

# **SUPER KRAFT**

## **WACO UPF-7**

### **Assembly Manual**



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**Warranty:** Kangke Industrial USA Inc. guarantees the kit to be free of defects in both material and workmanship at the date of purchase. This warranty does not cover any parts damaged by use or modifications. In no case shall Kangke Industrial's liability exceed the purchase cost of this kit. Since Kangke Industrial has no control of final assembly and material used by user for final assembly, no liability shall be assumed or accepted for any damage resulting from the use by user of final use-assembled products. This kit has been flight tested for normal use. If the plane will be used for extremely high stress flying, the modeler is responsible for reinforcing the high stress points. Inspect this kit immediately after receiving it, report any missing and damaged parts within 10 business days otherwise the claim may be denied.

# Super Kraft

## 20% WACO UPF-7

*Jimmy Franklin* and his modified 1937 UPF-7 Waco bring the crowds to there feet at every air show he attends. His outstanding pilot abilities, jet-assisted performance and wing walking routine must be seen to be appreciated. For information on Jimmy Franklin and photos of his incredible Waco visit his web-site at [www.franklinairsows.com](http://www.franklinairsows.com)

The only model authorized for production by *Jimmy Franklin* the Super Kraft 1/5th standoff scale version of his plane will do the same at your field. Beautiful on the ground and breathtaking in the air, this balsa and ply airframe comes expertly covered in Jimmy's scale red and silver trim scheme, or if you like to personalize your planes it can be ordered with a beige only covering. The fiberglass cowl, wheel pants, struts, and sturdy aluminum landing gear come pre-painted in matching colors. Both wings are two-piece fully symmetrical, with an aluminum spar. The 72-inch top wing and 64-inch bottom wing deliver 1,480 square inches of lift, while four ailerons add to the incredible roll rate. The 62-inch long fuselage and oversize tail feathers produce control other models can only dream of. With a weight range of 12-15 pounds and an average wing loading of only 21.5 ounces per square foot it will perform on engines from 1.2 glow engines to 2.4 gas. Options include the use of two or four aileron servos, alternate elevator locations and adjustable servo tray locations will make balance easy. The prototype in the instruction had a finished weight of 14 pounds 13 ounces ready to fly.

Powered with a ZDZ-40 {RC Showcase 301-374-2197 or [www.rcshowcase.com](http://www.rcshowcase.com)} vertical performance was breath taking. Servo requirements are Elevator 60 oz/in, Rudder 90 oz/in, Ailerons with a two-servo system 80 oz/in with a four-servo system 40 oz/in. In the proto-type we used Hitec {858-748-6948 or [www.hitecrcd.com](http://www.hitecrcd.com)} servos.

Elevator and Ailerons used HS5475HB, Rudder HS5945MG and a standard HS325BB for the throttle. The batteries were lithium-ion {Skyborn Electronics 972-267 5099 or [www.rcpowerflight.com](http://www.rcpowerflight.com)} 4400 mha. @ 6 volts for the reciever and 2200mha. @ 4.8 volts for the ignition.

**WARNING!** As model aircraft get larger and more powerful, the risk for injury increases. KANGKE's extensive testing procedures insure a high quality kit that has gone through many steps to provide you with a safe reliable airframe. Nothing we can do however will make up for poor assembly or irresponsible behavior at the field. A model this size and weight traveling at 60 MPH contains enough energy that if it were to contact another person, the injuries would be extensive, possibly fatal. The safe operation of this model is yours and yours alone. If you are a beginner or have never flown a model of this size and power, you should not make the attempt without the help of an experienced pilot.

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**Read each step of the instructions carefully. Be sure you understand what is required and what the procedure is before you glue or cut anything. How well you assemble this model will have a direct effect on its flight characteristics.**

If you are familiar with the assembly of ARF type aircraft you will find the order of assembly steps in this manual to be unusual, this was necessary to insure the fastest, most accurate assembly possible. Super Kraft recommends you follow the assembly order as shown.

