

# How to Install a Steering Servo in a Fast Electric, Radio Controlled Boat

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## SECTION 1: INTRODUCTION

Steering and handling of Fast Electric (FE) boats is controlled by the steering servo. A good solid installation of the servo, in a manner that it can easily be removed for servicing or replacement, is often an overlooked area of FE boat building. There are numerous methods of installing servos in hulls and some common ones are: attaching the servo in the hull using double sided tape, gluing wood blocks in the hull and screwing the servo into the blocks, and even directly gluing the servo to the hull bottom. There are pros and cons to all of these methods, but extra care and a strong servo installation is required for high power, brushless, motor set ups and larger offshore boats. This article describes a simple, low cost, and very strong method of installing servos into hulls in such a way that they can easily be removed for servicing. The components of the servo mount are shown in Photo 1 :

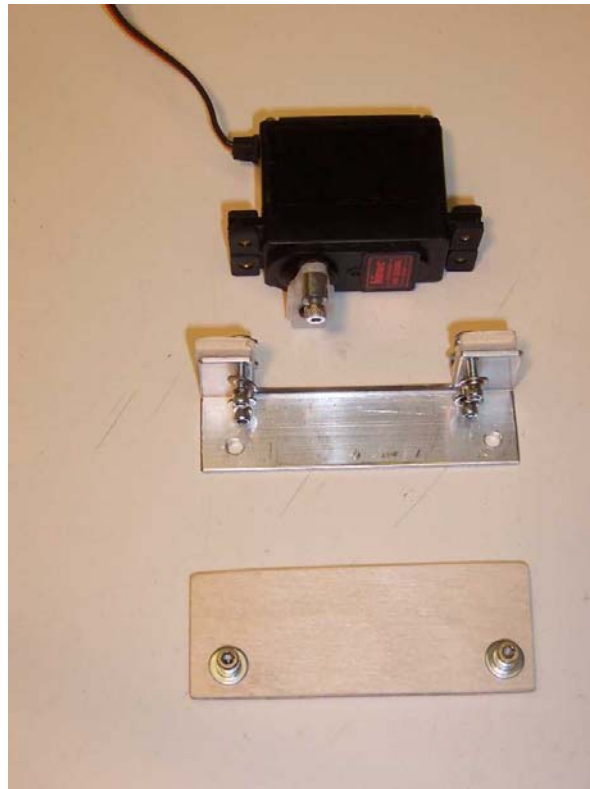


Photo 1: The components used to mount the steering servo in the hull

The basic idea of this servo mount is to glue a small wood sheet into the hull floor that has blind nuts pre-installed under the sheet. Then the servo is screwed onto a right angle aluminium bracket. One trick is to glue two small pieces of wood with blind nuts onto the aluminium bracket so it is very easy to screw and unscrew the servo mounting screws – no struggling to hold the nuts in place on the bracket. Then the entire aluminium bracket and servo is then simply screwed into the wood sheet on the hull.

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### **SECTION 2: REQUIRED MATERIALS**

The following materials are required to make the servo bracket and install it in a hull.

#### Materials

Minimum  $\frac{3}{4}$ " X  $\frac{3}{4}$ " X  $\frac{1}{16}$ " thick right angle Aluminum stock

$\frac{5}{32}$ " minimum thickness aircraft plywood

# 2-56 X  $\frac{1}{2}$ " cap head screws and blind nuts – Great Planes part No. GPMQ3500 "Blind Nut Bolt Set"

# 4-40 X  $\frac{3}{4}$ " cap head screws and blind nuts – Great Planes part No. GPMQ3503 "Blind Nut Bolt Set"

Du-Bro EZ-Push Rod Connector

Medium thickness CA Glue

220 grit sand paper

### **SECTION 3: ALUMINUM SERVO BRACKET**

The following steps describe how to make the bracket and install the servo in the bracket. Small, plywood, backing pieces with blind nuts are installed to eliminate the need to fumble with nuts while installing or removing the servo from the bracket.

#### 3.1 Making the Bracket:

The aluminium angle bracket must be sized to fit the servo to be used. For most standard servos,  $\frac{3}{4}$ " angle stock is adequate. Larger servos will require larger stock. An opening must be cut into the vertical face of the angle stock to allow the servo to be screwed into the bracket. For a standard servo this opening is 1- $\frac{5}{8}$ " wide and it is the full  $\frac{3}{4}$ " depth of the angle stock. Care must be taken to NOT make the opening too wide otherwise the servo screws will not have enough aluminium material to fasten to.

Measure the servo width (it is approximately 1- $\frac{5}{8}$ " for a standard servo) and mark this dimension on the vertical face of the aluminium angle stock. Leave at least  $\frac{1}{2}$ " of stock on either side of the opening to ensure the angle bracket is strong enough to hold the servo. Cut the angle stock using a Dremel tool with a cutting wheel, and hand file it to achieve the correct final dimension. Test fit the servo frequently while you are working to make sure the opening is not too large. Photo 2 shows the aluminium bracket with the correct size opening cut into it.



