

# **CAP-232 ARF**

## **ASSEMBLY MANUAL**



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## Congratulations!

Kangke Industrial USA, Inc. brings you one of the finest ARF Cap 232 models available. Skilled craftsmanship combined with top grade materials and precision jigs have all come together to produce an aircraft with outstanding flight qualities. If you follow the directions carefully the performance of this aircraft will surely please you.

### Specifications:

Length	54.5 in.
Wing Span	62 in.
Area	694 sq. in.
Weight	7.75-8.5 lbs.
Engine	60-90 2 Cycle 90-120 4 Cycle

### Kit Contents:

Fuselage	1
Wing panel	2
Ailerons	2
Cowling	1
Canopy	1

### PACK 1

Stabilizer	1
Elevator	2
Fin	1
Rudder	1

### PACK 2

Dihedral brace	1
Servo tray	1

### PACK 3

Fuel tank	1
Wheels	2
Tail gear	1
Tail wheel	1
Control horn	5
Control wire	6
Control rod	2
Motor mount	1
Hardware pack	1

### Pack 4

Manual	1
Decal kit	1
Cockpit trim	1
Wheel pants	2

The following additional items will also be needed to build the CAP-232

### HOBBY ITEMS:

4 oz. 30 min. epoxy
Hobby knife
Thin CA .5 oz.

Med. CA 1 oz.
Radio 4-channel min.
5 servos
Fuel line 20-inches
Motor (Tiger Shark .75)
Muffler
Spinner (Super Kraft 2.75")

### HOUSEHOLD ITEMS:

Popsicle sticks
Paper towels
Alcohol
Masking tape
Ruler
Felt tip pen
Screwdrivers
Pliers
RTV silicone
Sewing thread
5/32 drill
1/8 drill
Clothes pins

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.

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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 user-assembled products. This kit has been flight test 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.

## WING ASSEMBLY

Remove the tape holding the servo wire pull string from the center of the wing, work the string through the holes in the upper wing surface and secure to the top surface.



Trial fit the dihedral brace in its box in both wing panels. The "V" shape of the brace points down to produce positive dihedral. The brace should have a snug fit, sand lightly if necessary.



*The following steps must be done quickly before the epoxy has time to set up. Read the procedure and gather the materials before starting.*

Mix a small amount of 30-minute epoxy. Spread the epoxy in the dihedral box top, bottom, and sides about 1 inch in. The snug fit of the brace will push it down the box.



Spreads epoxy on both sides of one half of the dihedral brace and slide it into the box. Spread the epoxy that oozes out over the entire surface of the wing rib-mating surface and on the other half of the dihedral brace, as well as the other wing box adding more as necessary. Slide the two wing halves together. Wipe off any excess epoxy with a paper towel moistened with alcohol.



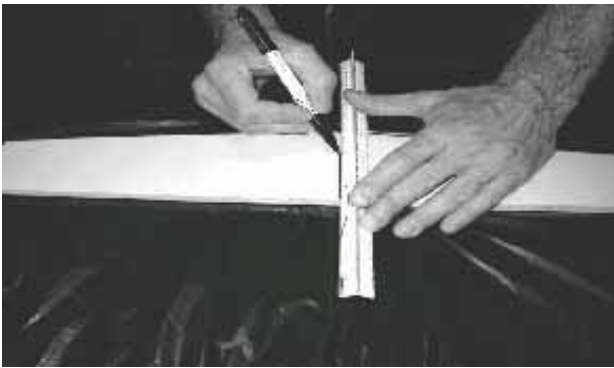
Stretch masking tape across the seam on both sides of the wing so the tape applies pressure to the joint. Stand the wing in a safe place and do not disturb till the epoxy has fully cured. Mix a small amount of epoxy and thin it 25% with alcohol, Paint the bare wood with a thin coat to fuel proof and strengthen the dowel pin area.



## STABLIZER ASSEMBLY

*Care must be taken during the installation of both the stabilizer and the fin. Misalignment of the tail components will make the aircraft difficult to trim in flight.*

Begin by locating the center of the stabilizer. Measure its width at the leading and trailing edge of the tips, make two marks in the center and using a straight edge draw a line across the top.



