



*Assembly Instruction Manual  
and  
Flying Manual  
for  
Semi Scale Yak -54 102 in . ARF*

*As produced by :*

**QUIQUE'S AIRCRAFT CO.**

**Somenzini & Ulery**



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## **Quique's Signature series**

### **102" YAK 54**

The flying manual:

Thank you for purchasing the most exiting aerobatic airplane of its class. This 102" YAK 54 is a scaled down version of the YAK-54 120" a very successful airplane. Winner of important contest such Don Lowe Masters Champion 2003 & 2004, Free Style Champion Tucson Shoot Out 2004, XFC Champion 2004 and Free Style World Champion 2003. The 102" Yak-54 is a pure IMAC performer designed to be a winner when you choose to fly either precision maneuvers or free style 3-D aerobatics. This airplane is a truly balanced designed. It showed during my personal extensive test, incredible similar flying characteristics to the 120" Yak-54 that I used in competition. Very axial rolls, crispy snaps, strong knife edge, almost no mixing, locked in flying characteristic and very predictable airplane in all 3D maneuvers. I powered mine with a 3-W 106 QS boxer engine, 3-W canisters and 3W 26x12 or 27x10 prop for an incredible combination of power, smoothness and quietness. The total weight of my airplane is 26lbs 2oz. including the canisters, spinner all ready to fly.

#### **EQUIPMENT SELECTION**

##### **Engine, prop, exhaust system.**

As with any aerobatic airplane the engine selection is always a key element for the top performance of the airplane. The engine needs to be powerful enough in order to make this Yak-54 the airplane of your dreams! But in aerobatic maneuvers power it is not all that you need. You'll need also good throttle response and transition as well as good idling. The 102" Yak-54 has been designed to do unlimited, Aresti and 3D aerobatics, so for this very wide range of aerobatics without a question you need a good engine.

On my 102" Yak-54, I am running a 3W 106 QS, turning a 3W 26x12 2 blade prop or 3W 26x11 3 blade prop or 27x11 2 blade prop here at 900 feet above sea level and under 90 degrees F and about 80% humidity. I have unlimited performance, real strong power. Because this airplane is light you can also choose a good 85cc or go up to 110cc such is the case of the BME. 3W 106 or 100cc as well as the DA 100cc and the BME 110cc are probably best choices for this airplane. It will be your choice, but if you want the best from this airplane I will strongly recommend a good 100/110cc engine.

It is not necessary to use an engine soft mount. The airplane has been designed to carry the small amount of vibration of twin cylinder engines. If someone has a 100cc mono-cylinder I will not recommend it for this airplane.

As we recommend in the assembly manual try to mount the ignition, the battery for the ignition and switch harness all close each other and as far from the receiver or any other radio component. The closest radio component will be throttle servo but it is located in the bottom of the engine box. Please locate the ignition, battery and engine switch as we illustrated in the assembly's manual picture.

Noise has been and issue and will be a bigger issue in the future for giant scale airplane, our company supports quiet airplanes and we designed this airplane for canisters if that is your choice. Please read in the assembly manual “canisters installation” for further details.

### **Servos, receiver, match box & battery**

Your choice of servos is always important on any aerobatic airplane. The power that it takes to move the control surfaces with authority some times goes beyond our best guess! I will strongly recommend that you run a good quality servo with output power above 200 oz. of torque, digital and ball bearing style. I have in my airplane the JR8611 digital servos on 6 volts giving a solid 260 in. oz. of torque. As you can see we have provided in this airplane for the rudder a third servo mount if you choose to run a digital servo with smaller output such the JR8411(155 oz. at 6v.) or similar. This set up of three JR8411 servos will be equal more or less to two JR8611 servos.

For the ailerons or elevator if you use weaker servos (under 200oz) you are risking your 102” Yak-54 to a potential crash due to flutter on these control surfaces which of course will produce the total destruction of the airplane. The large area of the control surfaces and the long arms on the servos and control horns take a lot of abuse on the servos, so I strongly recommend you do not run cheap or weaker servos than what I am recommending. This is on the safety side, on the flying side, with powerful servos you will enjoy much more the flying of the Yak54, feeling the total control of the airplane under any maneuver with no limitations.