Photo 2: Front view of the aluminium bracket

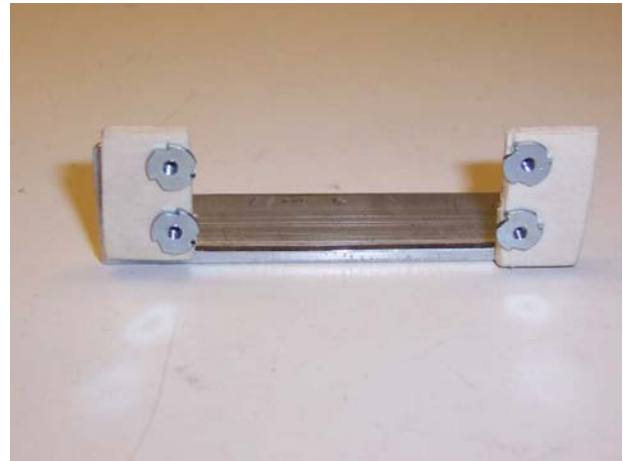


Photo 3: Back view of the bracket with blind nuts

In order to fasten the bracket to the wood mounting sheet in the hull, it is necessary to drill two  $\frac{1}{8}$ " diameter holes in the horizontal portion of the bracket. The holes must be positioned to be clear of the servo and servo arm as shown in Photo 2, in order to easily remove the entire assembly from the hull after final installation.

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Once the correct size opening has been cut into the right angle aluminium stock, temporarily place the servo into the bracket (similar to Photo 3), and mark the servo mounting holes on the aluminium bracket. Remove the servo and drill 3/32" diameter holes so that the #2-56 cap head screw can pass through the aluminium. Cut two small rectangular pieces of 5/32" aircraft plywood and glue them to the back of the aluminium bracket using medium CA glue. Roughen the aluminium with sandpaper where it is to be glued. As shown in Photo 3, the wood pieces may need to be slightly larger than the bracket sides in order to hold the #2-56 blind nuts. Test fit the #2-56 blind nuts on the wood pieces to ensure the correct size of wood.

Once the plywood backing pieces are glued onto the bracket, drill the mounting holes through the plywood using the holes in the aluminium bracket as a guide. Carefully press or tap the #2-56 blind nuts into the holes on the plywood backing pieces as shown in Photo 3.

### 3.2 Installing the Servo in the Bracket:

The servo can now be installed in the bracket using #2-56 cap head screws, lock washers and flat washers. The blind nuts, fixed in place on the plywood backing, make it very easy to install the servo. In this example, the servo is installed with the rubber grommets and brass sleeves around the mounting screws to provide isolation from vibration. This is optional for FE boats, but is normal practice for RC boats that have gas or nitro engines. Photos 4 and 5 show the finished bracket with the servo installed in place.

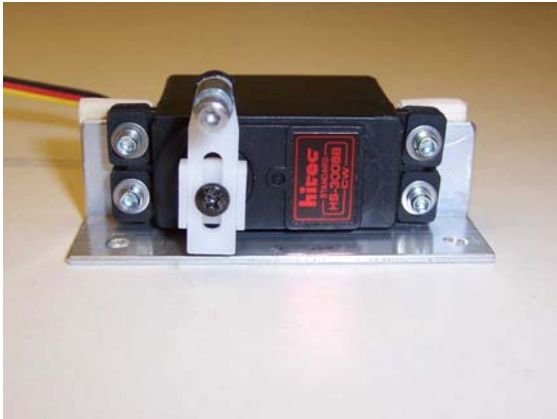


Photo 4: Front view - Servo in bracket

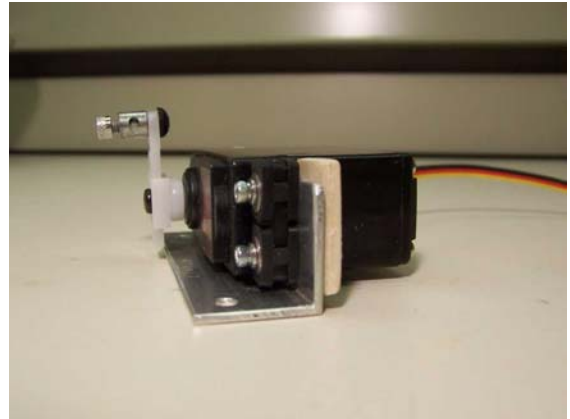


Photo 5: Side view – Servo in bracket

## **SECTION 4: WOOD MOUNTING SHEET**

Now that the servo bracket has been fabricated and assembled, all that remains is to securely fasten the bracket to the boat hull. Rather than glue the bracket directly to the hull, a wood sheet will be glued into the hull and then the aluminium bracket will be screwed on to the sheet. The wood sheet provides a large gluing area in the hull and thus allows for a very strong bond to the hull, while the use of screws to fasten the bracket to the sheet allows ease of servo removal for maintenance or repairs.