**Specs:**

Span	72 upper / 64 lower
Length	62 inches
Weight	12-15.5 pounds
Area	1,480 square inches
Loading	22 oz./ft average
Channels	4 with 6-8 servos
Engine	120 glow – 2.4 gas
Covering	Oracover
Tail wires	functional
Wing struts	functional
Cowl	fiberglass
Wheel pants	fiberglass

**Kit contents:**

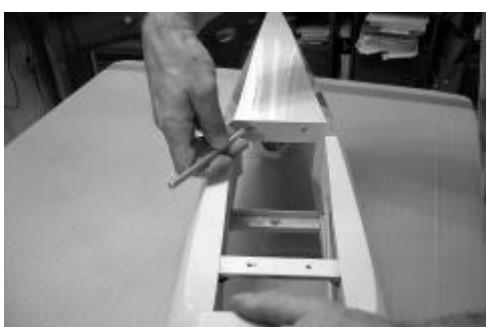
Wing panel/controls	4
Fuselage	1
Cowl	1
Windshield	1
Main gear	1
Tail gear kit	1
Stabilizer/elevator	1
Rudder/fin	1
Tail wire pack	1
Wing strut	2
Hardware pack	1
Wing tube	2
Wheel kit	1

The hardware for each step is packed in separate bags. The bag for the landing gear contains the gear screws, axles and wheel pant screws; the bag for the wings contains the strut mounts and all necessary hardware, etc. Keep the bags in separate containers to speed the assembly process.

**1) Open the holes for the landing gear.**



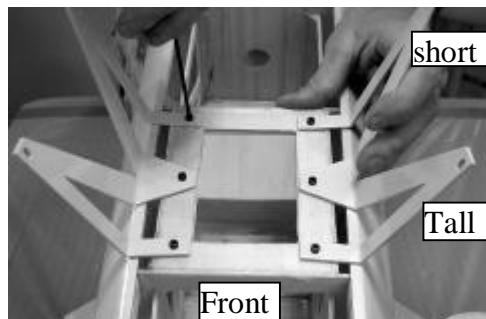
**2) Open the holes for the lower wing attachment dowels.**



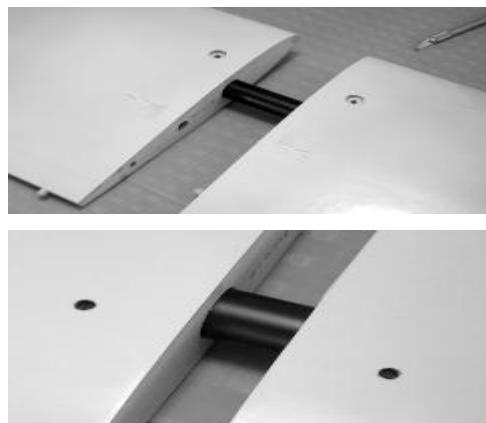
**3) Install the landing gear. This will stabilize the round fuselage and make assembly easier.**



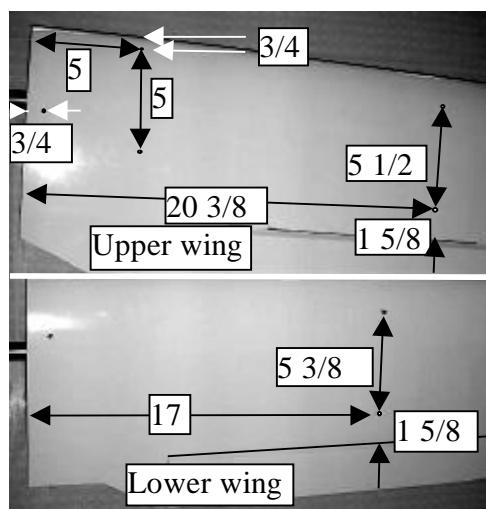
**4) Install the upper wing "M" struts. Note the front of the "M" is taller.**



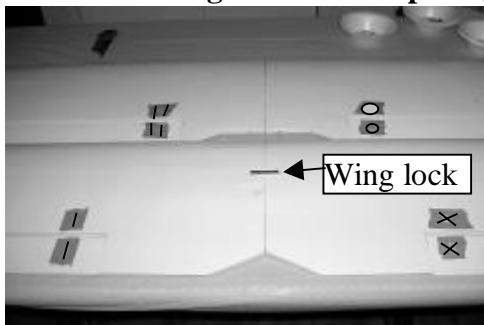
**5) Open the holes for the lower wing attach screws, on both sides of the wing.**