About the receiver I have in my airplane and flying successfully only one receiver JR955, same as I use in the 120” competition Yak54. Use one Duralite Plus 4,000 mah battery and three Match Boxes (Ailerons x 2 and Rudder) for best servo operation.

About transmitter, please read the radio set up section.

### **BASIC SET UP**

The basic set up here is all about the airplane itself, and does not include the radio programming which will see later.

All the incidence, wing, stab and engine have been already set by our factory. However before your first flight I will suggest you to double check stab incidence. The stab incidence is very critical and a small difference can affect the performance of your Yak54. The hatch line is the flight line or zero line, the front of the horizontal stab should be between 1/8 of degree positive to zero to the hatch line. Make sure both stab halves are adjusted the same. If there are any differences, please re-adjust the anti-rotation pin and stab tab with a round file.

### **Center of gravity**

As with any other aerobatic airplane the 102” Yak-54 requires a precise C.G. location for best performance.

You’ll balance the airplane by lifting it from the wing tips. First mark at the wing tip 8-7/8” from trailing edge as it is shown in the pic#1, do same at both wing halves. Put the airplane to gather, make sure the tanks are empty. With the help of one person, place one of your fingers lined up perfect center to the mark and you and your helper should then

lift the airplane (the wings will flex some but do not worry that is normal). The airplane should balance with the hatch line level (zero). Move things around (mainly the battery pack if necessary) until you find this balance. My airplane is balanced well with one Duralite Plus 4,000mha battery located at the rear end (bottom) of the rudder servo tray. As you know I have a 3W 106 with canisters, 3-W wooden prop 26x12 (2 blade), 4.5 in. Air wild spinner and 1,400 mah 4 cell battery pack for ignition.

Important: this C.G. location is the best “compromised” C.G. location for the very best performance for both precision and 3D flying. If you want this airplane to fly precision with a softer feel in the elevator, you might want to move the C.G location forward 10mm. With this C.G. the Yak-54 will become easier to land. However you’ll need to push a bit harder for inverted flight and the airplane will show deeper pitch on snap rolls and overall you’ll feel the airplane flies more by it self and not so touchy on the elevator. You might also find with this C.G location that the airplane will “fly” to the canopy at long vertical down lines, if that is the case I will recommend using the mixing program. Use throttle to elevator in the offset mode and throttle stick activated at the value of 1% to 2%. If you want the airplane more for 3D aerobatic, I will recommend that you move the C.G. position backwards 10 mm from the recommended “compromised” C.G. When I compete in free style or perform at air shows, where most of my routine is 3D flying, I remove the spinner from the airplane to shift the CG back. I am not adding weight to the tail as many pilots opt to do, but by removing the spinner I am taking out nose weight so I do two things at same time, one shift the C.G. and secondly I improve the thrust/weight ratio especially important for the 3D flying. In the case of this Yak-54, by removing the spinner (4.5in spinner Air wild and hollow back plate) it will mean a shift in the C.G. 10mm to the rear. This will give you an extra control response in the elevator helping you to perform better 3D maneuvers such, The Cobra (Harrier), Cobra Rolls (Harrier rolls), flat spins, Waterfalls, The Elevator, Parachute, Harrier vertical eight, The Wau, Roller Coaster , Climbing flat spin and The Wall. Torque Roll, Hovering or Knife Edge. The spins will remain the same. Please check pic. #2 center mark which is 8-7/8 inches. This is the best “compromise C.G” for both types of aerobatics. The forward C.G location is the mark at 9 ¼ inch and the back mark 8 ½ in. is the backwards C.G location.

## SERVO CONNECTION

The 102” Yak-54 has two servos per each aileron, one servo per each half elevator, 2 or 3 servos for rudder and throttle.

Connect both aileron servos to one Match Box for best servo operation, so you’ll need Match Box for right wing panel and one Match box for left wing panel.

The aileron servos need to be plug into different channels, so the right aileron will be connected to the aileron channel and the left aileron will be connected to the flap channel for JR, in case of Futaba connect to channel 7.

