

**ZIPP MANUFACTURING**

---

# *ILLUSION*

*Outboard Tunnel Hull*



A Zippkits R/C Boat

## **Building Instructions**

©2009 Zipp Manufacturing  
750 Ball Road • Frankfort, New York 13340  
[www.zippkits.com](http://www.zippkits.com)  
Toll Free (866) 922-ZIPP

# Table of Contents

<b>Introduction</b>	<b>1</b>		
		<b>Fuel Tank</b>	<b>36</b>
<b>SECTION 1 - THE FRAME</b>			
<b>Supplies needed to build</b>	<b>3</b>	<b>SECTION 4 - PAINT</b>	
<b>Equipment needed to run</b>	<b>4</b>	<b>Hull prep</b>	<b>37</b>
<b>Building Surface</b>	<b>4</b>	<b>Sanding and Filling</b>	<b>37</b>
<b>Parts identification</b>	<b>5</b>	<b>Primer and Paint</b>	<b>38</b>
<b>Building Jig</b>	<b>8</b>		
<b>Bulkheads</b>	<b>8</b>	<b>SECTION 5 - ASSEMBLY</b>	
<b>Fuselage Sides</b>	<b>9</b>	<b>Final Assembly</b>	<b>38</b>
<b>Chines</b>	<b>10</b>	<b>Setup</b>	<b>39</b>
		<b>Balance</b>	<b>39</b>
<b>SECTION 2 - SHEETING</b>			
<b>Tunnel Top</b>	<b>10</b>	<b>SECTION 6 - RUNNING</b>	
<b>Side Sheeting</b>	<b>12</b>	<b>Running</b>	<b>40</b>
<b>Bottom Sheeting</b>	<b>13</b>		
<b>Transom Assembly</b>	<b>16</b>	<b>ALSO SEE :</b>	
<b>Sealing interior</b>	<b>18</b>	<b>Tuning Tools</b>	
<b>Deck Sheeting</b>	<b>19</b>	<b>Troubleshooting</b>	
<b>Cowling</b>	<b>22</b>	<b>Lawless Drilling Template</b>	
<b>Cowl Mounting</b>	<b>25</b>		
<b>SECTION 3 - EQUIPMENT</b>			
<b>Radio Box</b>	<b>14</b>		
<b>Servo Installation</b>	<b>29</b>		
<b>Engine Mounting</b>	<b>32</b>		
<b>Setup Board</b>	<b>32</b>		

## Introduction

Thank you for purchasing this kit. We are sure that it will provide you with many hours of enjoyment.

*Please take the time to read this entire manual before building this boat. You will become familiar with the building order, and less likely to make mistakes.*

This kit is not a toy. Although R/C boating is a fun and rewarding hobby, it can be dangerous if not done with common sense and safety in mind. Just about anyone should be able to build this kit, but it should not be operated by children without close adult supervision.

Here are a few safety tips:

- **Never operate your boat alone. If you get hurt, you may not be able to drive for help.**
- **Never, ever operate your boat in an area where there are full size boats or swimmers. If something happens, a 15 pound object traveling at 50+ mph can do serious damage.**
- **Always use a failsafe. This shuts the engine off in the event of radio signal loss. Test the failsafe each day of running, by shutting off your transmitter.**
- **Always carry a fire extinguisher, as gasoline is extremely flammable.**

**The manufacturer assumes no liability for damages or other loss in the use of this product, as we have no control over the construction or end use of this product.**

# ILLUSION

## Purpose

This boat was created as a race boat, designed for the Gasoline outboard tunnel class.

The boat is currently legal in all Gas Tunnel classes.

The Illusion was designed specifically for the Lawless® “G” Drive, and a Zenoah® Gasoline engine.

It has not been tested with any other drives or engines.

### **Note:**

**Some images have been removed for this PDF web version.**

**The printed manual supplied with the kit is complete.**

# ILLUSION

## **Tools and supplies needed to build:**

- Small wood plane (mini plane)
- Sanding blocks with 80 and 220 grit paper
- Drill with bits
- Square
- 12x48 FLAT plywood or bench (the thicker the better)
- Thin and Medium CA glue and accelerator
- Good quality 30 minute epoxy
- Epoxy finishing resin or West Systems Epoxy
- Screws or nails
- Lots of clamps! Spring clamps, paper clamps, c clamps, etc.
- Weights. Bricks, etc.
- Razor saw
- Wood filler
- Primer
- Paint

# ILLUSION

## Additional items needed to complete:

- Zenoah Gasoline engine
- Lawless “G” Drive outboard drive unit
- Tuned pipe or canister muffler (check the rules)
- 2 channel surface radio with 1 standard and 2 heavy duty servos (300 in/oz minimum each)
- Throttle pushrod
- Steering pushrod (at least “4-40” size with carbon or fiberglass tubes)
- 3 pushrod seals (Zipp #3404 )
- 16-24 ounce fuel tank or IV bag and tubing (gasoline compatible)
- Zipp 470 prop (starting point)
- Cable grease (Aeromarine # 7145 )
- 2 feet large silicone tubing (water line)

Before we can start building, we need to do some prep work. Good prep work will pay off later with a straight, true running boat.

First, we need a flat work surface. Nothing else will do.

If you don't have a perfectly flat bench, you can make one with your piece of 12x48 plywood.

Simply screw a couple of 2x4's lengthwise to the bottom. Make sure the 2x4's are straight!

You can then put this on a bench, and shim the corners to make it steady.

Or, if you are really pressed for space, you can set it on a couple of saw horses.

# ILLUSION

## The Build

We are ready to start the build!

Remember- The boat is being built upside down. Any reference to the top or bottom refers to the boat's top or bottom. If you are going to attach something to the top, it would be closest to the bench. Right and left are always as you are sitting in the boat, or from the rear.

Got it? If not, stand on your head as you build...

Let's identify the parts in the sheets. Don't remove the parts until you actually need them, as some look similar, but are not the same.

Before you do anything, carefully sand both sides of each sheet. This makes it much easier to sand each part later. If any parts fall out of the sheets, tape them back in place.

