CARF-Models Sukhoi SU-31

Building Instructions

Version 1.1

Building Instructions for CARF-Models Sukhoi SU-31

Thank you very much for purchasing our CARF Models Sukhoi SU-31 all composite aircraft, made in total area vacuum sandwich (TAVS) technology. Skilled craftsmen and experienced modelers have finalized the shapes and contours as well as the details of the plane before the production mold was made. This high-tech marvel of production tooling is a precise, handcrafted set of molds, which will allow us to supply precision composite parts for many years to come. Before you get started building and setting-up your aircraft, please make sure you have read the instruction manual several times, and understood it. If you have any questions, please don't hesitate to contact us. Below are the contact details:

Email: ordersupport@carf-models.com

Telephone: Phone your CARF Rep!!! He will be there for you.

Website: http://www.carf-models.com

Liability Exclusion and Damages

You have acquired a kit, which can be assembled into a fully working R/C model when fitted out with suitable accessories, as described in the instruction manual with the kit. However, as manufacturers, we at CARF-Models are not in a position to influence the way you build and operate your model, and we have no control over the methods you use to install, operate and maintain the radio control system components. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect application and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the CARF-Models company to pay compensation is excluded, regardless of the legal argument employed. This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages. In all circumstances our total liability is limited to the amount which you actually paid for this model.

BY OPERATING THIS MODEL YOU ASSUME FULL RESPONSIBILITY FOR YOUR ACTIONS.

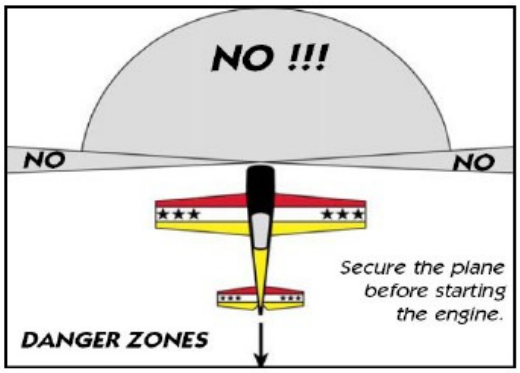
It is important to understand that CARF-Models Co., Ltd, is unable to monitor whether you follow the instructions contained in this instruction manual regarding the construction, operation and maintenance of the aircraft, nor whether you install and use the radio control system correctly. For this reason we at CARF-Models are unable to guarantee or provide a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgment in acquiring and operating this model.

Attention!

This aircraft is a high-end product and can create an enormous risk for both pilot and spectators, if not handled with care, and used according to the instructions. Make sure that you operate your Mustang according to the AMA rules, or those laws and regulations governing model flying in the country of use.

The engine, servos and control surfaces have to be attached properly. Please use only the recommended servos, propellers, and accessories. Make sure that the 'Centre of Gravity' is located in the recommended place. Use the nose heavy end of the CG range for your first flights. A tail heavy plane, in a first flight, can be an enormous danger for you and all spectators. Fix any heavy items, like batteries, very securely into the plane. Make sure that the plane is secured properly when you start up the engine. Have a helper hold your plane from the tail end or from behind the wing tips before you start the engine. Make sure that all spectators are behind, or far in front, of the aircraft when running up the engine.

Make sure that you range check your R/C system thoroughly before the 1st flight. It is absolutely necessary to range check your complete R/C installation first WITHOUT the engine running. Leave the transmitter antenna retracted, and check the distance you can walk before 'fail-safe' occurs. Then start up the engine, run it at about half throttle and repeat this range check with the engine running. Make sure that there is no range reduction before 'fail-safe' occurs. Only then make the 1st flight. If the range with engine running is less then with the engine off, please contact the radio supplier/engine manufacturer and DON'T FLY at that time. If you use a Spread Spectrum radio please refer to the instruction that came with your radio for proper range testing.



Check for vibrations through the whole throttle range. The engine should run smoothly with no unusual vibration. If you think that there are any excessive vibrations at any engine rpm's, DON'T FLY at this time and check your engine, spinner and propeller for proper balancing. The lightweight sandwich composite parts don't like too much vibration and they can suffer damage. The low mass of all the parts results in a low physical inertia, so that any excess vibrations can affect the servos and linkages.

Make sure that your wing and stab spar tubes are not damaged. Check that the anti-rotation pins in the stabilizers are not loose. Check that the M3 bolts retaining the horizontal stabilizers onto the aluminum tube are tight, and that the rudder hinge wire cannot come out.

Take Care

Composite sandwich parts are extremely strong, but fragile at the same time. Always keep in mind that these contest airplanes are designed for minimum weight and maximum strength in flight. Please take care of it, especially during transport, to make sure that none of the critical parts and linkages are damaged. Always handle your airplane with great care, especially on the ground and during transport, so you will have many hours of pleasure with it.

Gluing Preparation

It is most important to prepare all surfaces properly before gluing, to ensure a good bond, with the minimum amount of glue. The inner surface of the laminated sandwich parts must be scuffed with 240 grit sandpaper, then cleaned with denaturized alcohol or equivalent before gluing parts together. Milled carbon or fiberglass sandwich parts also need to be lightly sanded and cleaned before gluing in place. We recommend at least 30 minute epoxy for all structural joints, mixed with a little micro-balloons to give a light weight fillet to all joints.