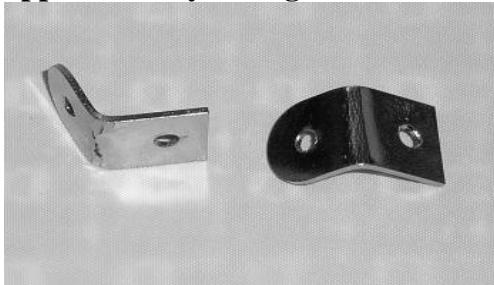
**6) Open the holes for the "M" and "N" strut brackets. The holes are small and hard to find. Use the dimensions below to locate them.**



**7) Label and remove the ailerons.  
Install the Wing lock in the top wing.**



**8) Bend the attach brackets to  
approximately 80 degrees.**



**9) Install the brackets on the outside  
of the “M” struts with a screw,  
washer, and lock nut. Snug them but  
do not tighten. Then install the top  
wing.**



**10) Install the lower wing.**



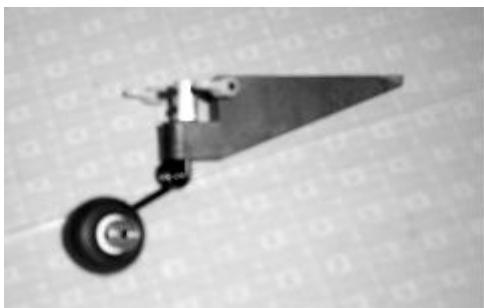
**11) Install the “N” struts in the same  
manner as the “M” struts. Note the  
brackets will point in the opposite  
direction, on the lower wing they face  
out, on the upper they face in.**



**12) The upper wing incidence needs to  
be set. How the plane flies will change  
with this setting. The best way to do  
this is with an incidence meter,  
however it can be done with a ruler.  
For gentle flight with soft stall, set the  
incidence from 0 to 1.5-degrees  
positive {the front of the wing should  
be the same to  $\frac{1}{4}$ -inch wider than the  
back}. For aggressive maneuvers set it  
from 0 to 1.5-degrees negative. This  
will make the stall more aggressive  
and reduce the knife-edge coupling  
caused by the large stagger of the  
wings. You will find this a fun place to  
experiment with set-up when flying. It  
can be changed quickly with shims  
under the brackets and when you get  
it where it fits your personal taste,  
make it permanent with the slots in  
the brackets. Remove the wing by  
removing the screws that hold the  
brackets to the wing.**



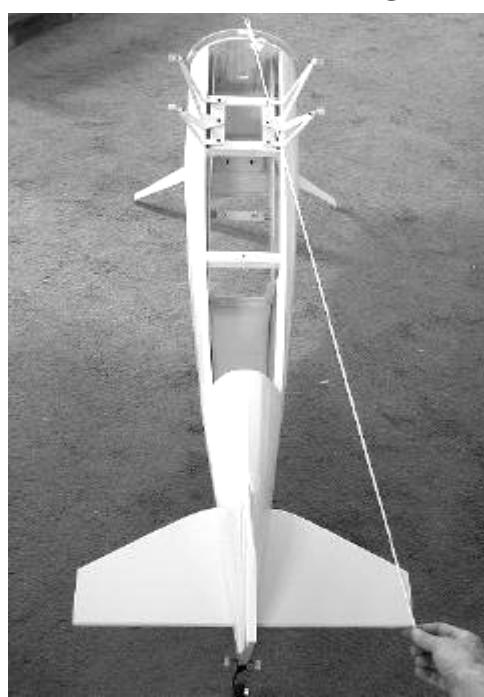
**13) Assemble the tail wheel as shown.**



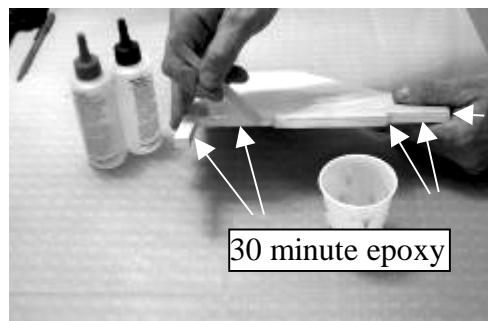
**14) Install the tail wheel using the provided screws with the pivot over the end of the fuselage bottom.**