## **ILLUSION**

Take the time to mark all the parts, as there are a few parts that are similar, but not the same.

# ILLUSION



We like the Great Planes 11 inch bar sanders



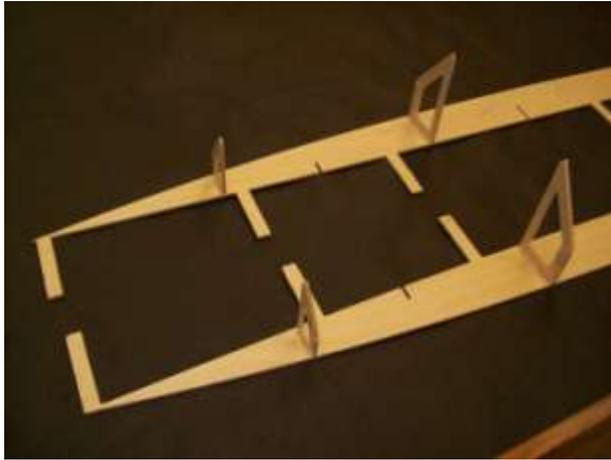
Your life will be much easier with one of these



Use good quality epoxy and finishing resin



Acid brush trimmed for fast epoxy application



Stringers and half-bulkheads being glued.



Note that the sponson sides are mirror images.



Sponson insides and all bulkheads in place on jig.



## Let's get started.

Attach the jig board to your FLAT bench (or 12x48 ply) with screws, nails, clamps or whatever you need, to make sure it's attached to the surface. Make sure the "F" is so that you can read it. Remove bulkheads R, 4, 6 and the (2) sponson sides.

Sand the edges with 80 grit to remove the fuzz, as well as the little tabs that held them in the sheet. Lay each sponson side on your bench so that they are mirror images of each other.

Test fit the half bulkheads R, 4 and 6 into the sides. Be sure that you understand which is the bottom of the sponson sides and bulkheads. Put pieces of waxed paper under the areas you are gluing so that you don't attach the parts to the bench.

If all is well, glue the half bulkheads in place with medium CA and accelerator.

Use a square to be sure that all bulkheads are 90 degrees to the side.

Remove all remaining bulkheads from their sheets, and sand the edges smooth as before. Make sure all parts are marked before you remove them.

Assemble the bulkheads into the slots in the sides, including the ¼ inch transom bulkhead. Be sure that all are in the correct slot. Don't glue anything yet. Put this whole contraption on the jig, and carefully insert each tab into its jig slot.

You can use a small hammer to tap each bulkhead to be sure it is seated.

Don't let the tabs extend below the jig, but make sure that all tabs are fully inserted.

Once you are happy with the way everything goes together, start gluing the tabs into the jig. Tap each tab to be sure it is fully seated.

Remove and sand the jig supports, and glue them to the jig at bulkheads 6 and the nose. The supports glue into slots in the jig.

Using thin CA and accelerator, glue the bulkheads to the sponson insides. Don't glue the ¼ inch transom yet. Be sure that all bulkheads are flush top and bottom, and fully inserted in their slots. Try to keep everything as straight and square as possible.



Fuselage sides being installed in framework.



Rear radio box mounts.



Note blind nuts glued to bottom of mount.

When done, check to make sure everything is flat, flush and square, and then reglue all joints with thin CA.

## Fuselage sides

Remove and sand the two fuselage sides, and carefully slip them up into the bulkheads from the bottom.

You will have to lay them into position, and “rock” them into place.

The fuselage sides start at the transom and go to bulkhead 7. Do not glue in place yet.

Locate the two radio box mounts with holes in them. Glue the two mounts together, aligning the holes.

Glue the two 6-32 blind nuts into the assembled mount. The blind nuts go in the part of the mount without tabs. Use the 6-32 screws and washers to draw them into place. Use medium CA to fix them in place.



Radio box mounts installed.

Glue in the front and rear radio box mounts.

These go into slots in the sides as they are assembled. The radio box mount with the blind nuts goes in the rear, with the blind nuts facing up.

Slide one side (at the front) out of place and insert the radio box mounts. While holding the mounts in place, slide the side back up.

Glue the fuselage sides to the framework, the RB mounts and the transom to the fuselage sides with 30 minute epoxy. Glue the transom to the framework at this time as well.

Coat the tops of the mounts with epoxy, as this area will be difficult to seal once the tunnel top is in place.



Tunnel bottom being glued into place.

## Tunnel Top

Once all the frame work is glued, we can move on to the tunnel top.

Remove the tunnel top sheet and sand the edges smooth. Test fit this on the center framework, sanding the framework slightly if it is not flat.

Glue the tunnel top in place with epoxy. Be sure that it is centered fore and aft. Weight down until cured.

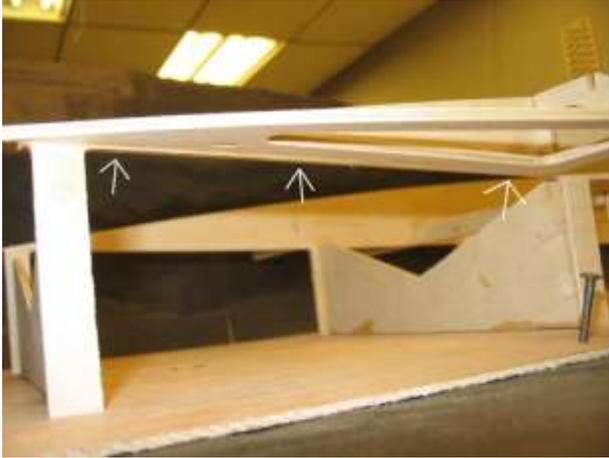


Side chine in place. Pay close attention to how the chine fits at the nose

## Side Chines

Remove the side chines from the sheet and lightly sand. Put these in place on the bulkheads and glue with thin CA and accelerator.

The front of these chines should be centered on the sponson inside, and flush with the bottom of the side (see photos).