Tools

1. Sharp knife (X-Acto or similar)
2. Allen key set (metric) 2.5mm, 3mm, 4mm & 5mm.
3. Sharp scissors
4. Pliers (various types)
5. Wrenches (metric)
6. Slotted and Phillips screwdrivers (various sizes)
7. M3 tapping tool (metric)
8. Drills of various sizes
9. Small spirit level, or incidence meter.
10. Dremel tool (or Proxxon, or similar) with cutting discs, sanding tools and mills.
11. Sandpaper (various grits), or Permagrit sanding tools (high quality).
12. Carpet, bubble wrap or soft cloth to cover your work bench (most important!)
13. Car wax polish (clear)
14. Paper masking tape
15. Denaturized alcohol, or similar (for cleaning joints before gluing)

Adhesives and Solvents

Not all glues are suited to working with composite parts. Here is a selection of what we normally use, and what we can truly recommend. Please don't use inferior quality glues - you will end up with an inferior quality plane that is not so strong or safe. High performance models require good gluing techniques. We highly recommend you use either a slow (minimum 30 minute cure) epoxy resin and milled fiber mixture, or a slow filled thyrotrophic epoxy for gluing highly stressed joints (eg: Hysol 9462, Aeropoxy). The self-mixing nozzles make it easy to apply exactly the required amount, in exactly the right place, and it will not run or flow onto places where you don't want it! It takes about 1 - 2 hours to start to harden so it also gives plenty of time for accurate assembly. Finally it gives a superb bond on all fiberglass and wood surfaces. Of course there are many similar glues available, and you can use your favorite type.

1. CA glue 'Thin' and 'Thick' types. We recommend ZAP, as this is very high quality.
2. ZAP-O or Plasti-ZAP, odorless, or ZAP canopy glue 560 (for clear canopy)
3. 30 minute epoxy (stressed joints must be glued with at least 30 min & NOT 5 min epoxy).
4. Loctite Hysol 9462, Aeropoxy or equivalent (optional, but highly recommended)
5. Epoxy laminating resin (12 - 24 hr cure) with hardener.
6. Milled glass fiber, for adding to slow epoxy for stronger joints.
7. Micro-balloons, for adding to slow epoxy for lightweight filling.
8. Thread-locking compound (Loctite 243, ZAP Z-42, or equivalent)

We take great care during production at the factory to ensure all joints are properly glued, but of course it is wise to check yourself and re-glue any that have been missed. When sanding areas on the inside of the composite sandwich parts to prepare the surface for gluing, do NOT sand through the layer of lightweight glass cloth on the inside foam sandwich. It is only necessary to rough up the surface, with 80/120 grit, and wipe off any dust with acetone or de-natured alcohol (or similar) before gluing to make a perfect joint. Of course, you should always prepare both parts to be joined before gluing for the highest quality joints. Don't use Acetone for cleaning external, painted, surfaces as you will damage the paint.

Tip: For cleaning small (uncured) glue spots or marks off the painted surfaces you can use old-fashioned liquid cigarette lighter fuel, like 'Ronsonol' or equivalent. This will not damage the paint, as Acetone and many other solvents will.This is what we use at the factory.

At CARF-Models we try our best to offer you a high quality kit, with outstanding value-for money, and as complete as possible. However, if you feel some additional or different hardware should be included, please feel free to let us know.

Email us: info@carf-models.com

We know that even good things can be made better !

Kit Contents

Below are pictures of the contents of the kit after you open the box. Carefully remove and inspect each piece of the kit.

Motor Dome Extension

Milled Wood Pack

Fuse Hardware Pack

Wing Hardware Pack

Rudder Pack

Stab Pack

Fuselage pack

Qnt.	Description
8	Allen bolts M4x15mm (for fuel tank tray mounting)
8	Washer, M4 (for fuel tank tray mounting bolts)
4	M4 T-Nuts (for fuel tank tray mounting bolts)
2	Allen bolts M4x15mm (for tail wheel mounting)
2	Washer, M4 (for tail wheel mounting)
4	Allen bolts M6x30mm (for Engine mounting)
4	Washer, M6 ID x 13mm OD (for Engine mounting)
4	M6 T-Nuts (for Engine mounting)
2	Allen bolts M6x60mm (for wheel mounting)
2	Stop nut M6 (for wheel mounting)
2	Washer, M6 ID x 13mm OD (for wheel mounting)
6	Allen bolts M6x20mm (Landing gear plate)
6	Washer, M6 ID x 20mm (Landing gear plate)

Wing pack

Qnt.	Description
4	Plastic nut M6
4	Aluminum clevise M3 (with Pins and E-clips)
4	Nuts, M3
4	All-thread M3 x75 mm (linkages)
4	Brass tube ID3 OD4 x 60mm (to reinforcement the linkages)
4	Ball-link, M3 (linkages)
4	Allen bolt, M3 x 20 (to secure ball-links to aileron horns)
4	Washer, M3 (to fix servos to phenolic plates)
4	Stop nut M3 (to secure ball-links to aileron horns)
8	Sheetmetal screws, Ø 2.9 x 13mm (for servo hatch mounting)
28	Sheet metal screw Ø 2.9 x 16 mm (to secure servos)
8	Allen bolt, M3 x 15mm
8	Washer, M3
8	Stop nut M3

