelines should be followed when mounting twin floats on an R/C model aircraft:

1) The floats must be accurately aligned with the model in the side, front and top views.

2) SIDE VIEW: The "step" of the floats should be located right on, or just slightly behind, the model's normal center of gravity (C.G.). The exact step location is not super critical, just as long as you are pretty close. On models of this size, you could be 1/2" fore or aft of the C.G. without causing any serious handling problems.

3) SIDE VIEW: The flat top surfaces of the SIG Floats should be mounted parallel with the model's 0° reference line. In other words, when the tops of the floats are level, the airplane should also sit level or with its nose just slightly up. In this alignment, the airplane should lift off the water effortlessly once flying speed is reached.

How do you know when your airplane is sitting level? You must determine the 0° datum line of your airplane. If you have a high-wing airplane with a flat bottom airfoil the bottom surface of the airfoil is a good reference, as it is often times set near 0°. In that case, the tops of the floats should be parallel with the bottom surface of the wing. Use a small bubble level to check the alignment. In other cases, where you're model has a "flat plate" stabilizer, which is set at 0°, it is handy to take your measurement with the bubble level placed on the stab. If you are putting the floats on an airplane with a symetrical airfoil, you can usually determine the correct 0° datum line of your airplane by studying the plans, and then take your measurements there.

4) FRONT VIEW: The floats should be square with each other, and the model should not lean to the side.

5) TOP VIEW: Both floats should be parallel and square with each other and with the centerline of the fuselage.

A PERFECT FIT FOR THE SIG RASCAL 110:
This instruction manual shows the floats being installed on a SIG Rascal 110 ARF. All of the hardware you will need to make this installation is included in this kit. When mounting the floats on other airplanes, you may need to purchase additional hardware.

There is an old rule of thumb in full-scale aviation that you need more power to fly off water than off land. That may be true in full-scale, but in our experience it doesn't carry over to models. Most R/C models are vastly overpowered already, compared to full-scale airplanes. Consequently we find that we can fly our Rascal 110 ARF on floats with the same engines that we use when we fly off land. The Rascal 110 typically flies with a 1.2 to 1.5 cu.in. glow engine, and that size engine is also recommended for float flying.

The main reason the Rascal 110 performs well on floats is because of it's large wing area, which gives it a very favorable wing loading even with the additional weight of floats. Consider these numbers:

RASCAL 110 with Saito 1.50 4-stroke engine

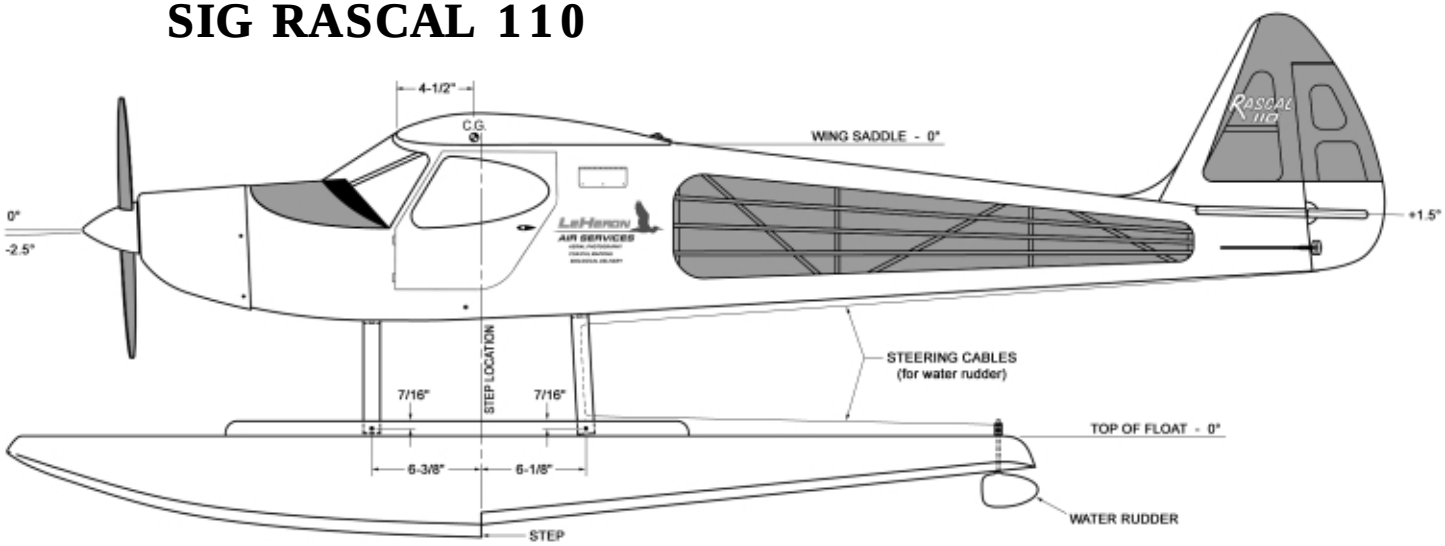
	ON LAND GEAR	ON SIG FLOATS
R.T.F. Weight	12.4 lbs. (198.9 oz.)	15.4 lbs. (246.5 oz.)
Wing Loading	18.8 oz./sq. ft.	23.3 oz./sq. ft.