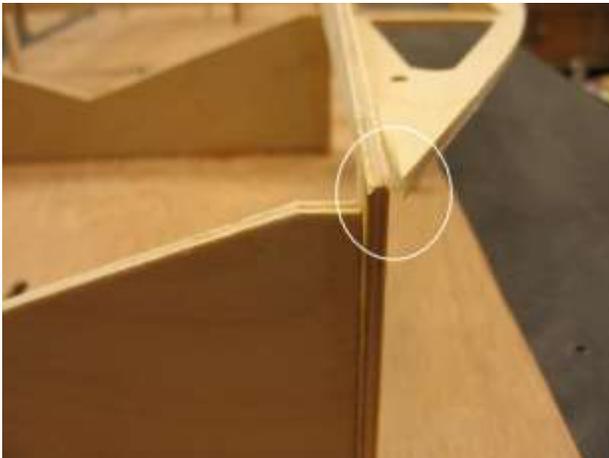


Side chine flush with the bottom of the sponson side.

Be sure that the side chine is not hanging down below bulkhead 6 also.

Use thin CA and accelerator to glue the side chine in place.

Repeat on the other side.



Side chine centered at tip.

## Bottom Chines



Bottom chine in place.

Remove the bottom chines from the sheets and sand lightly.

Press the bottom chine into the slits in the bulkheads.

Fit the tab into the slot at the nose of the side chine. The fit should be tight. You may have to tap this part in place. Be careful, as the chine is somewhat fragile until it is glued in place.

When the bottom chine is fully seated in all slots, glue with thin CA and accelerator.

Repeat on the other side.

Reglue the chines with thin CA.



Bottom chine detail.



Side chine sanded to match angle of bulkheads.



Forward end of sanded chine. Note bevel.

## Sponson side sheeting

Plane and sand the side of the framework so that the side sheeting will sit flat on the framework.

Time to get intimate with your wood plane. If you don't have one, stop here. Go to the store and buy one. Really.

The mistake most people make with wood planes is trying to take off too much wood.

If you try to plane with the blade too deep, you will gouge and split the wood.

Adjust your plane to remove about 1/64 of an inch of material or so.

What we are trying to do with the plane is to shave the side chine to match the angle of the bulkheads.

When you have it close, use your sanding block with 80 grit paper to finish.

Dry clamp the side sheeting in place.

Clamp and adjust the sheeting so that it overhangs an equal amount on the top and bottom. Leave a little hanging off of bulkhead R as well.

If all is well, remove the clamps.

Mark the inside of the sheeting.

Using 30 minute epoxy, mix up about 1/2 ounce. Stir very well.

Using a small stick or acid brush, coat the chines and bulkhead edges. Work quickly.

Make sure that all surfaces that will touch the sheeting are coated. Try not to use so much that it runs all over. Brush epoxy on the front 6 inches or so of the side, to help strengthen the high stress nose area.



Side sheeting clamped and glued in place.



Bottom sanded and ready for bottom sheeting.



Bottom sheet clamped and weighted.

Start clamping, adjusting the sheeting for equal overlap on the top and bottom. Clamp thoroughly, but be careful not to distort the chines. Using a new mixing container and applicator, do the other side. Allow to cure at least 3 hours. Repeat on other side.

## Bottom Sheeting

When the side sheeting is fully cured, plane and sand the side sheeting even with the bottom of the bulkheads. Be careful not to change the shape or angle of the bottom.

When you are satisfied that the side sheeting and bulkhead bottoms are flush, glue the bottom sheets on the same way you did the sides, using 30 minute epoxy.

Use a couple of clamps and some heavy weights to hold them in place.

Check to make sure that nothing has shifted, then let it sit for at least 3 hours.



Radio box sides being glued.



Radio box sides glued as two assemblies.



Let's build the radio box while the glue cures on the hull.

## Radio Box

Remove all of the radio box parts: Two long sides, two short sides, the top and bottom, as well as the 1/8 ply top.

Sand all the parts smooth with 80.

Lay a piece of plastic wrap or waxed paper on your bench.

Using CA, glue the two small sides to the two long sides.

The small sides go between the long ones.

Use a square.

Put glue on the edges, and join the two box halves on the bench.

Lightly sand the bottom of the box.

Glue on the bottom.

Lightly sand the top.

**Skip ahead to the section on installing the servos.**

**It is much easier to glue in the servo mounts now, rather than after the radio box top is glued on.**

**Once all servo mounts are in place, go to the next steps.**



Radio box spacer installed 2 inches from front.

Draw a line 2 inches from the end of the radio box. Make sure it's the end without mounting holes. Using medium CA, glue the radio box spacer to the bottom of the radio box, along the line you drew.



Radio box tongue in place.

Glue the radio box tongue to the spacer with medium CA. Try not to get any glue under the lip, as it will interfere with the mounting of the radio box.

The back of the tongue should be flush with the back of the spacer, and centered side to side. The tongue is wider than the radio box so that the front will self center in the hull.



Tongue is really a lip...

The tongue and spacer serve as the front mount of the radio box. The rear is held in place with the two 6-32 screws, into the blind nuts.

## See Printed Version

Hull trimmed and sanded.



Cutting the hull free of the jig.



Installing transom top and doubler with epoxy.

Back to the boat:

Make sure that it has been at least 3 hours since you glued the bottom sheeting to the hull.

Trim the excess bottom sheeting flush. You can use your small plane to get close. Finish with an 80 grit sanding block.

With your razor saw, cut all the tabs that are holding your hull to the building jig.

Ditch the jig. We don't need it any more. Hey, this is really starting to look like something now!

After you finish admiring your cool new hull, let's move on.

## Transom Assembly

Test fit and glue the  $\frac{1}{4}$  inch transom doubler and the  $\frac{1}{4}$  inch transom top to the front of the transom with 30 minute epoxy. Use clamps, and check to be sure it doesn't slip or slide while it cures.

Try not to get too much glue in the corner, as we will be gluing transom braces in place next.



Side extensions in place.

When the transom assembly is cured, install the side extensions with medium CA. Do not use accelerator. Repeat on other side.