The elevator servos need to be connected to different channels also, the right elevator will be connected to the elevator channel and the left will be connected to the AUX3 channel for JR, Futaba will be the gear channel.

Depending on your radio brand and type you’ll need to activate the functions to make the aileron servos to travel in the right direction and simultaneously as well for the elevator servos. In case of JR 10X the function is #22 called Flaperon for aileron and tail dual servo. Futaba 9zap uses differential function for aileron and elevon for elevator. In case

that you do not have the top of the line radio and you are missing one or both of these functions you can program your mixing function.

For the servo rudder servos I will suggest also to use a Match Box for best servo operation.

For throttle servo I will recommend a top quality analog servo, such JR8231. The throttle servo needs to be analog for better handling of the engine vibration. Digital servos will not be forgiving while the analog will, making this type of servo best for the throttle application.

### HOOKING THE AILERONS TO THE SERVOS

Use good quality aluminum 1 ¼" servo control horn; connect the ball link at the outer hole. At the aileron horn, use two Heavy duty Dubro control horns. Measuring from hinge line to ball link point connection should be at 1 5/8 inches for both horns. The inner control horn will appear to be shorter because we are measuring from the hinge line and the aileron is thicker at the inner area. Hook the servos arms to the control horns using good quality 4/40 rods such Hangar 9 titanium rods. Make a quick check to see if the servo direction is correct. Make sure the aileron sub trim and trim at your radio program are at zero. Once it is at zero install the servo horn to be perpendicular to the main servo axis. If you find the servo horn is not perfectly perpendicular, slightly adjust the Match Box. Once all of this is done, adjust the pushrod to the proper length to set the aileron surface at a perfectly neutral position. With your radio set at high rate and traveling set at maximum, check full deflection right and left and adjust the Match Box for maximum traveling and both servos the same for best servo operation. Do the same thing with both wing panels. It is very important both ailerons travel the same distance up and down, if not it is called aileron differential. In the case of this 102" Yak-54 it will not need any differential, so make sure that both ailerons are traveling the same distance up and down. If the ailerons are not traveling same, then the aileron rolls will not be clean and axial and will look more like barrel rolls. Remember it is important to have the servo arm perpendicular to the main axis of the servo and the sub trim and trim of your radio at zero; this will make the job much simpler.

### HOOKING THE ELEVATORS TO THE SERVOS

Install the servos and connect to their respective channels as was suggested on servo connections. Set the sub trims and trim at zero and install a good quality aluminum servo horn perpendicular to the main servo axis with a length of 1 ¼". Install the Heavy duty Dubro control horn. Measuring from the hinge line to the ball link's bolt should be 1 ¼ in. Adjust a good quality 4/40 rod such as Hanger Nine's titanium rod to the right length in order to set the elevator at neutral position. Make sure both halves are traveling in the right direction. It is important that both halves of the elevator travel the same up and down, because if they don't, your airplane will not track straight at corners. Best way to check if the elevators are traveling the same it to measure at the counter balance leading edge or look at them from the back. If there is any difference on the travel, use the travel adjustment functions. Some times the travel adjustment function will not be as perfect as needed, so then use the sub trim to offset a bit at neutral position and re-adjust the rod to the right length to keep the elevator at neutral position. By playing with this you will

learn which is the best direction and the amount needed. You will be surprised how much influence a small amount off at center will affect the performance.

### HOOKING THE SERVOS TO THE RUDDER

Connect two or three servos to the Match Box and then the Match Box to the receiver and set sub trim and trim to neutral position, install a good quality aluminum servo arm as shown in the assembly manual, place all arms perfectly perpendicular to the main servo axis. If there is difference adjust the Match Box to the desired position. Install to the rudder surface the control horns, the best for this case will be the HD Dubro rudder control horn as we suggest in the assembly manual. Now you need to prepare the cables and connect them to the servo arm. Connect the other end to the control horns. The servo arm length 3 ½ in. and the control horn again from hinge line is 1 7/8 in. each side. Adjust the cables in order to set the rudder at neutral position. After you fly the airplane for 3 to 5 flights you will need to readjust the cables because they will get to “their place”. After that you should check the cables every 50 flights or so.