Use the same procedure to locate the center of the firewall. This line will be used to insure the stabilizer is square to fuselage



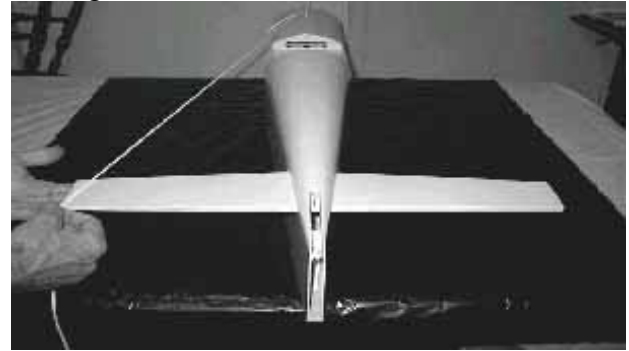
Slide the stabilizer through the slot in the rear of the fuselage. Use care not to split the wood. Looking in through the rudder slot adjust the stabilizer till the line on its center is positioned in the center of the slot.



Insert a pin in the top of the firewall directly over the centerline drawn.

Tie a piece of string around the pin and pull it to the rear corner of the stabilizer. Using the string to measure, go back and forth between the corners until both sides are equal and the line on the stabilizer is still centered in the rudder slot. Using a felt tip pen trace the outline of the fuselage on both the top and bottom of the stabilizer. Remove the stabilizer from the

fuselage.



Lay the stabilizer on a flat surface. Using a sharp razor knife and a straight edge slit the covering about 1/4 inch inside the fuselage outline on both the top and bottom surfaces. Try to cut only through the covering, not into the wood surface, as that would weaken the stabilizer. Remove the covering from the center. If necessary, use a covering iron to secure the edge of the remaining covering to the stabilizer.

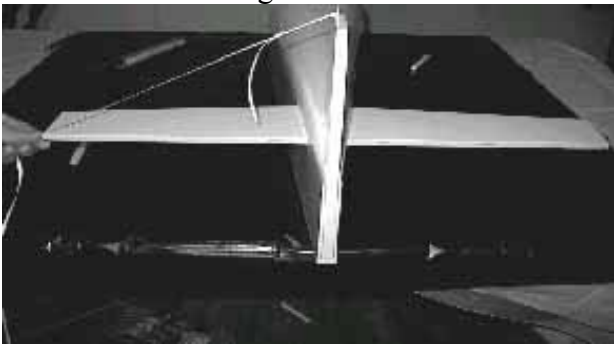


Slide the stabilizer into the fuselage slot exposing about 3/8 inch of bare wood. Apply epoxy to the top and bottom of the wood. Slide the stabilizer through the fuselage to expose the wood on the other side, apply epoxy and center the stabilizer using the outline of the fuselage as a guide. Verify the alignment using the string as before, correct if necessary. Wipe off excess epoxy with a paper towel moistened with alcohol and allow curing.



## FIN ASSEMBLY

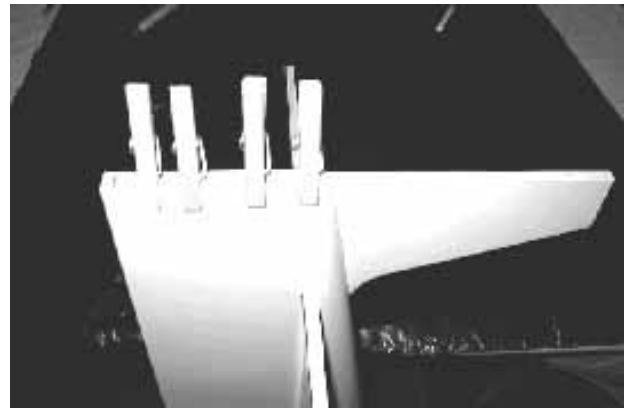
Trial fit the fin in the fuselage. Use a pin stuck in the center of the top and a string to verify its alignment. Use a felt tip marker and mark the outline of the fuselage on the fin.



Using the same procedure as was used with the stabilizer, remove the covering where the wood will be glued.