Transom brace being installed.

When the transom assembly is cured, install the transom braces with medium CA. Do not use accelerator, and glue in one brace at a time. Glue the second brace right over the first. Repeat on other side.



Transom braces in place.

Use clamps and make sure they are flush with the top.



Lots of strength here...

## Sealing Interior

Now we need to seal the inside. It is vital that all exposed wood be sealed.

Mix up about 4 ounces of epoxy finishing resin or West Systems epoxy. You can thin the resin with about 10% acetone, so that it brushes easily. Go easy on the acetone, as it will soften the epoxy glue joints if you use too much.

It's pretty funny to get the inside sealed, and see the side pop off the boat because you thinned the sealer too much...Don't ask!

Start from the front.

Using a brush, coat all areas of wood inside the hull. Get inside the holes.



Sealing interior with epoxy.

Continue coating the inside with finishing resin.

If you need to mix more, use a new container and brush. If you don't, the old resin will mess with the new resin, and create a problem. Trust me...

You should also mix a little filler with some epoxy, and use your finger to create a fillet inside the center section to bottom joints, to prevent leaks in this high water pressure area.

After you are 100% sure that all exposed wood inside the hull has been coated, let it sit overnight.



Ready for top deck sheeting.



Epoxy/filler fillets inside center section



Top of hull sanded flat for top deck.



Top decks marked on the inside.

After the hull sealer has had a chance to cure, let's get the hull ready for the top sheeting.

## Top Deck Sheeting

Trim the building tabs, and sand the bulkheads and framework flat.

Test fit the top deck sheets in place.  
If all is well, mark the insides of the sheets.

Lay some newspapers on your work surface, and place the deck on the papers "good" side down.

Mix about 2 ounces of epoxy finishing resin or West systems. Do not thin it.

Using a credit card or similar, squeegee some epoxy on the bottom side of the deck. Do the entire surface. This will waterproof the underside of the deck. Get it pretty thin. The resin goes a long way.

Using a stick or acid brush, coat the tops of the bulkheads, chines and framework with finishing resin.

Put resin on the inner edge of the deck, where it contacts the center section.

Put the deck in place.

Align and clamp the deck at the front and rear.

Check to make sure the deck is properly positioned fore and aft, at the center section.

Add heavy weights to the deck.

Check all around to make sure that the deck is tight against the top of the hull.

Also check that the deck is in contact with the fuselage sides. If not, you can use some clamps to



Decks clamped in place at the nose.

slightly pull the sides out to the deck.

Continue adding weight until the entire deck is in contact all the way around. Check the transom from behind. Check the nose as well. Allow to cure overnight.

After the deck sheathing is fully cured, use your plane and 80 grit to sand flush. Give the whole boat a good sanding with your 80 grit block. Use wood filler to fill any gaps or gouges, and to build up the nose, if necessary.



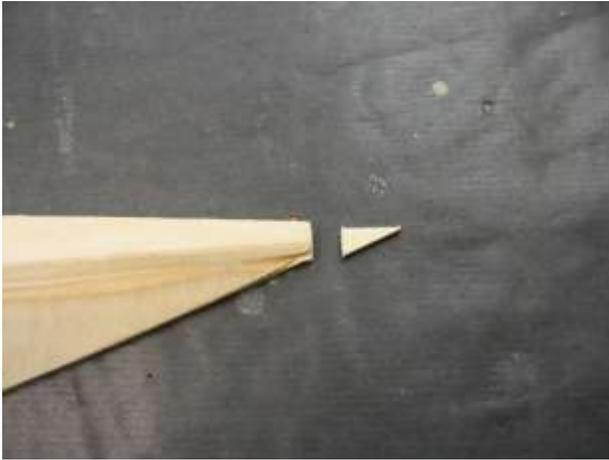
Deck clamped at the rear.

After the filler is dry, sand it with 80 grit, using light pressure.

At this point, you can round the deck where it meets the sides. You can also round the bottom to side seam. Do not round any other edges. We need them sharp.

## See Printed Version

Round these edges, but not others.



Trim nose to a blunt point.

Trim the nose back, so that it is not so sharp. If it were left sharp, it could hurt...



Nose sanded to shape.

Sand the nose to a nice round shape.

At this time, you should look over the entire hull, and sand any glue bumps or uneven seams, etc.



Nose blocks in place.

## Center Section Nose Blocks

These are the two shaped balsa blocks. They fair the front of the center section for less wind resistance.

Lightly sand the fuzz off the edges, but do not round the edges.

Test fit, and then glue them tightly to each side, at the front of the center section.



Glue them so that they are flush (or a little above) with the top, and a little short on the bottom. Use medium CA.

Flush, or slightly above the top sheeting.



Sand the tops flush with the center section top, and sand the tunnel top sheeting to meet them.

Sand the tunnel top sheet to meet the nose blocks.



Cowl bottom with front mount.

## Cowling

The cowling is pretty simple.

It's important to follow these instructions carefully, as a mistake in epoxy glass is not so easy to fix.

Remove the cowl bottom and the two cowl mounts.

The two cowl mounts get glued together with medium CA.



Glue this to the top of the cowl bottom, flush with the rear.

Mount and dowel glued in place.



Sand the edges of the ¼ inch dowel, and glue it into the hole in the mount. Make it flush with the inside.

Dowel serves as front mount for cowling.



Sand the front of the cowl bottom so that it has a bevel. This is needed to allow the bottom to fit inside the very nose of the cowling.

Sand the inside of the cowling where the bottom will be. Also true up the bottom of the cowling itself for about 12 inches of the nose. Only sand enough to even the bottom.

Don't worry about the portion behind this, as we will cut it off later.

Test fit the cowl bottom into the nose of the cowl. Take your time, and sand a little more off of the bottom until it slides all the way forward in the cowl.

Front of cowl bottom with bevel sanded.



Cowl bottom sealed with epoxy prior to being glued to the cowling.

When you are happy with the fit, glue the cowl bottom in place with 30 minute epoxy.

Also coat the top of the wood with epoxy, as it will be difficult to seal once it is in place.