### HOOKING THE SERVO TO THE THROTTLE

Nothing is different here from what you’ve been doing but a few things to look at. Try to have similar number (%) at your high and low throttle settings. If these numbers are not similar then your throttle response will change. For that try to set the carburetor butterfly at middle range, and then set your throttle stick at center, then adjust the top and bottom end. The ideal % will be if you are like 100% for full open and 100% for idle with trim at center. To reach that 100%, play with the clevises position at the servo horn. With the trim at center then you can kill the engine by shifting the throttle trim to full down position. At this value the throttle will be lineal, then if you do not like how the engine responds, use the throttle curve function if your TX program has it. My personal feeling on this is to not use throttle curve as I like to feel the engine how it is with out any electronic feeling in between.

Advice, use a good quality servo for the throttle and as mention before an analog type, I have seen many crashes because the throttle servo failed. You know accidents happen when something fails, your throttle servo is as important is any other servo on board.

### RADIO SET UP

Your radio set up is a very important side of the airplane for the very top performance. All of the mechanical and aerodynamic adjustments have been done, and please keep in mind if you change any of these mechanical values all the electronic values will change. So let’s have a look to the radio programming.

After you do the servo connection as I have described above, you will need to adjust the rates. For that I suggest for you to adjust all servo travel to full position. I have given you above the servo size arm and the links position at the control horn however different radios will give you different travel. So to avoid mistakes I would like to talk about the measurements at the airplane rather than percentage.

While you adjust the maximum traveling for each servo (rudder, elevator and aileron) you are adjusting the high rate that you are going to need to do the 3D aerobatics.

So go and check the following values.

**Elevator**, measuring at stab counter balance as it's shown **pic. #3 a**. You should have 4 ½ in. up and down.

**Aileron**, measuring at the aileron root as is shown in **pic. #4 a**, you should have 3-13/16 in. up and down. Please remember that both ailerons should move the same up and down.

**Rudder**, measuring at the counter balance as it is shown in the **pic. #5 a**, you should have 5- 3/16 in. right and left.

Once you finish with the maximum rate adjustments, it will be the time to adjust the low rate. The low rate value is the one that you will use for all your flying except for the 3-D. These values that I am going to recommend to you are good compromising numbers to balance best with minimum radio programming set up for all spectrums of the Aresti maneuvers.

**Elevator**, measuring at stab counter balance as it's shown **pic. #3 b**, you should have 7/8 in. up & down

**Aileron**, measuring at the aileron root as it's shown **pic. #4 b**, you should have 3 3/8 in up and down. Please remember to check both ailerons so they are traveling the same distance up and down.

**Rudder**, measuring at the counter balance as it is shown **pic. #5 b** you should have 2 5/8 in. right and left.

Now that you have adjusted the high and low rate let me give you the exponential that I found best at high and low rate.

	<b>High rate exponential</b>	<b>Low rate exponential</b>
<i>Elev.</i>	80%*	45%*
<i>Rudder</i>	45%*	15%*
<i>Ail.</i>	70%*	65%*

\*I have not put any symbols (+ or-) because depending on the radio brand that you fly this symbol can have a different meaning. The type of exponential that I am suggestion to you is the one that reduces the sensitive feeling around neutral stick position, in other words makes softer feeling to the airplane.

### **Mixing**

The 102" Yak 54 requires none or very little mixing. I am using on mine 2% mixing rudder to aileron to stop the adverse roll coupling. This percentage is very low and probably you'll not see till you make a very long knife edge flight. The other mixing is rudder to elevator in order to keep the airplane tracking perfectly straight at knife edge position, without going to the belly or canopy at that position. The mixing is very small too. If you have mixing curve in your transmitter it is what I am using to fine tune the airplane along all the rudder stick deflection. Under this type of mixing I am running from neutral up to 33% right rudder stick deflection 1% up elev. mixing, from 33% stick deflection to 75% stick deflection 3% up elevator mixing and from 75% to full stick deflection 4% of up elevator mixing. On left rudder I am running from neutral to 33% stick deflection 1% up elevator mixing and from 33% stick deflection to 75% stick

deflection 3% of up mixing elevator and from 75% stick deflection to full stick deflection 4% up elevator mixing.