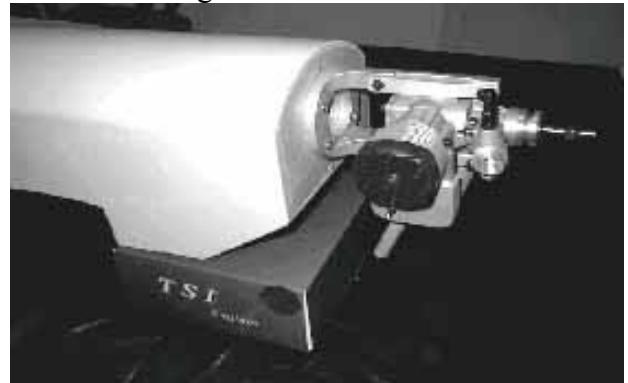


Apply epoxy to both sides of the fuselage slot as well as both sides of the fin. Slide the fin in place using the fuselage outline as a guide. Wipe off the excess epoxy with a paper towel moistened with alcohol. Use clothes pins to secure the tail post. Verify the alignment with the string and allow curing.

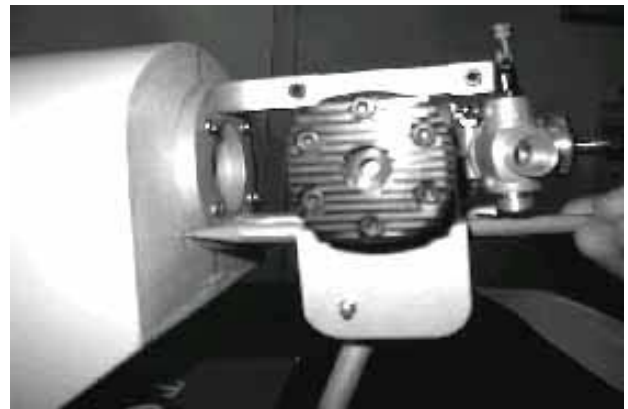


## SERVO TRAY / CONTROL RODS

Temporarily install the motor mount with 4 M-4 screws provided. Temporarily install the motor centering it in the mount.

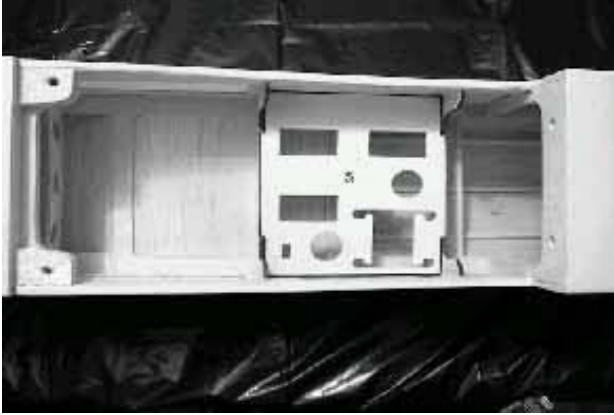


The throttle push rod must travel in a straight line from the throttle horn on the carburetor to the firewall. Using a pencil as shown make a mark on the firewall 1/4 inch outside the mount.



Trial fit your servos in the servo-mounting tray, open the holes if necessary, do not mount the servos at this time. Trial fit the servo-mounting tray in the fuselage, be sure the throttle servo hole is on the same side as the carburetor. The tray should fit snugly between the fuselage

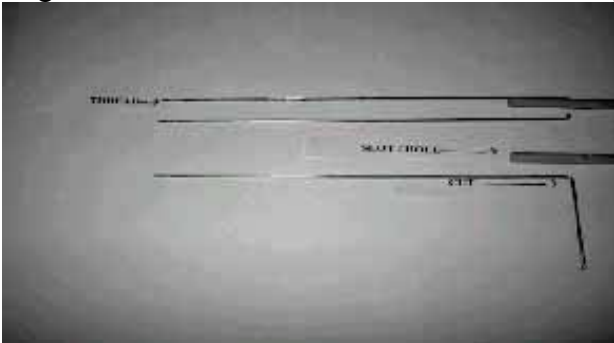
sides and between the bulkheads. Epoxy in place when satisfied with the fit.



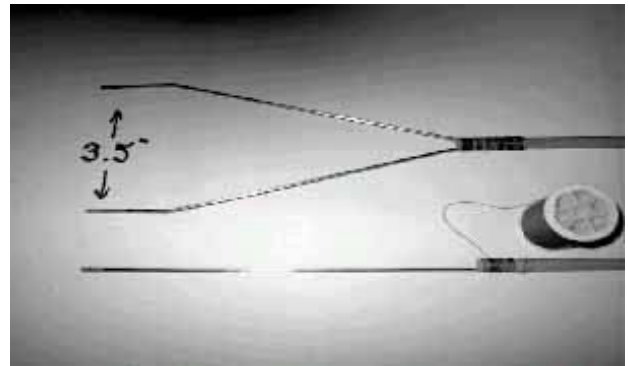
Trim the covering to open up the two elevator slots and one rudder slot in the rear of the fuselage. The elevator slots are located in front of and just below the leading edge of the stabilizer. The rudder slot is 4-inches forward 1-inch up from the bottom rear of the fuselage. Open the left side rudder slot only. The slots can easily be found by shining a flashlight inside the rear of the fuselage.