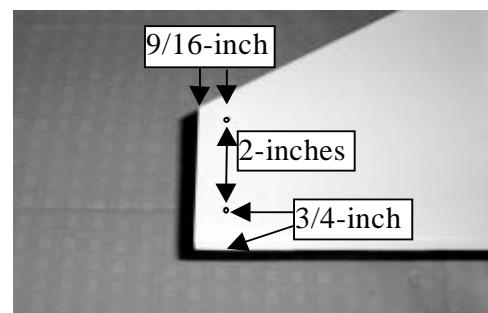
**15) Test fit the stabilizer and fin. Use a string from the center of the firewall to verify the stabilizer is square to the fuselage. Carefully remove the fin; do not disturb the stabilizer alignment.**



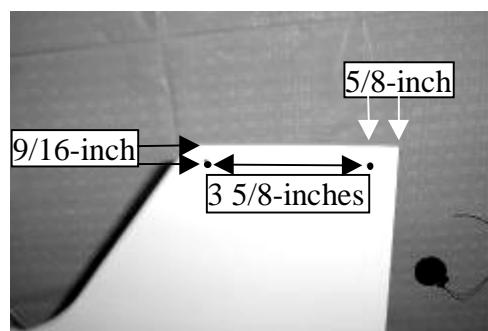
**16) Do not remove any covering material from the fin or stabilizer. Apply 30-minute epoxy to the areas of the fin shown, as well as a small amount to the front and rear of the stabilizer through the fin slot in the fuselage (*Do not use CA*). A light coating is all that's necessary, clean up any spill with a paper towel and alcohol.**



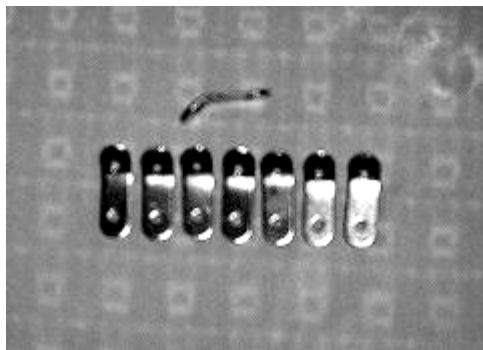
**17) Locate and open the holes in the stabilizer for the flying wire brackets. The holes are small and difficult to find the dimensions below will help locate them. The flying wires are functional and must be used.**



**18) Open the holes in the fin as done with the stabilizer. Use the dimensions below to locate them.**



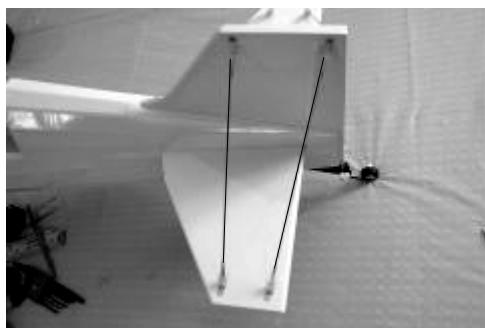
**19) Bend eight flying wire brackets to a 45-degree angle.**



**20) Install 4 of the brackets on the fin, the other four on the upper surface of the stabilizer, the remaining four on the lower surface of the stabilizer. Snug the screw but do not tighten.**



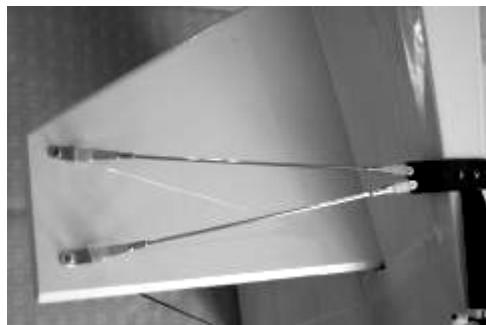
**21) Install the four long upper flying wires. Note the longer wires go to the rear. Slide 2 rubber clevis lock sleeves over each wire. Install the wire so there is no endplay, but not tight enough to distort the stabilizer or the fin. Slide the lock sleeves over the clevis pin. This will prevent it from opening in flight.**



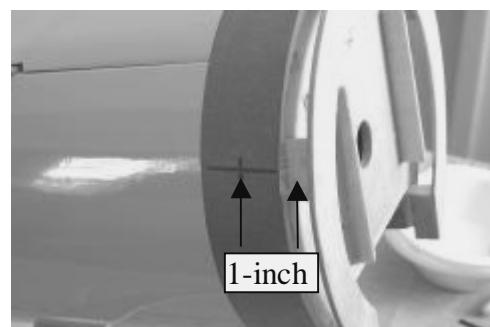
**22) Install the lower flying wire bracket at the front of the tail wheel bracket as shown.**