Vertical Fin/Rudder pack

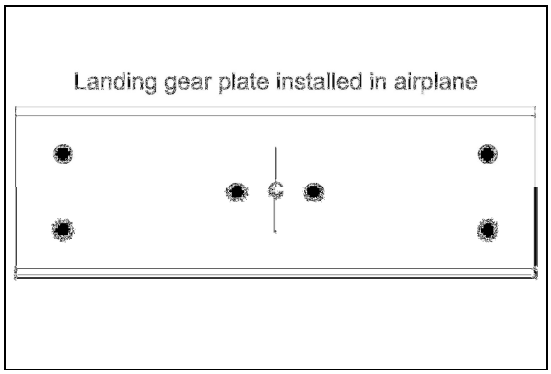
Quantity	Description
2	Allen bolt, M3 x 20mm
6	Ball-link, M3
6	Stop nut M3
2	Pull-Pull Cables 0.9mm Ø, 2 metres each
2	Threaded ends for Pull-Pull Cables
6	Crimp tube 2.6 mm. I.D
12	Sheet metal screw Ø 2.9 x 16 mm (to secure servos)
12	Washer, M3
4	All Thread M3 x 45 mm
4	Spring steel clevises M3
4	Allen bolt, M3 x 16mm
4	Nuts, M3

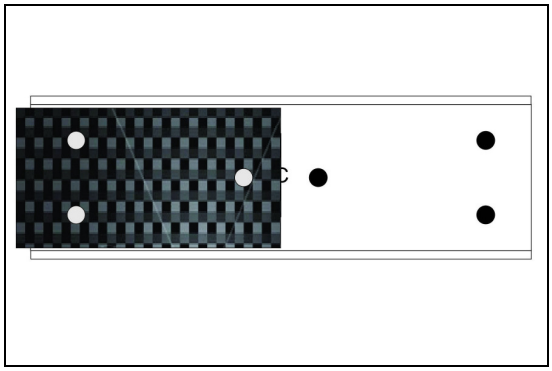
Elevator/Stabs pack

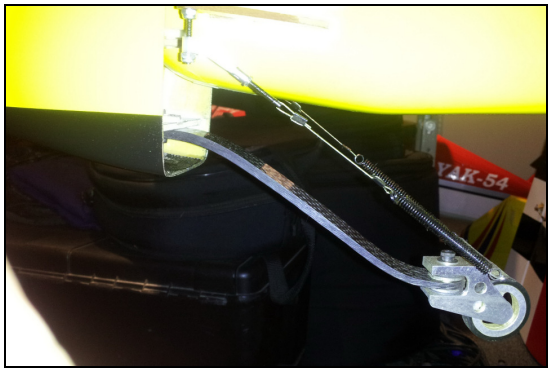
Quantity	Description
2	Allen bolt, M3 x 20mm
2	Stop nut M3
2	Washer, M3
2	Ball-link, M3
2	All-thread M3 x75 mm
2	Brass tube ID3 OD4 x 60mm
2	Aluminum clevise M3 (with Pins and E-clips)
2	Nuts, M3
8	Sheet metal screw Ø 2.9 x 16 mm (to secure servos)
2	Allen bolts M3x16mm

Landing Gear

First we need to install the landing gear by locating the center of the landing gear mount. On the inside of the fuse, locate the two inner gear holes on the LG mount and make a mark in the center. The gear will be drilled with a 1/4" (6mm) drill bit from the outside of the fuse through the openings in the bottom. It may be best to have a helper for this next step. Slide one of the landing gear into the fuse. Center it fore and aft on the landing gear plate and slide it up to the center line. Have a helper hold the gear in position and drill only the inner hole**. Note,** be sure to keep hands clear when drilling hole. Drill only one hole at a time and then install the 6mm bolt and lock nut. Do the other two landing gear bolts and then the other side in the same manner.





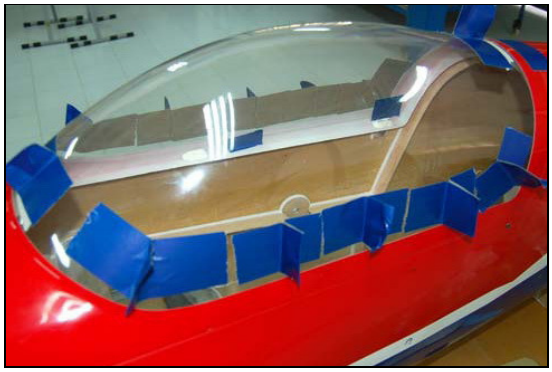


We used a White Rose tail wheel assembly in our Sukhoi. Two 3mm screws are used to hold the tail wheel to the mounting plate. The blind nuts have already been installed at the factory. Use a piece of heavy paper to make template for the screw location.

Wheels and spats

Two 6mm bolts are provided for the wheel axles. The wheel spats are attached to the landing gear with two 3mm screws and a blind nuts. Use photos as a guide to complete this step.