Begin the elevator and rudder control rods by

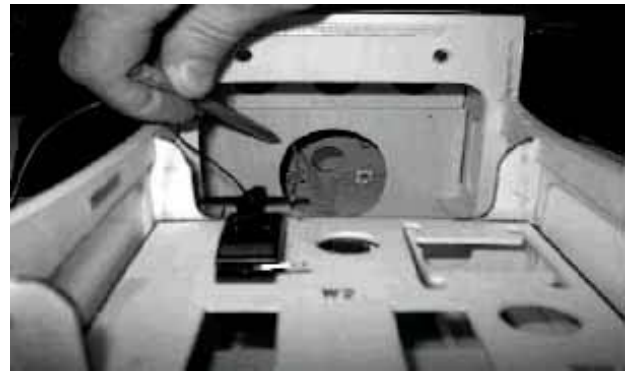


bending 3 rods at a 90-degree angle 9 inches from the threaded end. Using wire cutters cut the wire 3/16-inch from the bend. The elevator control rod has two slots in one end, one slot in the other. The rudder control rod has one slot at each end.

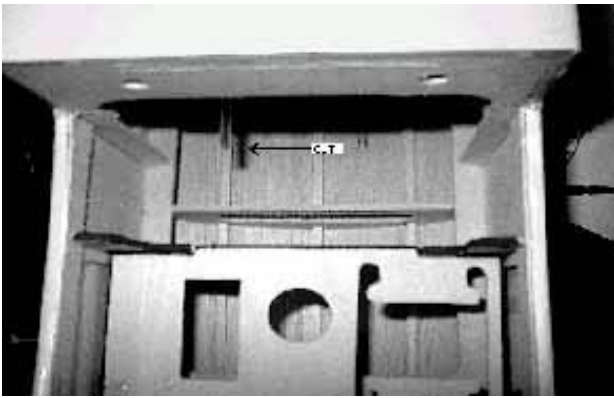


Insert the bent end in the hole with the wire in the slot. Wrap the wire with thread, soak with medium CA, and allow to cure. Repeat the procedure for the other ends. Bend the elevator wire as shown at the control rod and 1-1/2" from the threaded end. The rods will be installed later after the elevator and rudder has been installed.

Drill a 5/32 hole in the firewall at the location marked earlier for the throttle push rod. Temporarily install the throttle servo. Make a Z bend at one end of the throttle wire, install the Z bend in the servo end and pass the other end through the fuel tank opening, and out the hole in the firewall. Make a mark 3/8-inch from the tank opening at the wire location, and drill another 5/32 hole.



Slide the nylon outer throttle casing through the two holes until it just passes the front wing support bulkhead. Trim the casing 3/8-inch forward of the firewall and epoxy in place. Install the servos following the radio manufactures instructions.

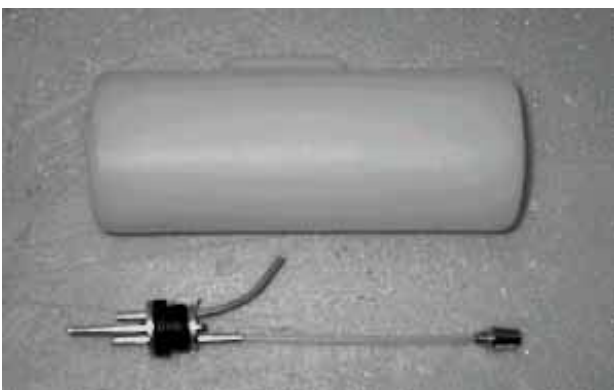


## FUEL TANK

*Because the motor and carburator are completely enclosed by the cowling it will be necessary to add a fill/drain line to eliminate the need to remove the cowl to refuel the aircraft.*

Insert the three tubes through the rubber stopper. Install the inner and outer cap plates and the center screw, do not tighten the screw. Slide the long and one short tube in allowing 3/8-inch to protrude to the outside. The second short tube [fill/drain] should be 1/8-inch beyond the inner plate. Bend the long tube as shown to the tank top bubble. Insert the flop weight in the end of the supplied flop tube. Cut the flop tube just short enough so the flop weight cannot touch the tank end when assembled. Lube the rubber stopper lightly with cooking oil, align the vent tube with the tank bubble and carefully insert into the tank.