**23) Install the lower flying wires as was done with the top. Be sure not to distort the surfaces. Now tighten the six bracket attach screws.**



**24) Wrap the front of the fuselage with masking tape. Draw a straight line back from the center of each cowl mount block. Measuring from the center of each cowl block, make a cross 1-inch back. These marks will be used to locate the center of the blocks when the cowl mount holes are drilled.**



**25) Place cowl in position, slide a ruler under the cowl to the mount block and adjust the cowl so the dimension is the same all the way around. This will insure the cowl is square to the fuselage.**



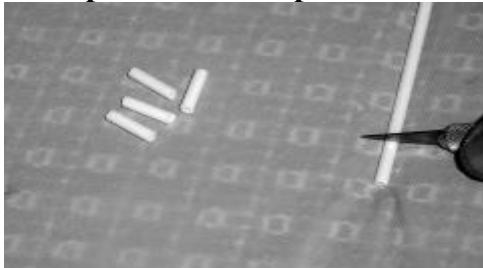
**26) Make a mark on the cowl at the center of the cowl block for each mount location.**



**27) Drill a 1/16-inch hole at each mark.**



**28) Cut five 1/2-inch lengths from the inner plastic throttle push rod.**



**29) Drill the cowl blocks only to 1/8-inch, push the pieces of push rod into the holes flush with the surface of the block. Soak the area around the hole with thin CA.**



**30) Test fit the cowl.**

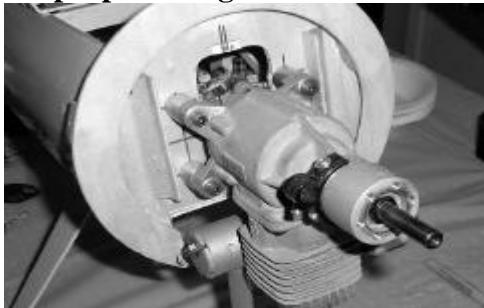


**31) Measure the distance from the firewall to the front of the cowl; record this number for the engine installation. -----**



**32) Remove the cowl and top cover to prepare for the engine installation. Because of the large number of available engines this section should only be used as a guide. Follow the engine manufactures instructions for proper installation. 1-degree of right**

thrust has been built into the firewall, this is the proper amount for the smaller engines in the range, 1 1/2 degrees works well with 150 size, and 2-degrees was used in the proto type for the ZDZ-40. The center of the hole in the firewall should be the centerline of the propeller flange. Different engine mount spacing will require different thickness shims to achieve the desired angle. Contact your engine or engine mount manufacture for proper sizing.



33) Make the required openings in the cowl for your engine selection.



34) Assemble the fuel tank. Two or three line systems may be used. Check the installation instructions for your engine.



35) For glow applications attach the tank with a bead of silicone directly to the hole in the firewall. Use the 3/8 X 3/8 balsa stock to support the tank. For gas applications mount the tank under the strut support as shown, using the supplied balsa as supports front and rear.



36) Locate the center of each hinge and insert a pin. The pins will keep the hinges centered during assembly.



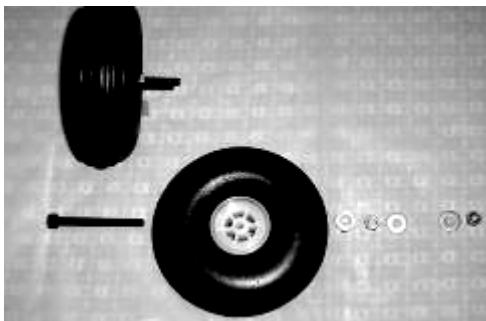
37) Slide the rudder in place; align for free movement with minimum gap at the top and hinge line. Remove the pins and apply 3 drops of thin CA to each side of each hinge. The CA will "wick" up the hinge and secure it. Repeat the process for all other control surfaces.