### **Flying!!**

If you have followed the assembly manual and this flying manual your airplane should be ready to go and perform the most exiting aerobatics that you have ever experienced! So prepare your self to enjoy one of the best aerobatic airplanes in the world!!!.

Before you take off let me tell you what I do with my airplanes before the first flight. It all starts when I drive from my shop to the field. This is a perfect time to mentally do a re-check over all the airplane, servo's screw tight and Loctite TM, battery fully charged, prop tight, spinner tight, key lock in the Dubro control horn in place, etc.

At the field I put together the airplane and then I turn the TX on and check command direction, and rates. The next thing I do is to remove the antenna from the TX and check the radio range to make sure it is under the parameter given by the radio manufacturer. If all that is fine I will fill the gas tank and start the engine. With the engine at idle you must do the same range test as you did before (walking around the airplane at the distance recommended by the radio manufacturer). This is to check to make sure that there is not any RF interference.

If all is fine, well... it is the time to fly the airplane of your dreams!

### **VERY IMPORTANT**

**Never fly the airplane with high rate elevator and exceeding 50% of maximum airspeed. If you do that you are risking the life of your airplane! Why? This airplane is extremely responsive to the elevator and flying at high elevator rate with greater airspeed than is recommended you could overload the wings.**

### **Tips**

Let me give you some tips how to control your rates at different maneuvers, this is important to know because if you try to do a maneuver with the wrong rate the airplane simply will not do it.

#### **Aresti Maneuvers**

*Take off / landings*

Elev. Low rate

Ail. Low rate

Rudd. High rate

*Snap roll*

Elev. Low rate

Ail. Low rate

Rudd. Low rate

*Stall turn*

Elev. Low rate

Ail. Any

Rudd. High rate

*Rolling circle/ rolling loops*

Elev. Low rate

Ail. Low rate

Rudd. High rate

*Knife edge loop/ knife edge pass by/ knife edge etc.*

Elev. low rate

Ail. Low rate

Rudd. High rate

*Spins*

Elev. low rate

Ail. Low rate

Rudd. High rate

*Loops/ corners/ lines*

Elev. low rate

Ail. Low rate

Rudd. Any

### **3D maneuvers**

*Torque roll/ panic/ cobra/ high alpha rolls/ waterfall/ wall/ terminator/ flat spin /reverse flat spin/ roller coaster/ pendulum/ high alpha rolling circle/ knife edge spin.*

Elev. high rate

Ail. high rate

Rudd. high rate

### **Final Words**

I hope you'll have fun flying the 102" Yak-54; it has been fun for me during all the testing period.

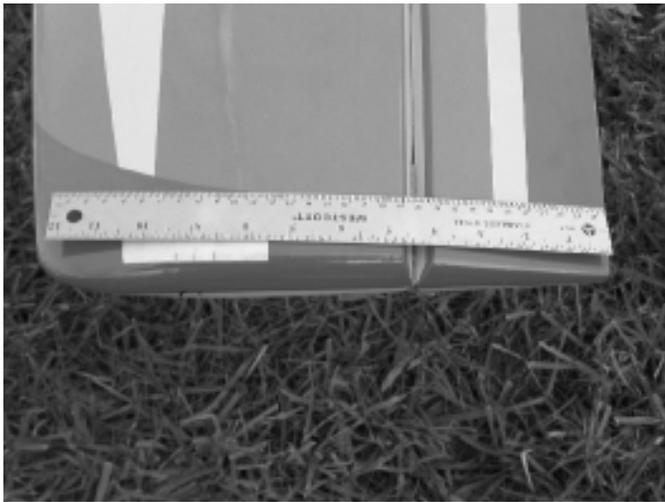
It responds extremely fast to all flying surfaces, it is crispy and also smooth, with incredible similarly flying characteristic to my 120" competition Yak-54.

I believe with this airplane and for those of you who like to compete, you have in your hands an aircraft that has a unique precision and presentation that can you take you to the winner's circle! Just practice hard and feel confident in your Yak-54 and your flying skills.