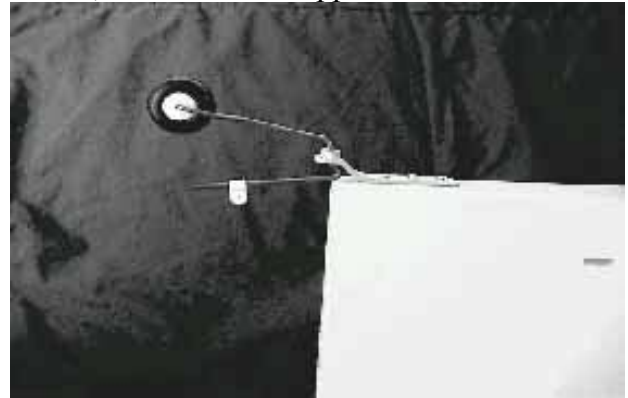
Do not tighten the screw. Set aside for installation later.



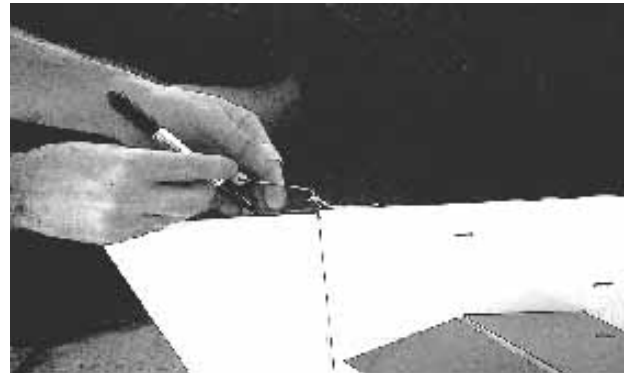
## LANDING GEAR

Install the tail wheel on the bracket using the small lock tube and medium CA. *do not get glue on the wheel.* Align the tail wheel pivot

with the center line of the rudder hinge as shown, secure with 3 supplied wood screws.

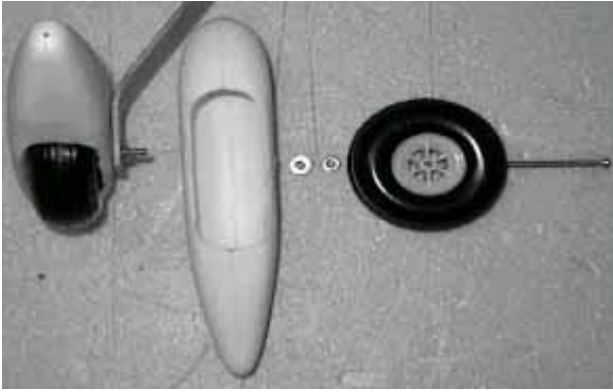


Temporarily install the rudder. Align the tail wheel steering arm with the rudder, make a mark 3/8-inch forward from the end of the arm. Cut a slot at the mark to fit the rudder/steering arm link. Epoxy the link to the rudder, allow to cure.



Cut out the wheel opening in the wheel pant. Drill out one axle hole in each pant [*be sure to make a right and left side*]. Slide the supplied threaded axle through the wheel, and thread on a nut leaving 1/16-inch side play. Apply one drop thin CA to the thread to lock the nut. Slide the supplied spacer over the axle, spread the wheel pant and work the axle through the hole. Repeat the procedure for the other side. Place the landing gear against the bottom of the fuselage and determine the front, [*the gear sweeps slightly forward*] install the pant/wheel assembly on the gear with a washer and nut, snug the

nut.



Install the landing gear with the 4 supplied M-4 screws and washers.

Stand the fuselage on the gear and align the wheelpants, when satisfied tighten the axel nuts.