As you can see, the net weight difference between the land and floatplane configurations of the Rascal 110 is exactly 3 lbs. With 1522 sq.in. of wing area, the wing loading remains relatively light for an airplane of this size. Other airplanes, similar in size and weight to the Rascal 100, will also perform well on these floats without the need to change engines. If your model is equipped with a marginal engine, one that barely flies it from grass fields, then you will want to consider a more powerful engine.

IMPORTANT: These instructions assume that your airplane has already been successfully flown as a landplane. You will need to know exactly where your airplane's Balance Point (C.G.) is for reference when installing the floats on the airplane.

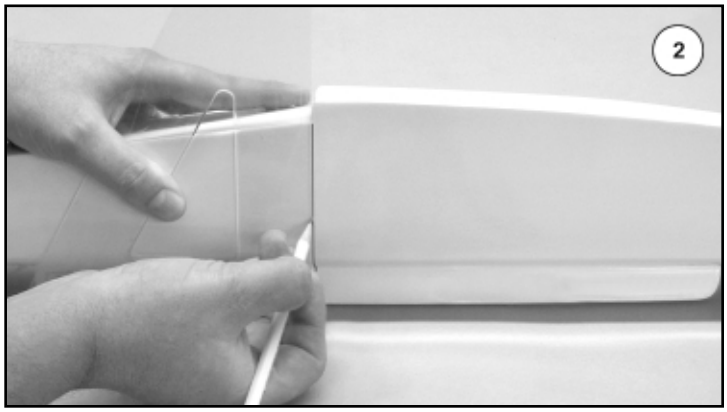
INSTALLING THE FLOATS ON A

SIG RASCAL 110

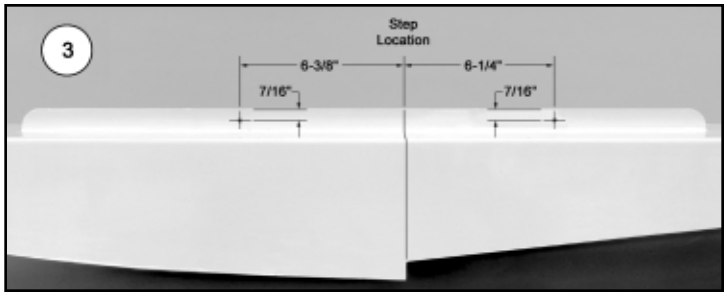


1) The standard Balance Point (or C.G.) for the Rascal 110, as specified in its assembly manual, is 4-1/2" behind the leading edge of the wing. This is the balance point recommended for flying this airplane from land, and it is the same balance point we recommend for float flying. If your Rascal 110's balance point is not currently at 4-1/2", we recommend that you rebalance your airplane at that C.G. location at this time.

Question: *Why is it important to know your model's precise Balance Point when mounting floats?* ***Answer:*** *Because for any float-airplane combination, the "step" on the bottom of the floats should always be located just slightly behind the airplane's balance point for proper performance on the water.*



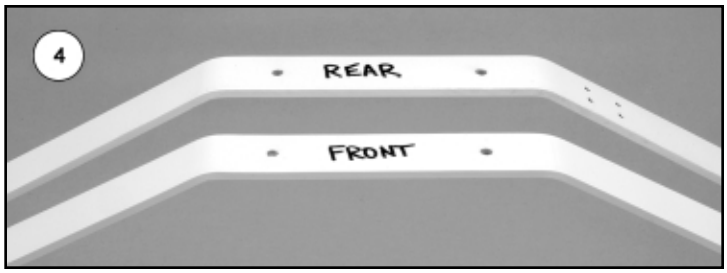
2) Mark the step location on the plywood mounting flanges that are protruding from the tops of the floats. A simple, accurate way of doing this is to set the float upside down on a flat surface and use a 90° triangle to project the step location onto the side of the float and then on to the mounting flange. Use a soft lead pencil or non-permanent marker to mark the step location.



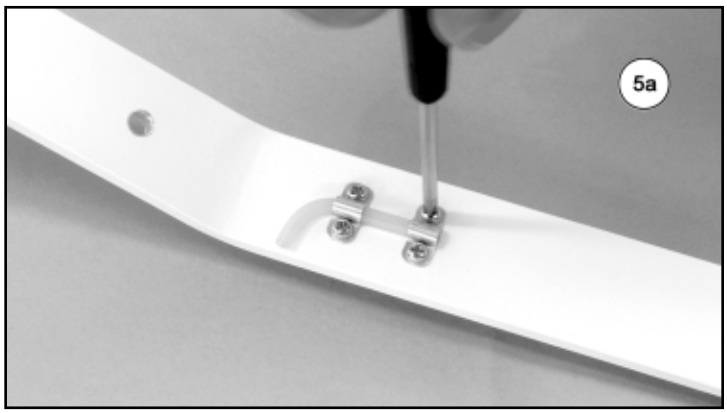
3) a) Now mark the hole locations for the aluminum Front and Rear Float Struts onto the plywood mounting flanges according to the measurements shown here. You must be very precise when laying out these marks, because if they are off, the floats will not be properly aligned with the airplane when you are all done.

b) After you've got the marks laid out, drill the holes completely through the plywood mounting flanges with a 5/32" or #22 or 4mm dia. drill bit, to create clearance holes for the M4 mounting bolts that will be used.

c) Iron down the plastic covering material around the holes to make sure the covering is stuck tight to the wooden structure.