Cowl bottom glued in place.

Tape or lightly clamp the cowl to the bottom, and make sure it is flush with the bottom edge of the cowling.

Set this aside in the upright position, so that a glue fillet will naturally form.



Cut lines on cowling.

Once the cowl bottom is fully cured, it's time to cut the cowling.

We will be making two straight cuts on each side of the cowling.

We want to drop the nose down  $\frac{3}{4}$  inch, but keep the tail the same height.

First, draw a line on the outside of the cowling that exactly matches the location of the front mount.

Make this mark exactly  $\frac{3}{4}$  inch from the bottom.

Draw a line from this mark to the rear bottom of the cowling.



Cut lines marked on cowling.



Clamping a yardstick to the cut line



Cowling after cutting.



Trim the nose blocks for cowling clearance.

Using a Dremel cutoff wheel or a razor saw, carefully make the  $\frac{3}{4}$  inch high cut against the front mount.

Then make the long cut. You can use a utility knife if you lay the cowling on the edge of your bench.

You can also use a razor saw or Dremel.

Now we can trim the inside of the nose blocks for clearance.

Use your razor saw to trim the insides of the balsa nose blocks so that the cowling fits between them.

## Cowl Mounting

Test fit the cowling on the boat.

It will not slide all the way back, as we have not yet drilled the dowel hole in the bulkhead.

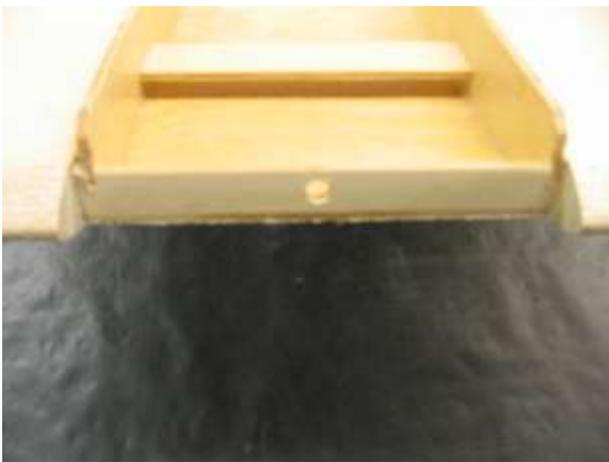
Set the cowl on the hull, and check the fit of the bottom edge against the deck.

Sand the bottom edge of the cowling if need for a nice fit.



End of dowel “inked” for transfer.

Use a black marker to “paint” the end of the dowel. Use plenty of ink. Slide the cowling into place, making sure the bottom edge of the cowling is resting on the top deck.



Hole drilled in bulkhead.

Push the cowling into the bulkhead, so that it transfers the ink to the bulkhead.

Remove the cowl, and carefully center punch your mark, and drill a  $\frac{1}{4}$  inch hole.

Slide the cowling back on, and it should fit tightly against the bulkhead, and flat on the deck.

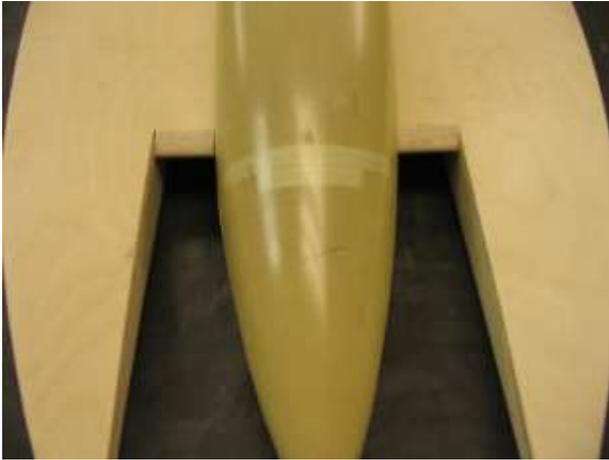
If it does not, find out why and correct it.

## See Printed Version

Cowl bottom should fit tightly to bulkhead.

If you really mess up, put tape over the inside of the hole in the bulkhead, stand the boat on its end, and fill the hole with epoxy. After it cures, start over.

# ILLUSION



Cowling in place.



Rear of cowling marked for trimming.

With the cowling fully seated, mark and trim off the excess in the rear.  
Sand the edge so that it is even.



Cowling trimmed.



Make a mark 2 inches forward of the rear of the cowling, and  $\frac{3}{4}$  inch up from the deck.



1/4-20 nylon cowl mounting bolt.

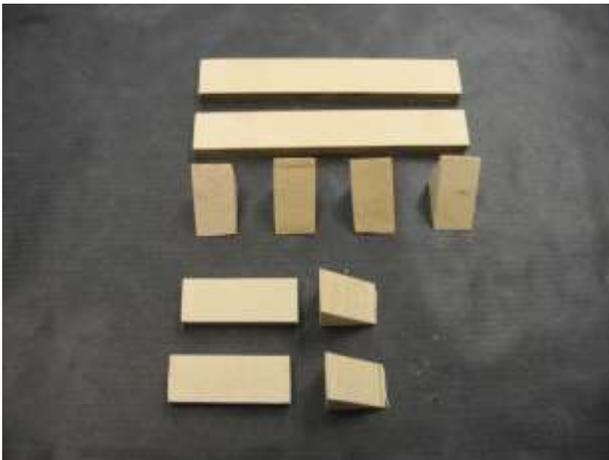
Make sure the cowling is still fully seated, and drill a hole with a #7 (.201) bit. Do this on both sides, being careful not to disturb the cowling position.

Remove the cowling and drill the holes out to  $\frac{1}{4}$  in the cowling only.

Tap the hole in the fuselage side with a  $\frac{1}{4}$ -20 tap, and harden the threads with thin CA and accelerator.

Run the tap through again to clean the threads.

Bolt the cowling on with the supplied  $\frac{1}{4}$ -20 nylon bolts.



Servo mounts.

Next, we will mount everything we need, to make this boat go!