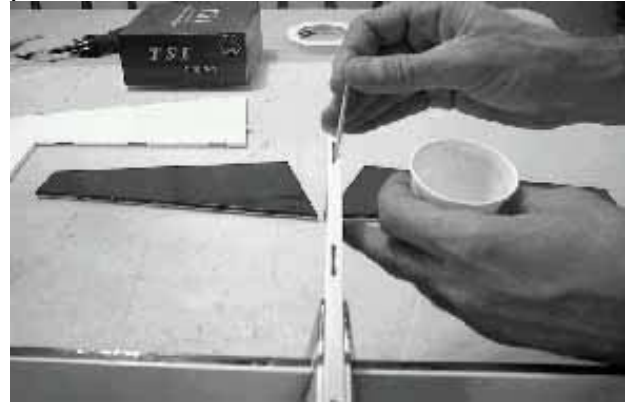
## CONTROL SURFACES

Install two straight pins in the center of each of each hinge. This will prevent the hinge from sliding too far into the slot when the control surfaces are joined.

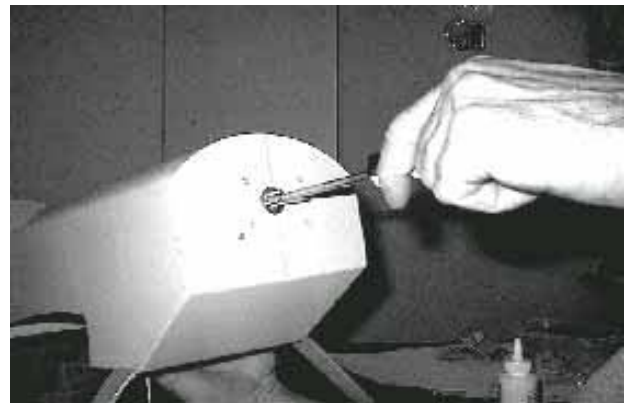


Mix a small amount of epoxy, using a tooth pick work the epoxy thoroughly into the hinge slots. With a paper towel moistened with alcohol wipe the excess off leaving only epoxy in the slots. Slide the hinges into the slots until the pins bottom, epoxy the control surface slots the same

way, slide on the control surface, remove the pins and allow to cure.



Apply a 1/4-inch bead of RTV silicone around the fuel tank stopper. Slide the tank up against the rear of the firewall. Hold the tank firmly against the firewall while you tighten the screw in the stopper. Work a small amount of silicone around the tank inside the fuselage at the bulkhead.

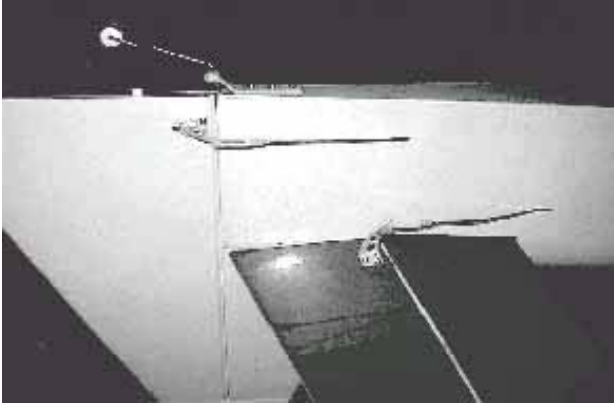


Tie a loop in a long piece of string to pinch the elevator control rod wire to the width of the fuselage.

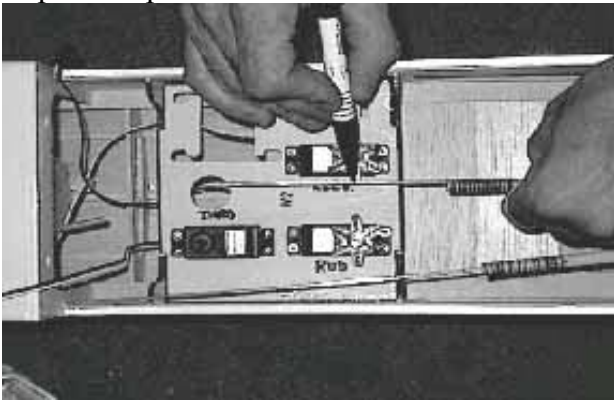


Slide the control rod down the fuselage, line the wire up with the slots in the fuselage side. Pull the string to release the wire through the slots. Install the rudder control rod.