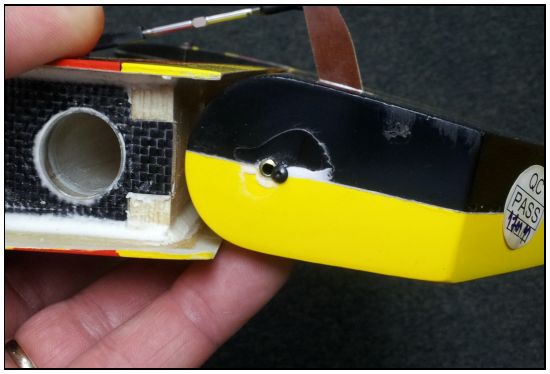
Canopy Installation

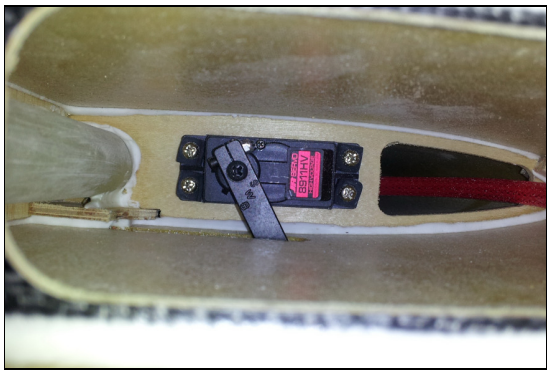


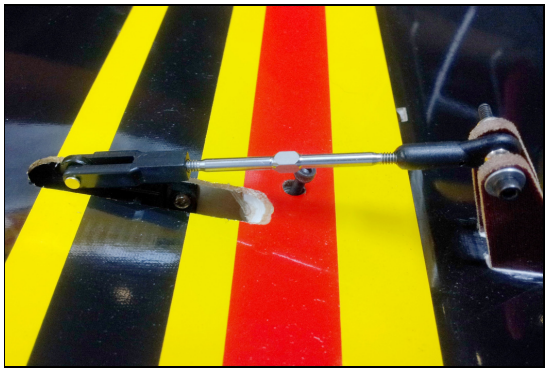
The canopy frame mounting has already been completed at the factory for you. It is held in place with 4 bolts (M4 x 12mm) and the holes are counter-bored so the bolt-heads sit flush with the fuselage surface. Fitting the clear canopy into the frame is a little bit tricky, but this is a step by step guide of how to do it successfully: Sand the inside edges of the canopy frame carefully with rough sandpaper, to ensure a perfect fit of the canopy inside. Lay the canopy on top of the frame, and mark the rough shape with a felt pen or wax crayon. Cut the outer border of the clear canopy with sharp scissors, about 12mm (1/2") too big all around. Unless you are in a very warm room, we recommend the canopy is slightly warmed up with a hair dryer to prevent cracking, but be careful not to melt or deform it! When the canopy fits inside the frame roughly, mark the final cut line. Then cut it to exact shape with a 6 - 8 mm overlap all around. Make several hand-holds with wide paper masking tape (see photo) to make holding and positioning the canopy easy. Push the canopy up tightly inside the back of the frame and fix the bottom back corners with one drop of slow CA (ZAP-O or Plasti-ZAP recommended). **Note:** Do NOT use any CA accelerator/kicker - you will immediately 'fog' the clear canopy! Tape the front of the canopy to the frame temporarily. Mount the canopy frame to the fuselage (use all 4 bolts), and tape the back of the canopy frame tightly to the fuselage. Using the masking tape handles to pull the canopy outwards firmly against the frame, working from the back towards the front, glue the edges of the canopy in place in 2 more places each side, with just a single small drop of CA at each position, all the time checking the edge of the canopy is tight up against the frame at the front. Make a visual check from the front and back to make sure the canopy is straight. Now the canopy is fixed in position and cannot twist or warp. Carefully glue the canopy firmly in place. You can either complete the gluing from the outside, allowing the CA glue to wick into the joint between the frame and the clear plastic or, if you prefer, you can carefully remove the canopy frame from the fuselage, and use a 30 minute or a 24hr epoxy and micro-balloon mixture gluing all the edges to the frame on the inside surface. Even if you use the CA glue method, we highly recommend that you also glue the inside edges with the epoxy mixture to be sure the canopy cannot come off in flight.

Horizontal Stabs

The stabs are 99 percent finished for you at the factory and only require little work to complete. The stabs installed on the fuse using a 14mm aluminum tube and two 3mm screws. Be sure to note the tube is marked L and R. A brass 4 mm tube is provided and is used to install the elevators. Cut the tube to size and install. The tube can be held in place with a small drop of epoxy or a small screw as shown. Next we need to install the elevator servos. We recommend a high powered servo like a JR 8911HV and aluminum servo arms like the SWB's shown. NOTE: Use the 3mm screws provided with the kit to mount the servo not the screws that come with the servos. With the servo installed as shown, center the servo and install the servo arm. Use the 3mm threaded rod provided to make up the linkage. It's a good idea to install a piece of 4mm brass tube over the threaded rod for reinforcement. We used titanium push rods.

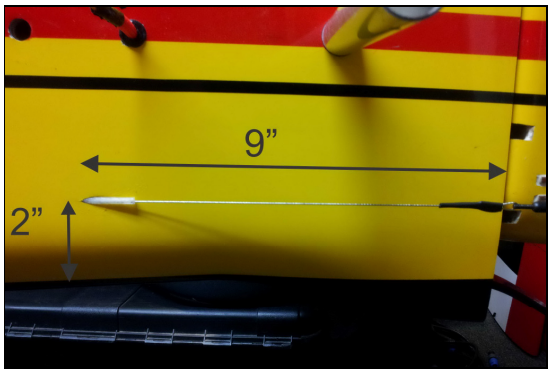






Rudder

The rudder only requires installation onto the Vertical Stab with a 4 mm brass tube. Cut the provided tube to length and install the rudder. Use a small drop of epoxy and a small screw to retain the tube. Use the cable provided to make up two pull cables. Two holes can be cut in the fuse as shown. 9" from the back edge of the fuse and 2" up from the bottom. We used a small piece of antenna tube as a guide for the cable through the fuse.