## Radio:

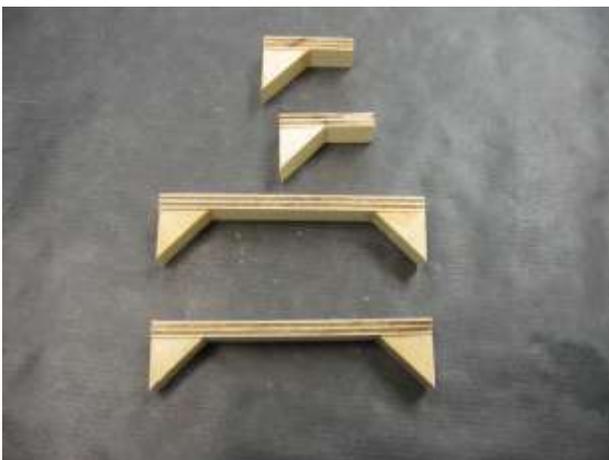
Find the 2 pieces of  $\frac{1}{4}$ x1-1/2 ply, and the 6 pieces of tri stock. Also find the 2 pieces of 1/2x 4 ply. These are the servo mounts.

Using CA, glue one piece of tri stock to the end of each piece of ply.

Make sure the two pieces are flush with each other by holding them flat against the bench while the glue dries. Use a piece of waxed paper or cling wrap on the bench, so the part doesn't become a permanent part of your bench...

When dry, sand each mount smooth with 80.

Get your servos...



Assembled.



Marking servo for mounting screws.



Note servo is mounted to the end of the rails.



Line marked for rudder servo rails.

Hold the throttle servo at the end of the mount, mark the hole locations in the ply. Be sure to leave a 1/16 gap between the servo case and the mount. Drill on the marks with a 1/16 bit. Repeat for the other side.

Assemble the grommets and bushings on the servos. Note that the brass bushings go in from the bottom of the servo.

Screw the servo to the mounts, making sure the case does not touch the mount. Lay the mounted servo on the bench.

Check to see that it sits flat on the bench. If not, find out why and correct it.

If you are using two of the Hitec 805 servos, follow the instructions below.

If using something else (gear drive, etc), make sure it is solidly mounted, and the center to center distance for the servo arm holes are 3-1/2 inches.

## Hitec 805 Servo Installation

Lay the servo box on its side, opening towards you, and the front mount of the radio box on your right.

Make a pencil mark 1-5/8 inch from the bottom, inside the box. This is where the top of the rudder servo rails will be. Repeat on other side.



First servo rail installed.

Glue one of the large servo mounts into the box, aligning the top of the mount to your line. You can use medium CA for this.



Both rails in place.

Extend your line  $2\text{-}11/16$  from the edge of the first mount, and glue in the other mount. Make sure it is level and parallel with the first mount.

Check the fit of your servos.



Rear of box marked for throttle servo rails.

## Throttle servo

On the other end (rear) of the box, draw a line  $1\text{-}1/2$  inches from the bottom. This is where the top of the throttle servo rails will be.



Throttle servo in place.

Glue in the throttle servo, aligning it to your line and centering it in the box.



Note that the servo location allows access to the two mounting screws in the floor.

Attach the rudder servos to their mounts as follows: Assemble the servo arms and tie bar for a 3-1/2 inch center to center length for the pushrods.

Put the servos in place in the rails, and power them up with the transmitter and receiver. Make sure your steering trim is centered.

Put the servo arms on the servos and center them on the rails.

Mark the holes and drill for the servo screws.

Once all the servos are fitted, remove everything from the box.

Go over all the joints of the servo rails with a small fillet of medium CA and accelerator.

Glue the radio box top onto the radio box. This is the 1/8 ply top without the lid.

Using 80 grit, sand the entire box.

Carefully remove the lid from the 1/8 ply radio box top.

Sand the edges smooth.

Glue the 1/8 ply top to the radio box.

It has a slightly larger hole for the lid, so try to center it so that the "lip" is even all around.

Make sure that you don't get any glue in the "lip", as it will interfere with the way the lid seats.



Hitec 805's and a standard servo in place.



Radio box in place.

Seal the inside and outside of the radio box with finishing resin or West Systems. Use a metal acid brush, bent over, to seal the underside of the top.

Be careful not to get any excess resin in the “lip” where the lid seats, as this would interfere with the seal of the lid.

Flip the box over, onto some waxed paper, and seal the bottom. Allow to cure overnight.

While you have epoxy mixed, seal the radio box lid the same way. Do both sides, as well as the edges and lay it on waxed paper to cure.

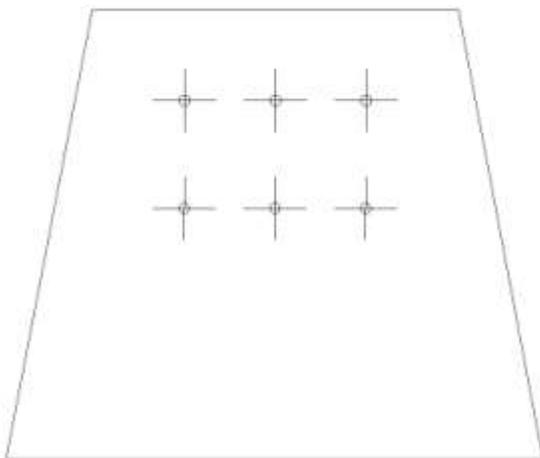
## Engine Mounting

If using the Lawless “G” drive follow the directions below.

If not using the Lawless drive, install your drive so that when adjusted all the way down, your drive is even with, or slightly below the sponson bottoms when the drive is level.



Lawless drive mounted to transom.