### 4.1 Location:

Select the location within the hull where the servo is to be installed. Typically this will be near the stern of the FE boat and in such a position that a simple straight push rod can be used to control the rudder arm. Photo 7 shows a typical location for a hydroplane model boat. There must be sufficient space to accommodate the servo, bracket and a plywood sheet under the aluminium bracket.

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### 4.2 Wood Base Sheet:

The small plywood sheet to be glued in the hull should be at least 5/32" thick, and should be slightly larger than the base "foot print" of the aluminium bracket. The larger the sheet, the stronger it will be glued in the hull.

Trace the outline of the aluminium mounting bracket, and the base plate holes, onto the stock plywood. Trace a slightly larger outline around the bracket outline and cut the plywood to these traced dimensions. Test fit the aluminium mounting bracket and drill 1/8" diameter holes through the plywood base at the marked hole locations for the bracket.

Turn the wood base over and press or tap the #4-40 blind nuts into the underside of the base sheet. Make sure the blind nuts are flush with the bottom of the wood sheet. The underside of the finished base sheet, with the blind nuts installed, is shown in Photo 6. Test fit the servo bracket and screw the bracket onto the base sheet using the #4-40 cap head screws, lock washers and flat washers. The screws will be longer than required and will protrude beyond the bottom of the wood base sheet. Mark the screws where they protrude, remove them and cut them to the correct length so they do NOT extend beyond the bottom of the wood base sheet when the screws are fully tightened.

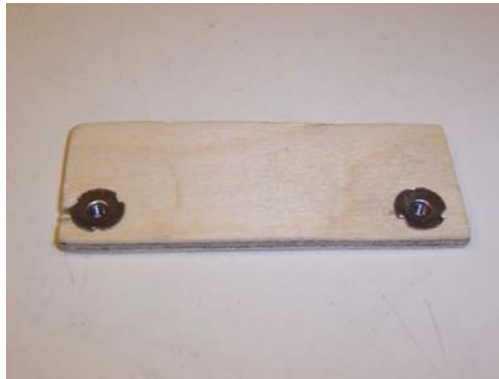


Photo 6: Underside of the plywood sheet with #4-40 blind nuts

### 4.3 Installing the Sheet

The servo mounting location should be prepared for gluing of the wood sheet by sanding the surface with 220 grit sandpaper and wiped clean. Test fit the wood base sheet, with the servo and bracket, in the hull to find the correct final mounting location. Mark this location in the hull. Remove the aluminium bracket from the wood sheet to avoid any CA glue from getting onto the #4-40 screws. Roughen the underside of the wood base sheet and glue it onto the hull using medium CA glue. Be careful not to get CA glue on the blind nut threads. Photo 7 shows the wood base sheet glued into the hull.

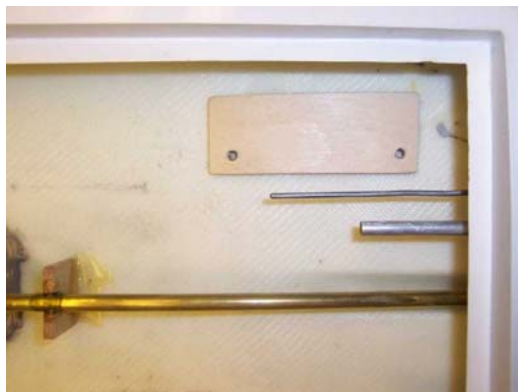


Photo 7: Wood base sheet glued in hull

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### **SECTION 5: INSTALLING THE SERVO**

After the base sheet has been glued into the hull, simply screw the aluminium mounting bracket (with the servo already installed), onto the base sheet.

Install the desired servo arm on the servo and pushrod connector on the arm. In this example, an adjustable arm is shown in Photo 8. The adjustable arm makes it easy to obtain the desired rudder throw by shortening or lengthening the arm as desired. As shown in Photo 8, a Du Bro E-Z connector will be used to attach the pushrod to servo arm.



Photo 8: The completed servo mount installed in a hydroplane hull

The techniques described in this article can be used to install a steering servo in a hydroplane hull as shown in Photo 8 or a monohull as shown in Photo 9.



Photo 9: The completed servo mount installed in a mono hull

### **ACKNOWLEDGEMENTS:**

This method of installing servos has been developed with tips and guidance from fellow FE racers at Metro Marine Modellers in Toronto, and other RC hobbyists. I wish to acknowledge and thank all those that have given me helpful suggestions and advice over the years.

Thank you to Steven Vaccaro of Offshore Electrics for posting this article so others may pick up some tips and get hooked on Fast Electric RC boats.