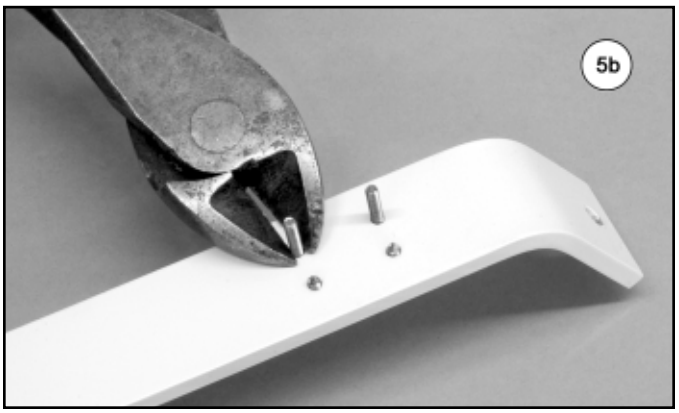
4) Locate the pre-painted aluminum Front and Rear Float Struts, and the two Spreader Bars. Notice that the Rear Float Strut is just slightly taller than the Front Float Strut. Also the Rear Strut has eight holes drilled and tapped in one leg for mounting the pull-pull cable guides in the next step.

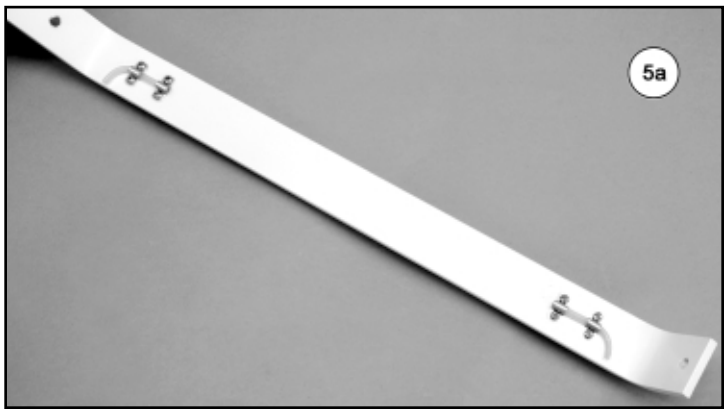


5) *Note in pictures further on that the leg of the Rear Float Strut which has the eight holes will be mounted to the LEFT float. Keep that in mind during this step.*

a) Mount the two Nylon Tube Cable Guides in place on the inside of the Rear Float Strut, using the Metal Landing Gear Clips and M2.5 x 14 mm Bolts provided. Put a drop of Locktite® threadlock compound on the threads of each bolt as you screw it in. Notice that the 90° bends of the nylon tubes should be positioned nearest the bends in the strut, and that they should face the rear of the airplane when the strut is mounted on the floats.

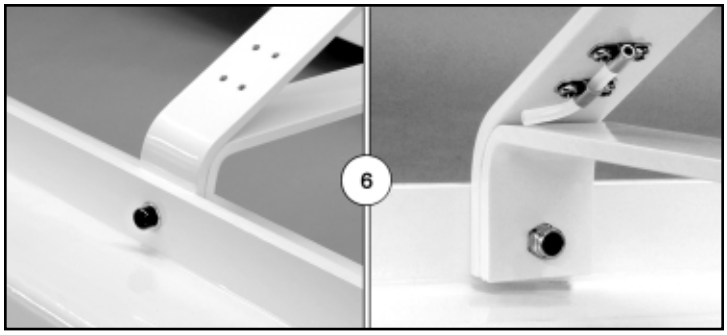
b) Cut off the excess length of the mounting bolts with a side cutting pliers.