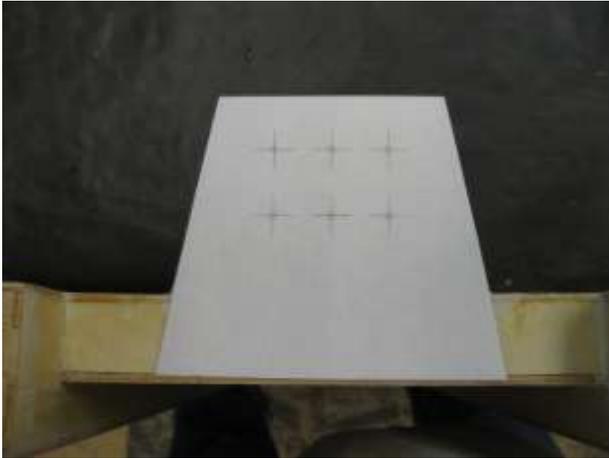


Lawless drilling pattern from manual.

Locate and cut out the paper template from the manual.

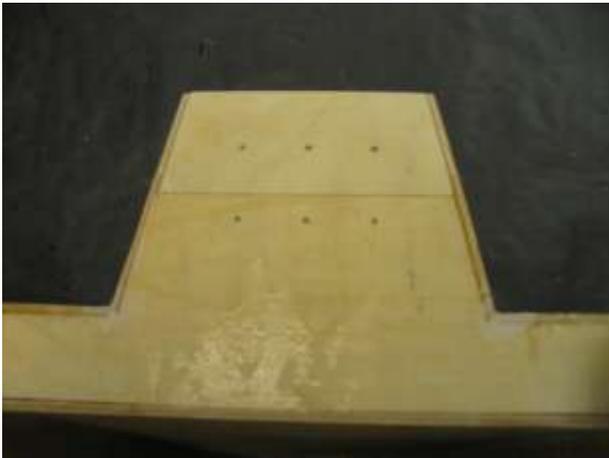
Use a little spray adhesive or rubber cement to lightly hold it in place on the transom.

# ILLUSION



Drilling pattern attached to transom.

Align the top of the pattern with the top of the transom, and center it side to side.



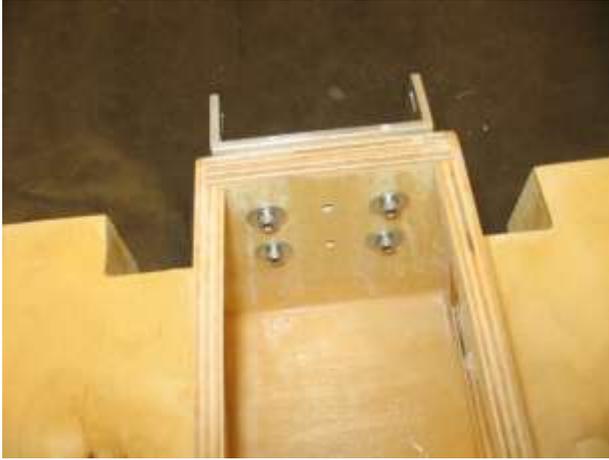
Holes center punched.

Use a punch to mark the holes.



Engine mount bolted to transom.

Remove the pattern and drill the holes with a 3/16 bit.



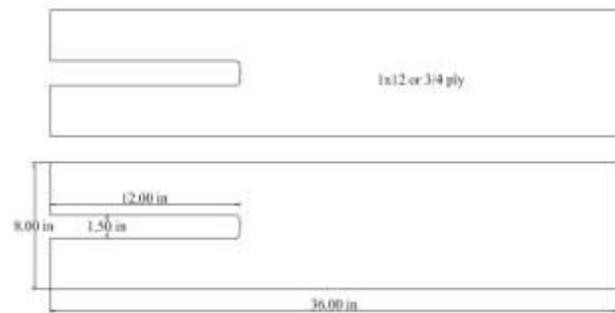
Easy adjustment from inside.

Bolt the bracket to the transom.  
Note that we put the nut plate outside the transom, and used shorter bolts.

It is much easier to adjust from inside the transom.

At this time, you should make a setup board from a piece of **flat**  $\frac{3}{4}$  ply, or 1x stock.

Make it 8 inches wide, and about 3 feet long.



# See Printed Version

Setup board in use.



Notice angle of shaft and cavitation plate.

The setup board is necessary to set the drive depth and angle.  
Without it, it is hard to see exactly where you are.



Clean, simple installation.

## Radio Box Installation

The radio box installs by sliding under the front mount, and with the two 6-32 screws and washers in the rear.

If you have trouble sliding the front mount in place, you can use a file to clean the slot.

## Pushrods

The throttle and steering pushrods are entirely up to you.

We used some fiberglass tubes and 4-40 pushrods for the steering, and a 1/16 braided steel cable with a liner for the throttle (Sullivan S508 works well).



4-40 rods and fiberglass pushrod tubes.



One pushrod brace in place.

We supply two pushrod braces, plastic clamps and 6-32 screws, nuts and washers for bracing the pushrods.



Pushrod brace detail.

These braces are made to mount against the first bulkhead, and support a ¼ inch pushrod.



## Fuel Tank

We like using an IV bag (500mL) for a gas bag.

Very simple to use, water proof and rugged.

You can use any type of tank you want, just make sure that you use gasoline compatible components...





## Finishing

Sand the entire hull with 80. Fill any dings, dents, craters, valleys or chips with wood filler. When dry, sand again with 80. Check to make sure that all imperfections are filled. If not, fill and sand again. Spend a little time getting this right, as it will make your boat look so much better when done.

Blow off the hull with compressed air, or use a vacuum to get the dust off.



Mix about 1 ounce of finishing resin. Use a credit card to spread out the resin on the top and sides. Squeegee as much as you can. Get a thin even coat of resin on all areas. Use a small acid brush to get the edges. Scrape as much resin as possible. You just want to wet the wood with resin; any excess will just have to be sanded off later.

This first coat is easy, as the wood will darken as it gets wetted with resin.

The second coat will be a little more challenging, but will use far less resin and be faster to cover. When you are sure that all areas on the top and sides are covered, let it cure overnight.

When cured, sand lightly with 80. Just make it smooth. It's ok if you sand through the resin on this coat.

When done, blow the dust off and do the bottom.

When the bottom is cured, sand with 80.

Repeat the whole thing for the second coat, only this time, after the second coat has cured, sand with 220 wet.