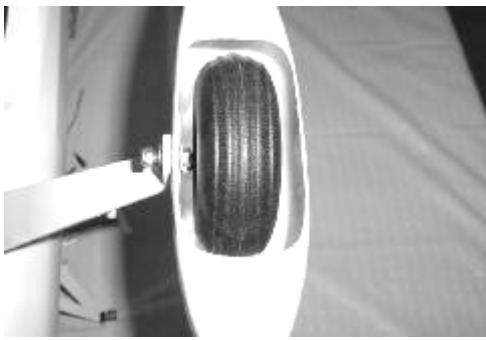
**38) Install the anti-rotation screw in the wheel pants, followed by a washer and lock nut. Place an axle screw in its hole to align the pant and tighten the anti-rotation screw.**



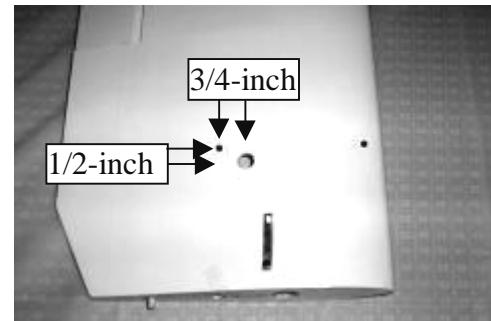
**39) Assemble the axles. Slide the axle through the wheel, install a collar and tighten the setscrew leaving 1/8 - 1/4-inch side play. Screw the non-locking nut up to the collar followed by a washer.**



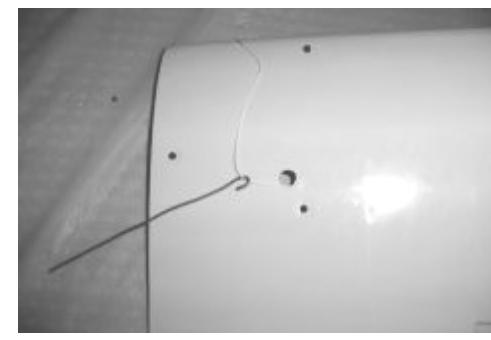
**40) Spread the wheel pant carefully and slide the wheel/axle assembly in place. Hold the axle with an Allen wrench and tighten the lock nut on the axle.**



**41) There are several different control configurations that can be used in the Waco. Because of this no control rods are supplied and must be fabricated by the builder. The first decision is the wings. The servo bays are open in the bottom wing only for the use of two aileron servos with a link to connect to the top ailerons. To use four aileron servos (recommended) open the bays in the underside of the top wing. You will also need to open a hole 3/4-inch forward and 1/2-inch to the center of the rear "M" attach screw.**



**42) Use a wire bent in a hook to pull the servo pull string through the hole.**



**43) The control horns come in two lengths, short for ailerons and elevators and long for rudder pull-pull. Locate the parts for a short horn.**



**44) Install the servo using the manufacture instructions, with the appropriate length extension. Use the string to pull the extension through the wing. Drill a 1/8-inch hole in the aileron and assemble the control horn. Fabricate a push rod using your choice of hardware. Repeat the process for the other three aileron servos, or fabricate an aileron link for two servo systems.**

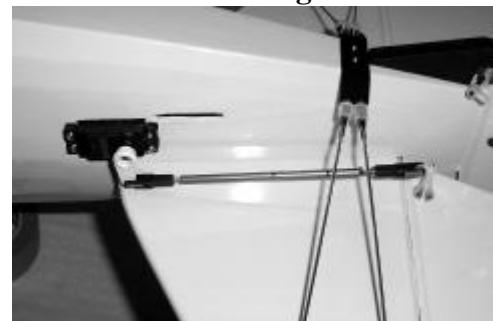


**45) The Waco will accept two elevator servos in the tail, or two in the servo tray. The rudder servo mounts in the tray and uses a pull-pull system. The servo tray may also be located in a number of different positions in the fuselage with the fabrication of some simple side rails. To determine the best location for the elevator and rudder servos, install the engine and ignition, cowl, propeller / spinner, and both wings. With the airframe**

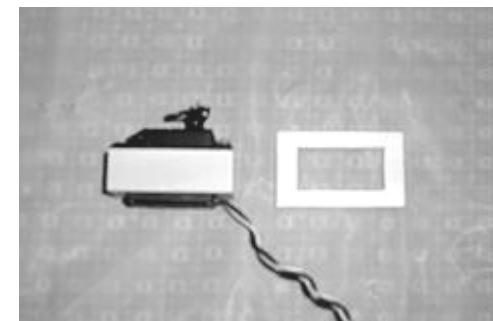
**supported at a point 4 1/2-inches back from the leading edge of the top wing, experiment for the best servo position to balance. Fine tuning the balance can be done with the battery and receiver in the final steps.**