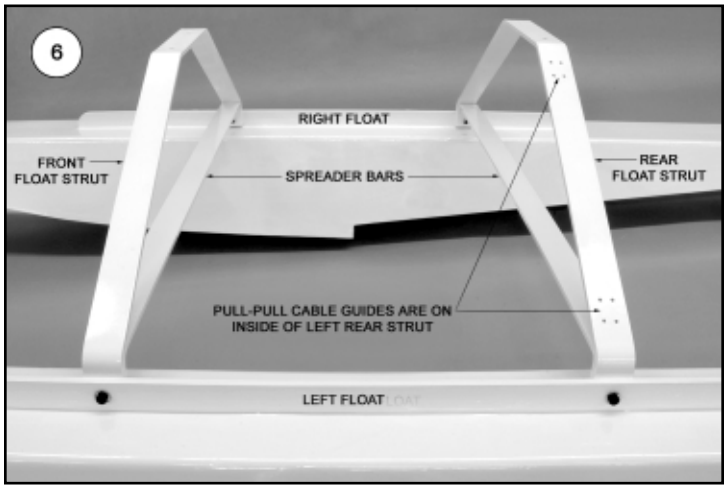


6) Mount the Front and Rear Float Struts along with the Spreader Bars to the plywood mounting flanges of the floats, using the M4 x 20 mm Socket-Head Bolts, M4 Flat Metal Washers, and M4 Lock Nuts provided. Put the flat washers under the head of the bolts. The lock nuts don't need washers since they bear on the aluminum struts. Snug the bolts and nuts, but do not tighten them completely until later.

BE SURE TO INSTALL THE REAR FLOAT STRUT WITH THE LEG CARRYING THE NYLON CABLE GUIDES ON THE REAR OF THE <u>LEFT FLOAT</u>!

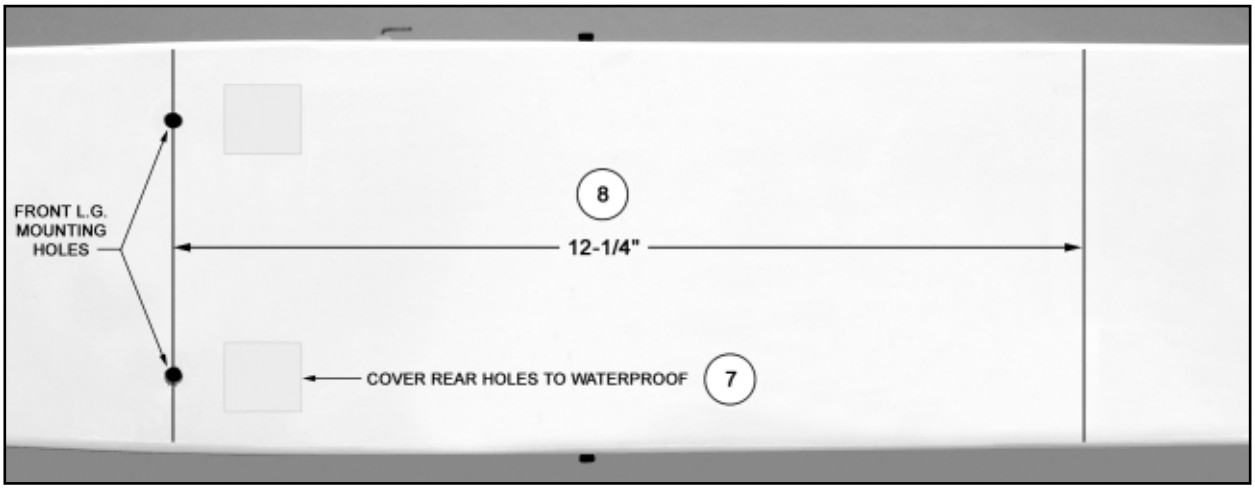


7) Remove the standard "land based" main landing gear from your Rascal 110. Waterproof the two rear landing gear mounting holes by covering them with scrap pieces of plastic covering material, plastic "trim" sheet, or some type of waterproof plastic tape. Do not cover the two front holes - they will be used for mounting the Front Float Strut later.



8) a) Draw a line across the bottom of the fuselage exactly through the center of the two front landing gear mounting holes.

b) Draw a parallel line exactly 2-1/4" back from the front line. This is the centerline where the Rear Float Strut will be mounted. Make sure you draw this line straight across the fuselage - perpendicular to both sides.

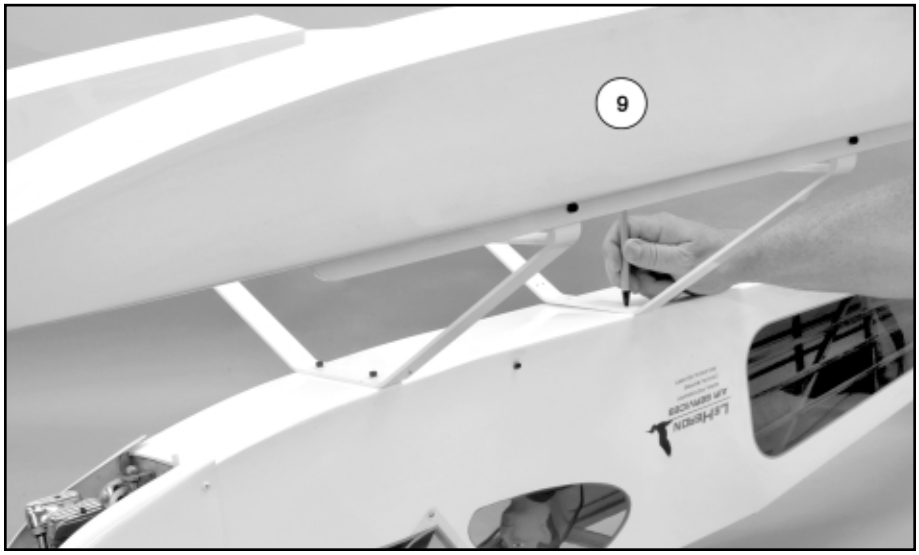


9) a) Turn the fuselage upside down and set the floats in position, bolting the Front Float Strut in place with two M4 x 20 mm Socket-Head Bolts and two M4 Split-Ring Lock Washers.