Sand with a bucket of water, a dribbling hose or in your bathtub.

Use one of those rubber sanding blocks.

Don't worry about the hull, it's waterproof now...

Sand the inside of the hull too.

Sand until all areas are smooth, but don't sand through to the wood. If you do, you have to re-coat the area with resin, and re-sand.





Once the hull is dry, wipe it down with alcohol. Use a tack cloth lightly to remove any dust. Spray a light coat of primer, inside and out. Let this flash for a few minutes, and spray a heavy coat on. Let sit overnight.

When the primer is dry, use spot putty to fill any nicks or surface imperfections. When dry, wet sand with 400 on the rubber block. If you are happy with the surface, spray on another medium coat of primer.



When dry, wet sand with 600 or 800.

Use compressed air or a vacuum to remove the dust on the inside and outside of the hull. Wipe down the entire boat with alcohol. Use a tack cloth to lightly wipe all surfaces.

Spray your color coats. When cured, wet sand with 1000+ and clear coat the entire hull. Make sure the clear is completely cured before final assembly.



## Final assembly

Before you bolt anything to the hull, give it a good coat of paste wax.

Install the engine.  
Install the servos and radio box.

Install the sharpened and balanced prop and prop nut on the flex shaft.

Install the fuel bag and fuel lines.



## Setup

Grease the flex cable.

Set the drive so that it is level or slightly negative, and the center of the prop is at the sponson bottoms, or slightly below.

Wrap your receiver, failsafe and battery pack in foam rubber.

Mount the switch.

Turn the transmitter on first, then the receiver.

Make sure the trims are centered.

Put the rudder servo arms on. They should be parallel with the servo, and 90 degrees to the pushrod. Use the sub trim function, if your radio has it. If not, get it as close as you can.

Attach the engine to the rudder pushrods. Is the engine straight? If not, adjust the ball links until it is.

Be sure to put the screws in the servo arms...

Adjust the throttle so that the carb is wide open when you pull the trigger all the way back, and closed when you push the trigger forward.

When the engine is running, you can use the throttle trim to set the idle speed.

Take the time to get this right. It's no fun running your boat onto the shore because the engine won't shut off...

Make sure all your water lines are firmly attached. Use those teeny little tie wraps at each fitting.

## Center of Gravity

The illusion should balance 24 to 28 percent from the back of the boat.

That is 10-1/2 to 12 inches from the back of the sponsons.

To check the CG, mark the bottom of the hull at 10-1/2 and 12 inches.

With the boat completely ready to run, except fuel, set the boat on a long dowel or skinny (1/4 inch) stick.

Roll or slide the boat forward and back until it balances. If it is within the two marks, you're good to go.

If needed, you can add some weight in front of the radio box for balance. We recommend that you run the boat first, and only add weight if you can't trim the boat otherwise.

## Running

Under no circumstances should you ever run a marine engine for an extended time without cooling water.

## At the pond

Make sure your transmitter and receiver batteries are fresh, or fully charged.

Do a range check with your transmitter antenna down, and note the distance. You should do a range check every day that you run. Should a problem arise, you can fix it before you damage anything. Tape the lid on the radio box with radio box tape, or use Scotch Plastic Tape. Regular tape leaves a residue.

Make sure that your prop is sharp and balanced.

Make sure all screws and nuts are tight.

Fill the tank; turn on your transmitter, then receiver. Wiggle the rudder so you know it works, and then start the engine.

Don't rev the engine much, as there is no load on the prop until it's in the water.

To launch, have a helper drop the boat in level. You can give it a little gas as it gets to the water, but not too much. Most people don't like getting sprayed with water...

Let the engine warm up for 30 seconds or so before giving it full throttle.

Drive past yourself, and make sure you have a stream of cooling water.

If you don't see any, bring it in pronto!

If all looks good, hit it!

Notice how the boat rides in the straights. Does it lean or pull to one side?

Is the deck about 5 degrees nose high?

How about the turns? Does the nose rise or fall in the turns? Does it slide or hook?

It's a good idea to have a helper write down your comments as you run the boat. After the run, you can use the included "Tunnel Tuning Tools" sheet to help you sort any problems.

**We hope you enjoy your Illusion  
Gas tunnel as much as we enjoy  
ours!**

## Tunnel tuning tools

**Drive: Depth-** Lower to loosen the boat, higher to wet the boat. Imagine that the prop wants to always ride at the same depth in the water. If you lower the prop, you are lifting the boat out of the water. The reverse is true for raising the prop; it lowers the boat in the water.

**Drive: Angle-** Negative to push the bow down, positive to push the stern down.  
This is a course ride angle adjustment. Small changes in the prop angle make large changes in ride attitude.

**CG:** This is the longitudinal (fore and aft) balance of the hull. Tunnels are usually 24-28 percent of the hull length, from the transom. This is the pivot point for turning. A forward CG keeps the hull wetter, preventing blowovers. Limits absolute top speed due to drag. An aft CG keeps the hull out of the water, and usually blows over with very high speed. That's why they call it a "balance" point...

**Prop:** The prop is very important to speed, as well as overall handling of the boat. You can (and should) experiment with many props, lifting and non lifting, to get the best speed and handling from your boat. Always sharpen and balance your props! A sharp prop helps reduce "prop walk", and a balanced one usually stays together!

The goal is usually to get as much of the hull out of the water as possible, without blowing over. This is a compromise. Add the requirement to turn, and everything gets even more complicated.  
Don't be afraid to try anything, as far as prop or setup.

## Troubleshooting

Boat bounces in the straights-	Drive angle positive Prop too deep Speed too slow
Boat blows over at high speed-	CG too far back Drive angle positive
Boat “plows”-	CG too far forward Drive angle too negative Debris caught under boat
Boat is very “light” and unstable-	Drive too deep Drive positive
Boat needs left trim to go straight-	Prop walk Prop walk Prop walk Prop walk
Boat slides too much in turns-	Not common...
Boat hooks in turns-	CG too far forward
Boat is slow and won't turn-	<b>Get a Zippkits boat!</b>