Rudder servos

Make up the Rudder tray from the milled carbon-plywood parts supplied. Prepare all joints by sanding, and assemble as shown, using thin CA to secure all the tabs and slots. Cut small pieces of plywood from the strip supplied and epoxy onto the bottom of all the servo rails. Finally reinforce all joints with epoxy and micro-balloons mixture. Drill the 2mm Ø holes for the servo mounting screws before gluing the assembly into the fuselage - it's much easier!
The rudder tray is supported on 2 carbon-balsa formers; the rear of the mount goes into the center bulkhead right behind the canopy opening. Prepare the inside surface of the fuselage carefully, and glue the complete assembly in place with epoxy and micro balloons mixture, with a nice fillet on all joints. Install the 3 servos into the rudder tray using the 2.9mm Ø x 13mm screws supplied, with the servo output shafts towards the tail of the plane. If you are going to use the supplied phenolic servo arms, we recommend you bolt them to metal servo wheels. An alternative is to use SWB double lock arms. Two 3"arms and one 4" offset arm. Plug all three servos into the receiver and power them up. Install the servo arms as close to parallel as possible. Use the sub trim to finish the alignment so they are perfectly parallel to the servo. Use the provided 3mm threaded rod to fabricate the connecting linkage and hook all three servos together. Make sure there is no servo buzz when finished. Note Photo is from a different model and is just to show you how to set up the linkage.
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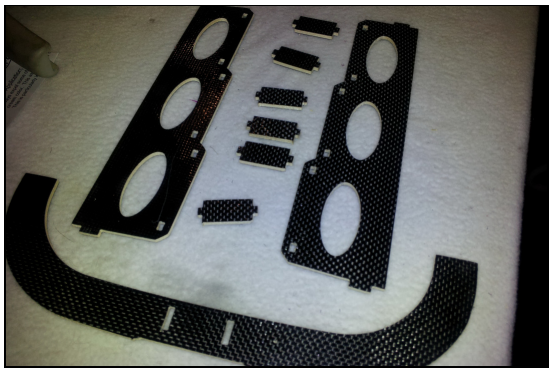
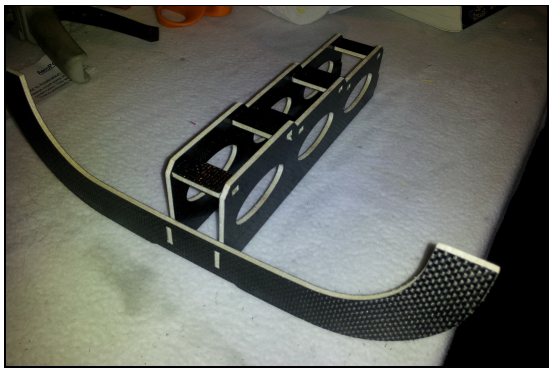
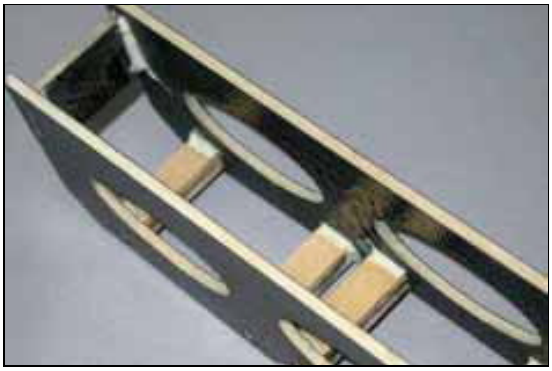
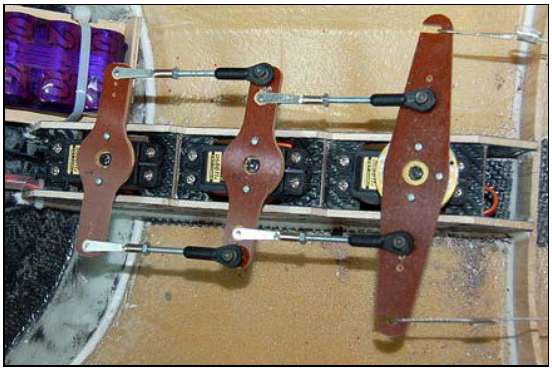
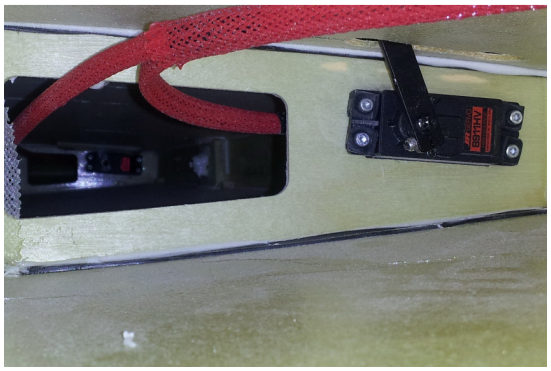