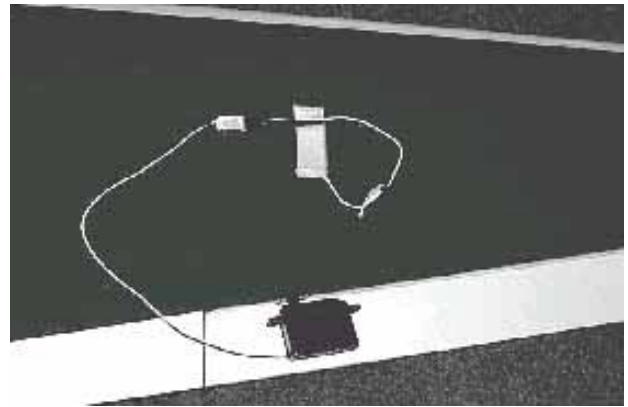
Screw on the supplied clevises so the rod just passes through. Attach the bellcrank to the clevis. With the control surface straight, align the bellcrank so the clevis attach holes are directly in line with the hinge line. Secure the bellcrank to the control surface with the supplied screws. Remove each screw coat with epoxy and reinstall.



Hold the control surface straight, mark the wire at the servo arm and install with a Z bend. Repeat the procedure for the other control rod.



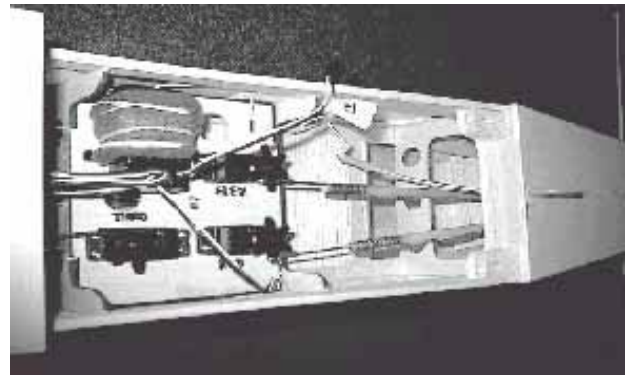
Check the length of your servo wire against the wing, if necessary add a 6-inch extension {tape the extension to the servo lead to prevent it from separating in the wing}. Tie the servo lead to the pull string and work it through the wing. Install the servo in the wing. Install the control rod wire, clevis, and bellcrank using the same procedure as before.



Install the motor mount and motor. Fabricate the throttle control wire using the same procedures as before {be sure the servo and carburetor are both in the throttle closed position}.



Wrap the receiver in foam and secure to the servo tray with rubber bands. Do not secure the battery at this time. Install the right and left aileron extensions, label the extensions to avoid confusion later.



Drill a 5/32 hole through the fuselage just behind the wing opening. Slide the left over nylon outer throttle casing through the hole allowing 3/4-inch to stick out secure with CA. Slip a 1-inch piece of fuel line over the outside and a 3/4-inch piece over the inside. Using the antenna wire stop supplied with your radio, pass the wire through the tube and secure to the

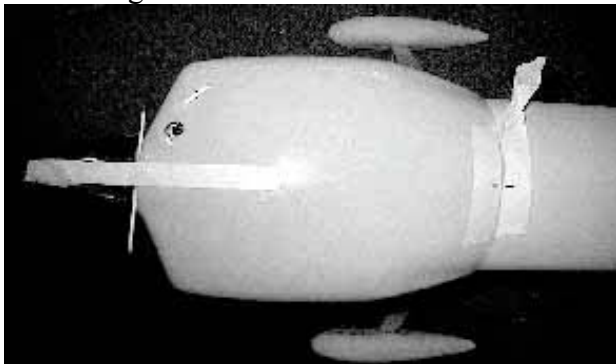
tail wheel with a rubber band. *Do not pass the antenna through the wing saddle. The constant pressure can cut through the wire and cause a loss of control!*

## COWLING

Open the holes in the cowling for the cooling vents and the spinner. Leave 3/8-inch around the spinner hole as shown {a rotary file such as a dremmel tool works best for this}. Open an air exit in the bottom rear the width of the cowl 1-1/2 inches deep.



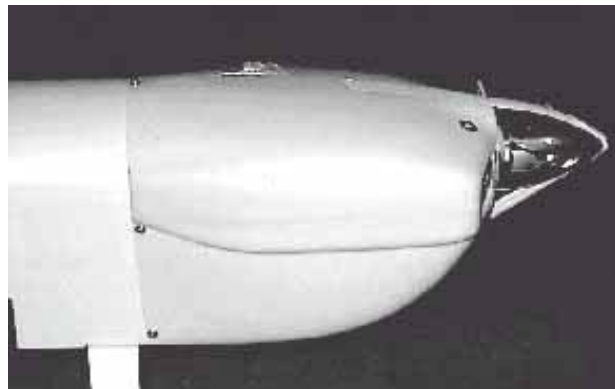
Slide the cowl in place and install the spinner. Tape a Popsicle stick to the back of the spinner as a spacer for assembly. Locate the center of the fuselage as well as the center of the cowl.