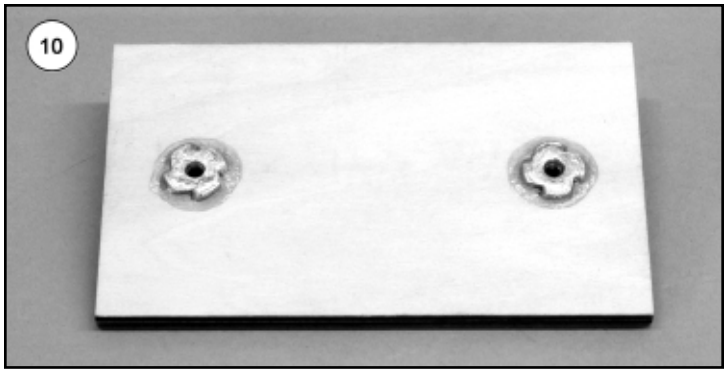
b) Carefully line up the Rear Float Strut with the line you drew on the fuselage. Make sure the strut is centered and square on the fuselage. Then carefully mark the locations of the two mounting holes through the mount and onto the bottom of the fuselage.

c) Remove the floats and set them aside. Drill the two rear holes through the bottom of the fuselage with an 5/32", #22, or 4 mm dia. drill bit.

d) Iron down the plastic covering material around the new holes to make sure it is stuck tight to the fuselage.



10) Install an M4 Blind Nut into each hole in one of the laser-cut plywood Float Mount Doublers (a second doubler is provided as a spare for possible use in other installations). Tap the blind nuts in place with a hammer, making sure they go straight into the holes and that the flanges end up flush with the surface of the plywood. Put a little glue on the flanges to keep the blind nuts from coming loose, but don't get any glue in the threads.

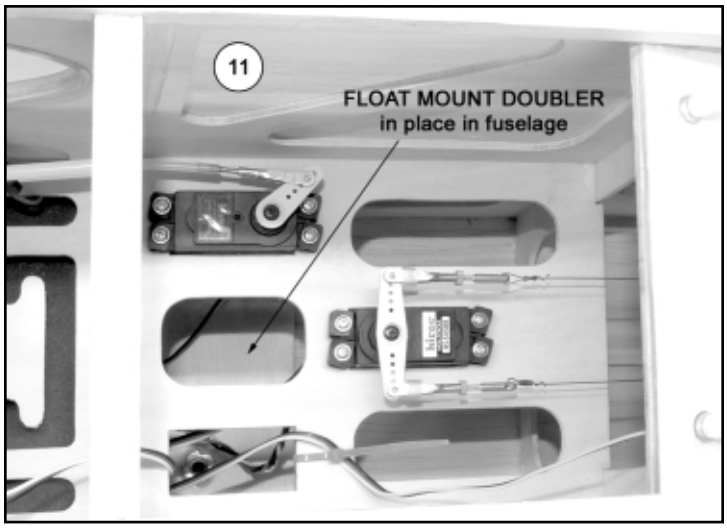


11) Install the Float Mount Doubler inside the fuselage, in the area for the rear float strut. The doubler needs to sit flat on the fuselage bottom, right up against the back of the fuselage former. Because of the servo mount in the fuselage, this job can be a bit tedious - especially for those of us with big hands.

a) The best way to proceed is to first get the Rascal's rudder pull-pull cables out of the way by removing the rudder servo arm temporarily and setting it in the bottom of the fuselage. Then put the doubler in place, going around the back of the servo mount and into position.

b) After you get the Float Mount Doubler in place, line up the holes in the blind nuts with the holes you drilled in the bottom of the fuselage. If you drilled the holes accurately, they should line up.

c) When you have the doubler positioned correctly, flow Thin CA glue along the edges of the doubler. The Thin CA will wick underneath the doubler, bonding it to the fuselage bottom. Then, use Medium or Thick CA to make sure the edges of the doubler are securely bonded to the fuselage sides and the former for strength.

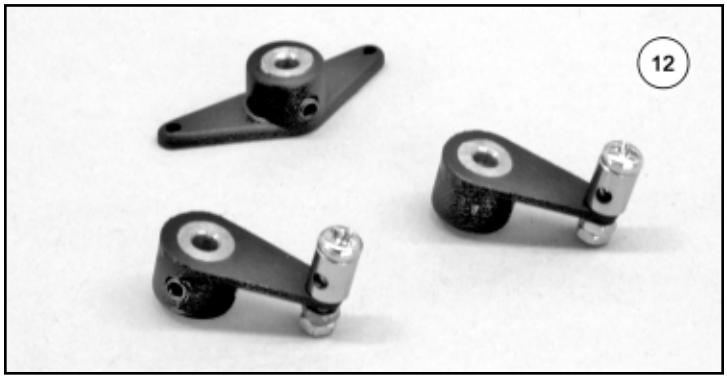


12) Locate two 1-sided Plastic Steering Arms, one 2-sided Plastic Steering Arm, and two complete Pushrod Connector assemblies.

a) Drill out the holes in the two 1-sided Steering Arms with a 5/64", #47, or 2 mm dia. drill bit, so that the stud of the Pushrod Connector will go in freely.