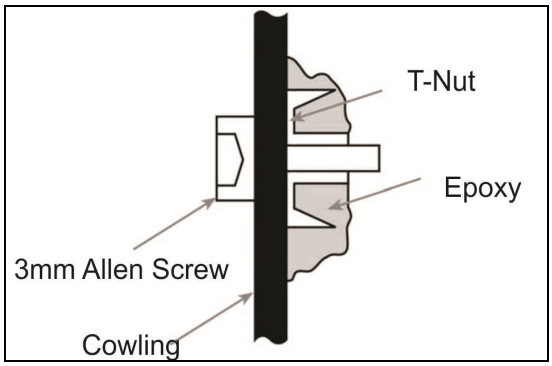
Wings

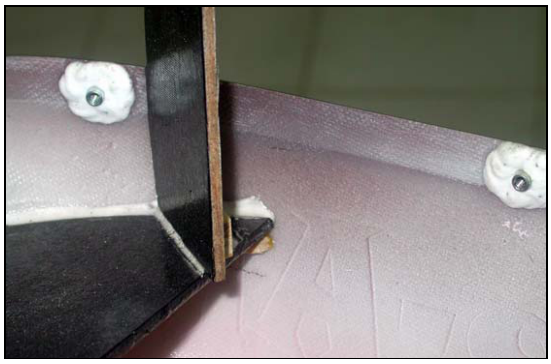


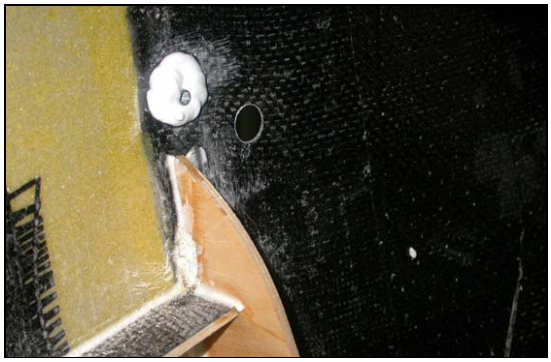
The wings are 95% finished at the factory, and have already been installed on your fuselage to set the alignment. Dual phenolic aileron horns are already pre-installed for you at the factory. Slide the wings onto the 50mm diameter alloy wing tube, and fit the 4 plastic wing retaining nuts onto the M6 threaded aluminum wing dowels. Each aileron has 2 servos, fitted into milled cutouts in the inner and outer ribs. For easier access we have included a milled servo hatch to fit in the recess over the outer servo position, and you will need to mill the slot in it to suit the exact position of your chosen servo arm.
It is ***mandatory*** to use full metal servo arms for the aileron controls, and we always use the SWB 1.5" double-loc arms (shown here) which provide full deflection throws without having to electronically reduce the end-points, to ensure the highest torque and mechanical advantage. These arms clamp onto the servo output shaft with no lost movement (play) at all. Secure your chosen metal servo arms to the servos, centering them all with your radio so the arms will be at 90 degrees to the bottom wing surface. Fix the servos in position using the Ø 2.6 x 16mm sheet metal screws provided in the hardware, with the output shafts towards the wing leading edge. It does make the outer servo fixing easier if you make up a very long x-head screwdriver so you can access the screws from the wing root. Check the servo output arms are aligned with the dual phenolic aileron horns, and correct any misalignment by adding thin plywood shims under the servos if necessary. Mill a slot in the servo hatch covers for the outer servos, to suit your servo arm, and secure in position using the Ø 2.9 x 10mm screws provided. The small slots in the wing underside for the inner servos will need to be made larger - to suit the exact location of your servo arm. Use the provided 3mm threaded rod to make up the linkage as shown in the photos. Be sure there is no binding of the servos

Cowling

Attaching the 2 piece cowling is quite easy, as it is already cut and trimmed at the factory, and should need almost no adjustment for a perfect fit. If necessary you can sand the inside back edges of both halves of the cowling to have a perfect flush fit with the fuselage. 3mm X 12mm allen head bolts will be used to join the canopy halves together as well as to attach it to the fuse. All bolts go into M3 T-nuts, which are glued to the inside of the cowling or fuselage, in *reverse* - that is with the spikes' pointing inwards All bolt heads should have M3 washers under them, and these are included in the hardware. Start by fixing the lower part to the fuselage with equally spaced bolts each side. Tape the cowl firmly in position and drill right thru' the cowl and fuselage sides with a sharp 3mm drill, about 7mm from the back edge of the cowl. Sand around each hole inside the fuselage, and clean off the dust. Insert the 6 bolts, check position, screw on the 'T-nuts and secure each with one small drop of thick CA. Now fit the upper part, taping it firmly at the back, and to the lower part at the sides - and secure in the same way with equally-spaced bolts, and also CA the T-nuts into position. Finally drill the holes in each side joint to secure the upper and lower halves together. Insert all bolts and tack-glue the T-nuts to the inside with CA. It is not possible to get to the back T-nuts, so remove the cowling and do these afterwards. Reassemble the complete cowling onto the fuselage with all bolts and washers to check the fit, when correct secure all the M3 T-nuts with a drop of thick epoxy/micro balloon mixture over the 'spikes', as shown in photos.