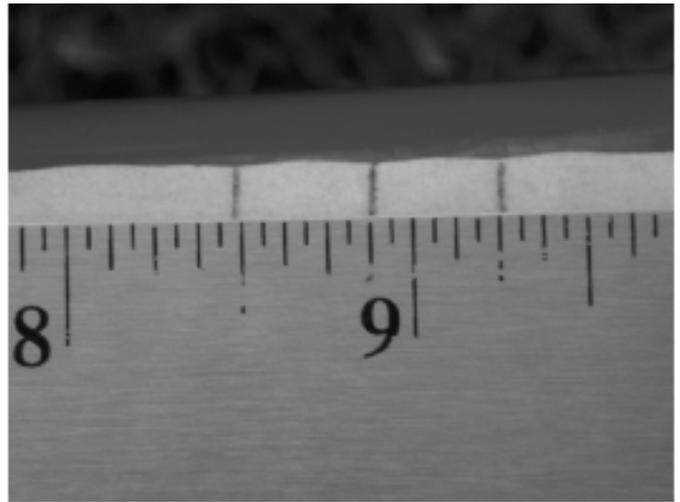
Finally I would like one more time to thank you for purchasing one of our airplanes and one more time enjoy it and have fun!

Sincerely yours,

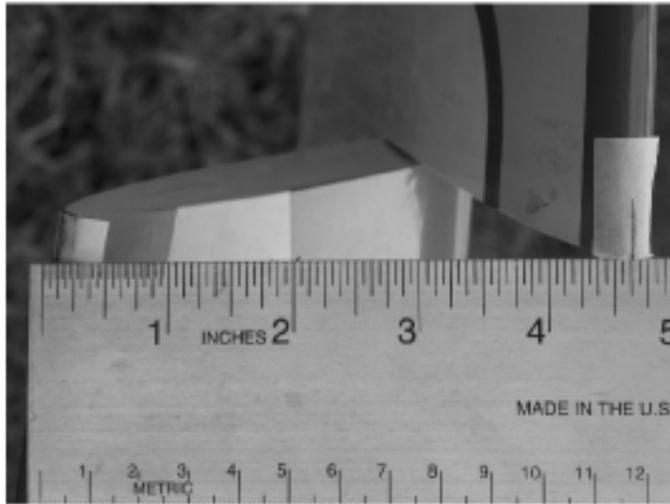
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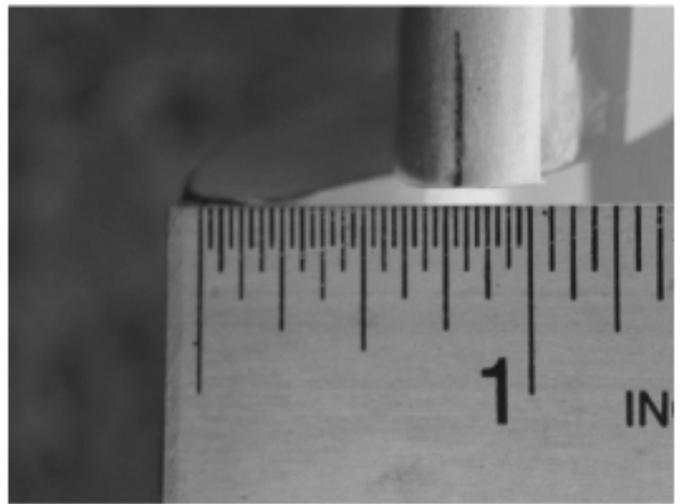
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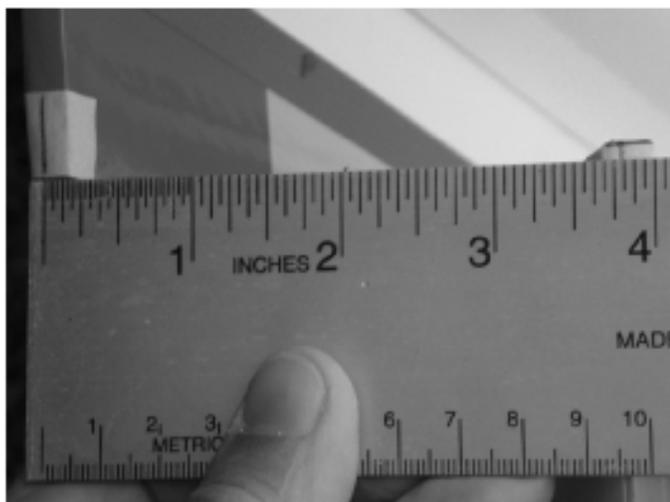