**46) Install the elevator and rudder servos in the determined locations. Fabricate the necessary linkage. Shown is a typical elevator servo in the rear of the fuselage.**



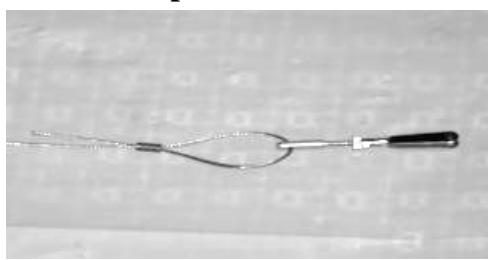
**If the elevator servos are mounted in the servo tray, use the spacers to raise either the elevator servos or the rudder servo to prevent linkage interference. Supplied is an optional throttle servo mount.**



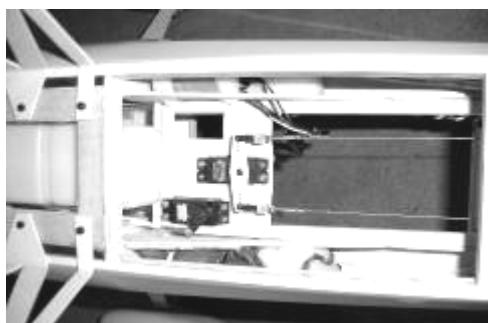
**Shown is the typical rudder servo and throttle servo mounted in the servo tray.**



**47) To fabricate the pull-pull cable slide a copper ferrule over the cable, pass the cable through the hole in the clevis link and back through the ferrule. Slide the ferrule up to the link, crimp the ferrule with pliers and add one drop of CA.**



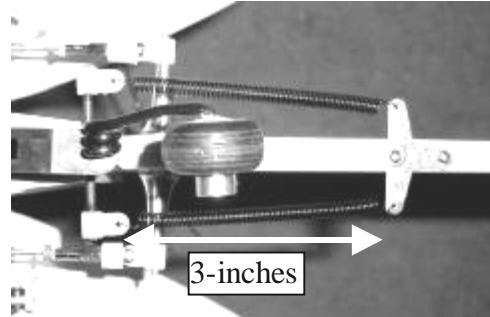
**Attach the clevis to the servo arm.**



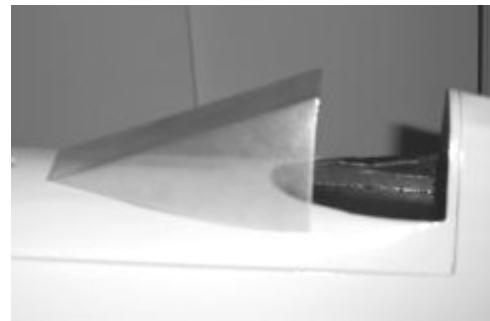
**Install the rudder control arms for best alignment with the cable and repeat the procedure.**



**48) Install the tail wheel control springs and bracket. Mount the bracket 3-inches from the rudder hinge line. The tail wheel response may be tailored to your liking by cutting an equal number of coils from each spring in 1/4-inch increments.**



**49) Trim the windshield for best fit and install with canopy adhesive.**



**50) Complete the final balance. With the airframe assembled and all servos and engine controls installed, locate the batteries and receiver so the airframe balances between  $3\frac{1}{2}$  -  $4\frac{1}{2}$ -inches behind the leading edge of the top wing. A hard point for switch mounting is located just above the lower wing saddle on the left side of the fuselage.**



## **Initial Control Settings:**

Rudder: 1.5" Right and Left

Elevator: 1" Up and Down

Ailerons: 5/8" Up and Down

With the airframe assembled, check all nuts, screws and brackets are tight.  
Double check all controls move in the proper direction.

## **MOTOR SET UP**

Be sure the motor is properly broken in using the manufacture instructions.  
Set the throttle throw to shut the motor off when the trim is pulled down and  
idles reliably with the trim up.

After the motor is set, run one tank of gas at full throttle, measure how much  
time it takes to run the tank dry.

## **CONGRADULATIONS you are now ready for test flights.**

Before leaving for the field be sure your batteries are fully charged and you  
have all the required support equipment {fuel, starter, glow driver, ect.}.