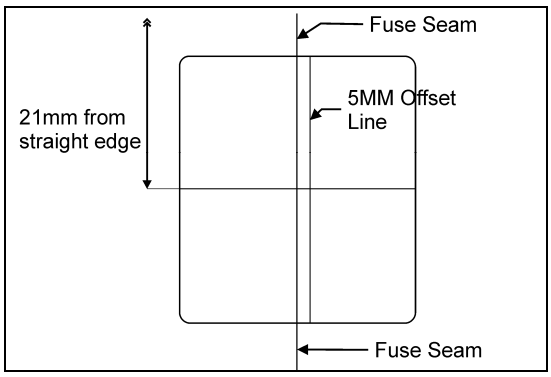


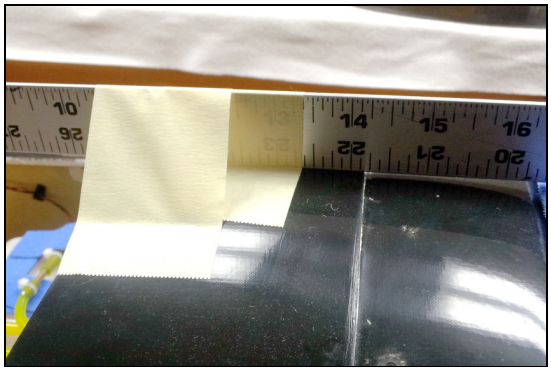


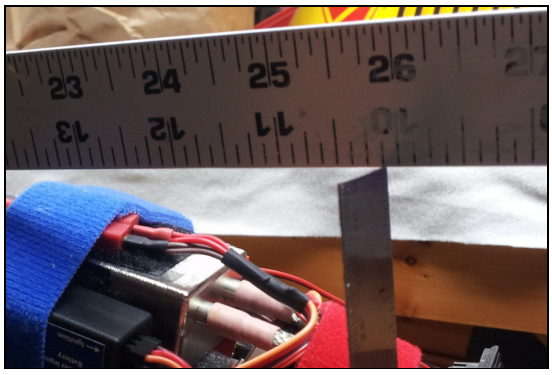


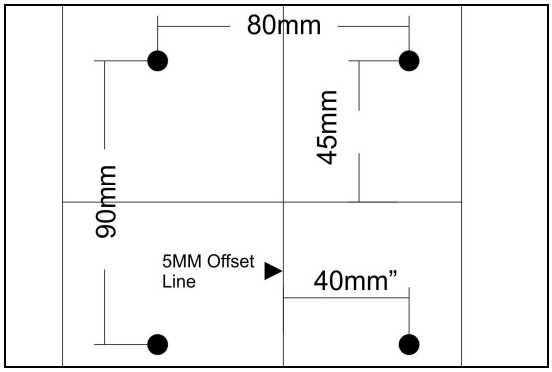
Engine

The Sukhoi has been set up for a DA-200 4 cylinder engine. If you choose to use a twin you will need to install the optional firewall included with your kit, or use standoffs. We will show you the DA-200 installation. Start by covering the plywood firewall with masking tape. Use the fuselage molding lines as a guide and mark the center line on the firewall. The Sukhoi requires 3 degrees of right thrust so you will need to offset the center line 5 mm to the right as shown. Next you need to locate the horizontal center line. Tape a straight edge to the top of the fuse, in the area right in front of the canopy frame. Make sure it stays flat against the fuse. Use a ruler to measure down from bottom of the straight edge 8 1/4" (21cm). This is the horizontal center line location. Use a square and mark the horizontal center line on the firewall. Next you need to mark the location for the engine bolts. Use a square on the center lines to ensure the lines are parallel. Measure from the offset center line. Use the photo as a guide for the hole locations. We used a 3 degree offset mount from SWB on our SU-31. You can use washers if a mount is not available. After you fly your Sukhoi you may find a slight thrust adjustment is necessary, this can be done with shims under the engine mounting plate.









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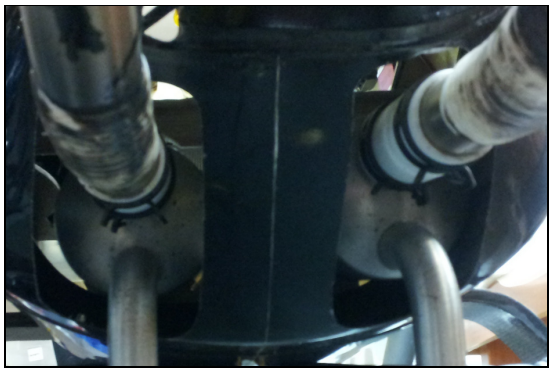
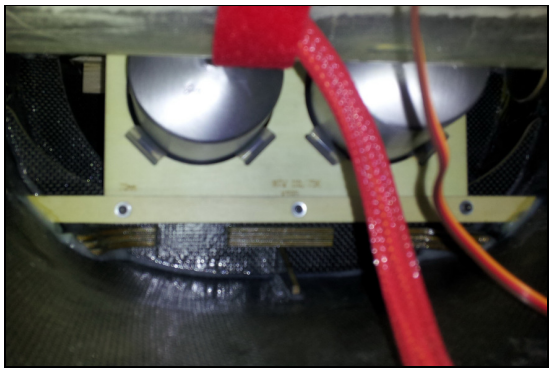
Exhaust