Drill a 1/8-inch hole through the cowl 1/4-inch from the rear on the cowl centerline. Insert a screw in the center, verify the alignment with the spinner then repeat the procedure for the remaining screws. Remove the cowl and apply one drop of thin CA to the screw holes and allow to soak in {the CA will “wick” into the wood hardening the threads}. Locate and open the hole for access to the glow plug as well as holes for the exhaust and needle valve. Some engines may require opening the side of the cowl for cylinder head clearance. Start with

small holes and slowly enlarge them for proper fit.

## CANOPY



Trim the canopy carefully along the scribed lines. Sand the edge smooth, be careful not to scratch the surface.

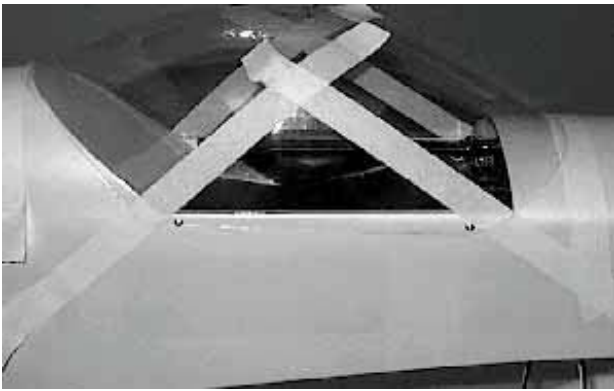
Locate the canopy for best fit, Tape securely.

Drill two 1/8-inch holes in each side of the canopy only then secure with the supplied screws. Remove the screws and harden the threads with CA as done with the cowling. As an alternative method, if you don't want the canopy removable, it may be glued on using canopy adhesive.



## FINAL ASSEMBLY

Install the fuel line to the carb, vent line to the muffler and allow the fill line to exit the opening in the cowl bottom {*the fill line will need to be plugged any time fuel is in the tank,*



*a correctly sized screw will work or a plug may be purchased from your local hobby store}. The supplied peel and stick black trim sheet may be fit and installed on the cockpit bottom. A pilot figure may be added if you wish as well as any other cockpit details. Additional paint and exterior trim such as decals and numbers may be added. Whatever details you add keep in mind that weight is the enemy of a high performance aircraft **KEEP IT LIGHT**.*

## WEIGHT AND BALANCE

*Nothing affects the way a plane flies more than weight and balance. Failure to perform this procedure may result in an aircraft that is at best difficult to control and at worst impossible to fly. Even small changes in the balance point make large changes in stability. For your first flights we recommend using a balance point at the forward end of the center of gravity {C.G.} range, this location will provide the most stability. As your comfort and skill increase slowly move the C.G. aft to increase the control response.*



Lay a strip of masking tape along the top of each wing as shown. Make two marks on the tape one 3-inches one 3 1/2-inches back from the leading edge of the wing. Repeat on the other side of the

fuselage. These marks represent the limits of the C.G. range.

Turn the aircraft upside down and support it from between the two marks. Slide the battery pack to a position where the plane will balance level to slightly nose heavy. Mount the battery inside the fuselage at the determined location. Install the on off switch in a convenient location per the manufactures instructions. Reinstall the wing and check the C.G. again If necessary add weight to the nose or tail.

## CONTROL THROWS



With your radio on, center all trims and adjust the clevises so all control surfaces are straight. Measure the control surface movement at the widest part of each surface. Use the servo horns and bell crank holes to adjust the control throw. For your first flights the control throws should be set to the following:

Elevator 9/16-inch up / down

Rudder 1 1/2- inch right / left

Aileron 3/8-inch up / down

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 CAP 232 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!*

## TRIMING BASIC FLIGHT

*The CAP 232 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.*

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 and 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 1/4-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 main wing 1/8-inch at a time till the elevator is neutral. If up elevator is required shave the rear of the wing saddle 1/8-inch at a time.

#### 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-ounce 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.