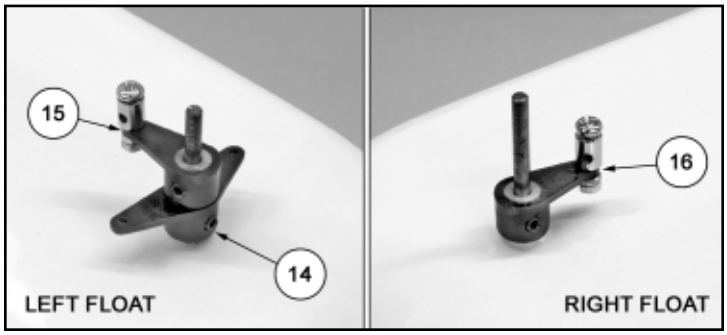
b) Assemble a Pushrod Connector on each of the 1-sided Steering Arms, as shown.

Note: *Although flat metal washers are provided with the pushrod connectors, we didn't use them. Simply screw the two hex nuts onto the bottom of the connector, and then tighten the two nuts against each other, with a very small drop of Locktite® threadlock between the nuts. Be careful not to get any Locktite® between the connector and the steering arm.*



13) Metal bearing tubes for the water rudders have been built into the rear of each float. Use a sharp #11 hobby knife, or the heated tip of an awl, to open up the covering over the holes. Make sure the covering material around the holes is ironed down tight before going any further.

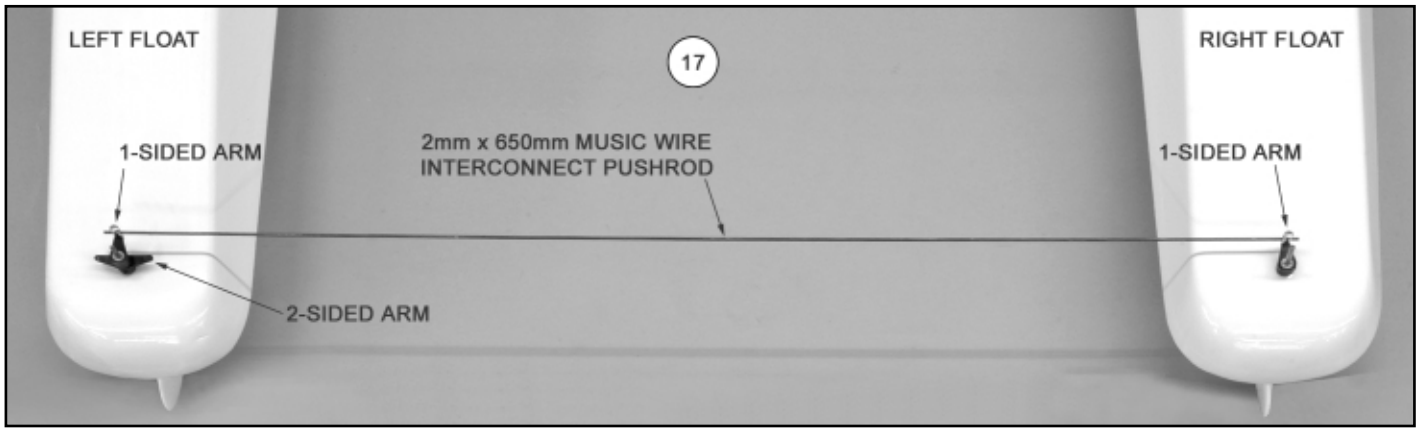
14) Insert one of the water rudders into the bearing tube in the rear of the left float, from the bottom. Then, install the 2-sided Plastic Steering Arm (from Step 12) onto the Water Rudder wire protruding from the top of the float. Install it with both its arms pointing across the width of the float, as shown, when the water rudder is straight back. Then, tighten the steering arm set screw. Check the movement of the water rudder to make sure it turns free and easy. If not, find the bind and fix it now.



15) Now install a 1-sided Plastic Steering Arm (from Step 12) on the left float, on top of the double arm. Note that it should be turned 90° to the first arm, with its arm facing forward when the water rudder is straight back. Tighten the steering arm set screw.

16) Install a water rudder and 1-sided Steering Arm on the rear of the right float. The steering arm should be installed pointing straight forward when the water rudder is straight back.

17) Install the 2 mm dia. x 650 mm Music Wire Interconnect Pushrod that connects to two water rudders. Install the wire in the Pushrod Connectors of the 1-sided Steering Arms on the left and right floats, adjusting the length of the pushrod as necessary to make the water rudders parrallel to each other.