Although the WACO will fly well in wind, wait for a nice day.

At the field have a helper hold the airplane, following the radio  
manufactures instructions perform a range check of the radio. Do this with  
the motor off, start the motor and do it again. ***Perform this test EVERY  
TIME YOU GO TO FLY!***

## **TRIMMING BASIC FLIGHT**

**The Waco is NOT a trainer. A true aerobatic aircraft, it goes only where you  
point it and will not recover to level flight without control input. If you do  
not have high performance experience seek the help of someone who  
does.**

Now lets fly, the first thing you should do is sit down, and calm down, if you  
were careful building, it's going to fly just fine.

Start the engine and taxi around to get used to the ground handling and fine-  
tune the tail wheel steering if necessary.

Line up on the center of the runway and slowly open the throttle, using the rudder to maintain directional control. Once the tail is up apply a little up elevator and allow the plane to gently lift off the runway. Keep the climb angle and turns shallow until you reach a safe altitude. Reduce the throttle to about 60% power. With the airplane flying away from you adjust the radio aileron trim tab till the wing stays level. Turn and line up the plane with the runway. Adjust the elevator trim till the plane maintains level flight. Once again with the airplane flying away from you adjust the rudder trim till the fuselage tracks straight {it may be necessary to correct the aileron trim after this procedure}. Continue to fly and trim until the aircraft is tracking well, land before the fuel runs out. Carry a little power on final approach until over the end of the runway, then cut power to idle, hold the plane just off the runway till the airspeed bleeds off and the plane settles on. If the landing is too long add power go around and try again, don't try to force it to the ground.

Now its time to zero out the trims. To do this measure the control location, center the trim tab on the radio and adjust the servo horn for large changes, the control clevis for small changes. For example if after the flight the rudder is 3/16 inch to the right, center the radio trim and adjust the clevis till the rudder once again measures 3/16 right. By doing this whenever you fly, setting the radio trims at center will result in a well-trimmed plane. Increase the control travel, as you become more familiar with the flight characteristics until loops take about 50 feet and knife edge can be maintained with 80% stick deflection. Final roll rate should be 300-360 degrees per second.

**If you have followed the procedures in this Manuel you will now be rewarded with one of the finest flying sport models available. All primary aerobatic maneuvers are at your fingertips and the aircraft will perform them with ease. No further trim work will be required until you are ready for unlimited or advanced 3-D flight. Before attempting any of the ADVANCED FLIGHT TRIM procedures you must be completely comfortable with inverted and knife-edge flight. The following trim sequence is very time consuming and you may not be able to complete it in one day. Every change made during this procedure will affect all others so it will be necessary to start the procedure from the beginning after each adjustment.**

## **ADVANCED FLIGHT TRIM**

**All the following tests should be performed at 80% power unless noted.**

### **C.G. Fine Tuning:**

Roll inverted, neutral elevator to two clicks of down trim, if the model descends move the C.G. aft. If the model climbs move the C.G. forward.

C.G. movement should be no more than ¼-inch at a time.

### **Engine Thrust Angle Right/Left:**

On a low pass 50% power directly into the wind, go to 80% power and pull to a vertical line at the same time. As the model slows do not correct the path with rudder. If the model yaws right add 1/16-inch shims under the right side motor mount bolts at the firewall. If the model yaws left place the shims under the left side.

### **Main Wing Incidence:**

Roll to knife-edge flight, if down elevator is required to maintain a straight line, shim the back of the upper wing 1/8-inch (add negative incidence) at a time till the elevator is neutral. If up elevator is required shim the front of the wing 1/8-inch at a time. When you are satisfied adjust the “M” and “N” struts to maintain the position.

### **Engine Thrust Angle Up/Down:**

On a low pass 50% power crosswind, go to 80% power and pull vertical at the same time. As the model slows do not correct path with elevator.

If the model tries to loop add 1/16-inch shims to the top motor mount bolts.

If the model tries to push over to the wheel side, add 1/16-inch shims to the lower motor mount bolts.

### **Wing Tip Weight:**

Level flight into the wind, roll inverted neutral aileron. If one wing drops add weight to the other wing tip 1/8-once at a time.

### **Elevator Surface Alignment:**

Fly away from you directly into any wind, apply full throttle and pull two consecutive loops. Model rolls right, raise left elevator, model rolls left, raise right elevator.