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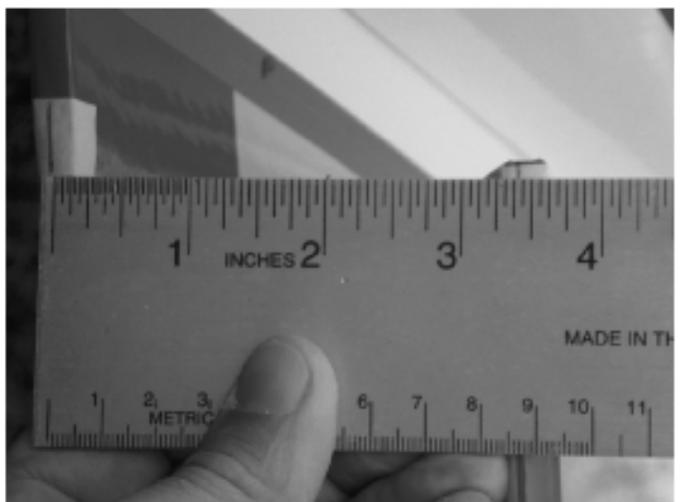
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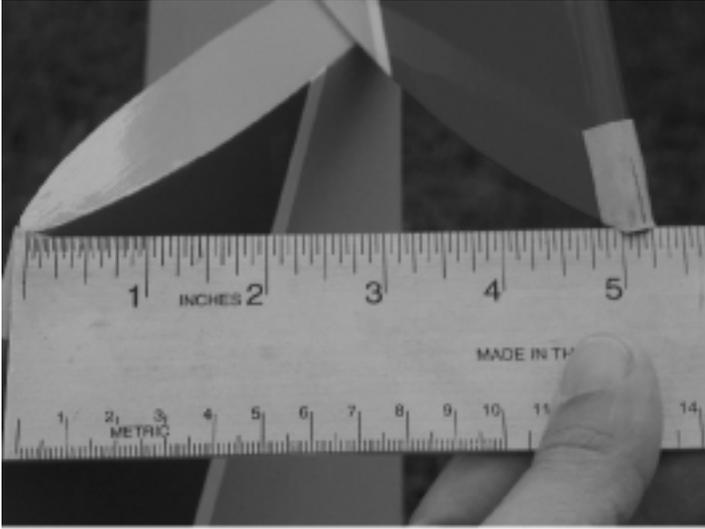
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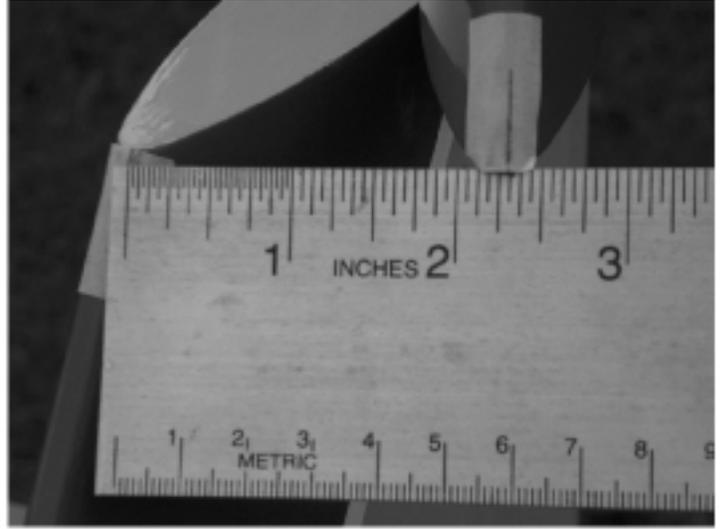
**# 4A**



**# 4B**



**# 5A**



**# 5B**