18) Remove the entire tailwheel assembly from your Rascal 110 and set it aside. So that you won't have to unhook the coil steering springs from the metal T-Horn that is screwed onto the bottom of the rudder, we have furnished another T-Horn for the float installation. So simply unscrew the original T-Horn from the rudder, and keep it with the rest of the tailwheel assembly. Then, screw the new T-Horn in its place.

19) The water rudders are driven by pull-pull cables running from the metal T-Horn on the bottom of the rudder, forward through the two cable guides on the left rear float strut, and then back to the 2-sided steering arm on left water rudder.

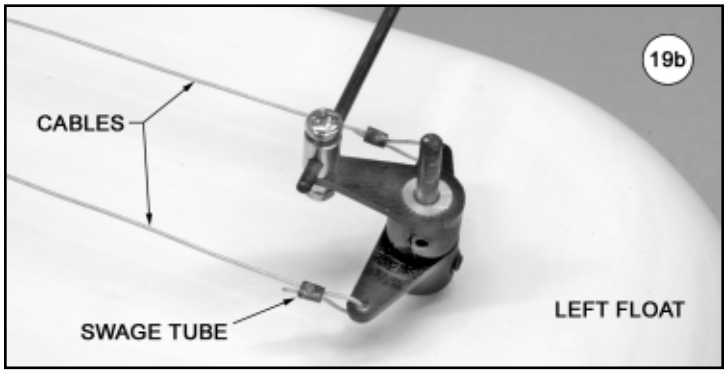
a) Begin the installation of the pull-pull cables by turning on your radio system and centering the rudder. When done, turn the radio back off.

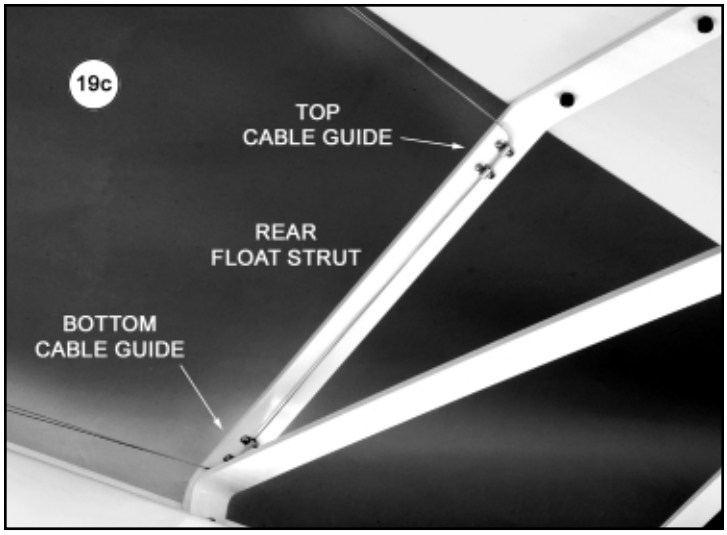
b) Locate the two pieces of Coated Steel Cable and four 2 mm od x 4 mm Metal Swage Tubes. Slide one of the swage tubes a couple inches onto the end of one of the cables. Then poke that end of the cable through the hole on one side of the 2-sided steering arm on the left float. Next loop the end of the cable back through the swage tube. Slide the swage tube up close to the arm - about 3/8" away. Use a pliers or a crimping tool to squeeze the swage tube tight against the cable, locking it in place. Cut off the excess short end of the cable that is sticking out of the tube. Repeat the process to attach the other steel cable to the other side of the steering arm.

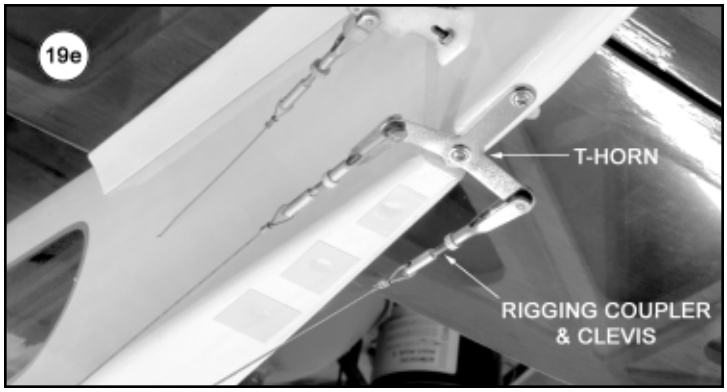
c) Now run the long unfinished ends of both cables forward to the <u>bottom</u> cable guide on the left rear float strut. Pass them thru that cable guide, and then up thru the <u>top</u> cable guide, and then finally back towards the metal T-Horn on the bottom of the rudder.

d) Clip a Steel Clevis/Rigging Coupler onto both the left and right sides of the T-Horn. Adjust the clevises so they are threaded halfway onto the couplers. ***Note:*** *You will have to drill out the holes in the T-Horn to 1/16" dia. to accept the clevis pins.*

e) Determine which cable goes on the right side of the rudder T-Horn and which goes on the left side for proper steering direction. Then, attach the ends of the cables onto the rigging couplers with the remaining two swage tubes, in the same manner you did the ends at the left water rudder steering arm. Be sure to pull the cables tight, taking out all the slack, before squeezing the swage tubes tight. It's not necessary to have the cables super taught, but there should not be any noticable slack.







20) Double check the final alignment of the floats to the fuselage. Set the airplane (no wing) on a smooth flat surface and slide books or wood blocks underneath the front and rear ends of the floats to keep the model from tipping fore or aft. Now set a small carpenter's bubble level on top of one float and shift the blocks until the level indicates that the float top is perfectly level. Now place the bubble level on the wing saddle. If everything has gone together accurately, the wing saddle should also be very close to level. If not, further adjustments can be made by using a shim of 1/64", 1/32", or 1/16" thick scrap plywood, cut to fit between the aluminum float struts and the bottom of the fuselage. If you want to raise the nose slightly, put a shim between the front float strut and the fuselage. To lower the nose, shim the rear float strut.

21) Recheck the balance of your airplane with the floats on. The addition of the floats should not have changed the balance point very much. The floats themselves balance near their "step", so if they are mounted on the model with the step located near the model's balance point, then the model shouldn't become either nose heavy or tail heavy because of the addition of the floats.

If you find that your model is slightly nose heavy or tail heavy with the floats on, then you will have to either; 1) shift your radio components fore or aft, or 2) add nose or tail weight to get it to balance. You MUST be sure that your model is properly balanced with the floats on before you try to fly it.

PRE-FLIGHT:

Waterproof your airplane as much as possible. You'll find that it is almost impossible to keep all water out of your airplane. Water has a tendency to get inside the smallest openings. However, if you take a few simple precautions you can usually avoid any serious problems. First, seal any openings in the model you can, especially on the bottom half of the fuselage, where there will be a lot of water spray. Don't try to seal the pushrod exits, you shouldn't put any bind on them and they are most likely high enough above the water to avoid being a problem. Put your receiver and battery pack in plastic bags and seal the bags shut with rubber bands. These two important pieces of equipment often sit on the bottom of the fuselage where any water that does get in will naturally collect. Mount all radio or battery switches inside the fuselage and actuate them with push/pull wires to the outside. Keep the charging jack inside the fuselage. Do not mount your servos against the floor. Following these guidelines should provide adequate waterproofing, in most cases.

In spite of all precautions, a wet interior is inevitable at some time. Make interior checks between flights and at the first sign of any moisture, dry everything out completely before flying again! If your servos or receiver get wet, open up the cases, blow them out, and allow to dry thoroughly before reassembly.

FLYING:

Float flying is fun! It's no more difficult than flying off land, just different. If you can successfully fly a model with wheels, you can be just as successful flying off the water. Some aspects of float flying are even easier. For instance, most water flying sites are much bigger and flatter than any model runway. On the other hand, if your engine stops at any time when your plane is away from shore, it can be difficult to retrieve the model unless you have a boat. For that reason, your engine's reliability is very important!

The best time to fly off water is when the wind is below 10 mph. In higher winds, taxiing into position for takeoff and back to shore after the flight, can become very difficult. Simply stated, the "grip" of the floats on the water is nothing like the grip of wheels to land. Your model will want to slide or drift across the water with the wind. It will also tend to weathervane into the wind. The floats just won't hold the model from turning as wheels would do on the ground. In addition, the small water rudders won't be able to hold the bulk of the model which is above water and catching the strong wind.

You will also find that many float planes will turn much better to the left than they do to the right due to engine torque. Sometimes, if you're having trouble turning the model to the right to point it in the direction you want to go, try making a wide left turn all the way around the other way.

Experience will quickly teach you how much wind is too much for float flying. Below 5-10 mph, the water rudder is very effective and can steer the model at slow speeds. Until you gain some experience, wait for a relatively calm day to try out your new floatplane. For maximum enjoyment, the less wind the better! Except for taxiing and steering on the water, the wind is no more of a factor in float flying than it is in land flying.

Always takeoff directly into the wind. Hold full up elevator and then advance the throttle. Steer straight with the rudder. As the model accelerates, relax the up elevator and the plane will start riding on the step of the floats. The back end of the floats will be out of the water and the airplane will accelerate even faster. You should be holding very little, if any, up elevator at this point. When flying speed is reached pull up slowly on the elevator until the plane lifts off. Keep your climb out and turns gentle until you get to safe altitude. Your model will probably not fly too much different on floats than it did with its wheel landing gear. It will just "feel" a little bit heavier, especially in the glide to landing. Make your first attempts at aerobatics - simple loops and rolls - at high fairly high altitude until you become familiar with your model's new flying characteristics. It won't take you long to discover that making touch-and-go landings on glassy smooth water is pure joy.

Use common sense to avoid damaging your floats on rocky or sandy shorelines. Use the technique of killing your engine with the transmitter about 6' to 8' from shore and catching the airplane as it comes to you, before it hits the shore.

Good luck and stay dry!