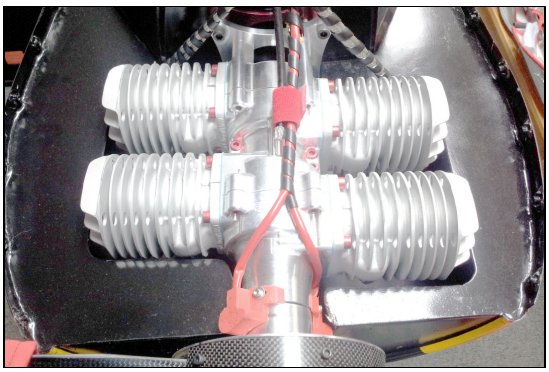
We used a MTW canister exhaust system on our Sukhoi. Use the photo as a guide to locate and cutout the holes for the pipes. The holes need to be 2 1/2” X 4 1/2" to allow enough air into the fuse for cooling. **Do not** cut through the center of the fuse at the seam as this will weaken the firewall. We also use a MTW exhaust mount. The mount will attach to a piece of hardwood 1/2” X 1/2" the 3 screws as shown. Glue the hardwood to the fuse right behind the landing gear mount.



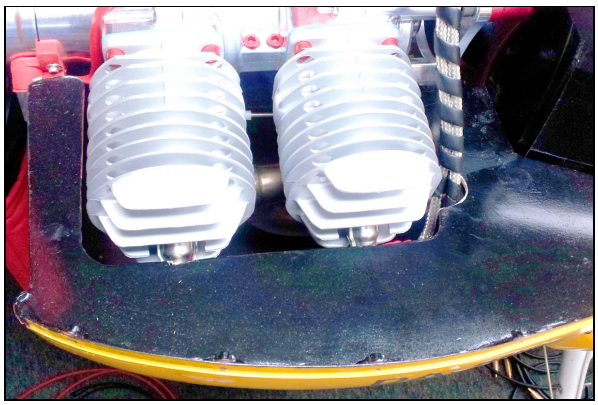


Engine cooling

It you intend to use the DA-200 it is very important to have proper baffling to provide adequate cooling. The baffling should come right up to the cylinders and go all the way around to the back. We used laminated balsa and glued it right to the cowling. It is a little tricky to remove the lower cowling but not impossible. The easiest way to do this is to use heavy paper to make a template then transfer it to the baffle.



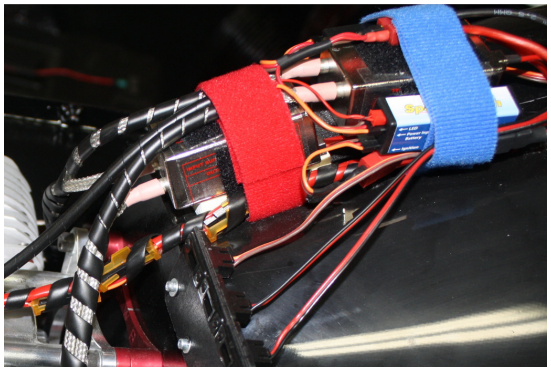
It is necessary to cut out two 2”x6” exhaust ports to allow hot air out of the fuse. The exact location is not important. It is important not cut through the center seam of the fuse. We also cut a hole in the bottom of the cowl for cooling and for our exhaust pipes to exit. See photos next page.



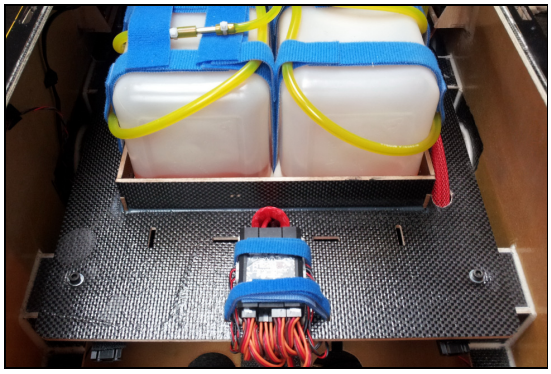
Equipment installation

The top of the engine dome, right behind the firewall is a great place to locate the ignition boxes. We also used this location to hide our battery charge ports.

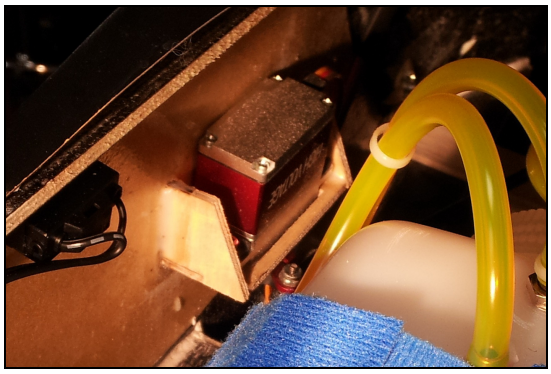
The provided Equipment tray is attached to four pre-installed mounts using 4mm screws. The configuration may be different depending on your equipment. Use the photos as a guide to setup and install the equipment tray. Note, if you are not going to use a high current receiver like the JR 1222 then it is recommended that you use a Powerbox with two batteries. There is plenty of room on the tray to mount a Powerbox.



A plywood servo mount is provided and used to install the throttle servo. The location of the servo may differ depending on your equipment. Use the photo as a guide to aid in the installation. We used a 3/16" carbon tube for the throttle pushrod.



Our batteries were installed right behind the firewall to achieve the proper CG. Ensure the batteries and all other equipment are securely fastened.



Center of Gravity

The Sukhoi has a large CG range for different flying styles. Our CG is set at 10mm behind the center of the wing tube and is Ideal for precision IMAC flying and is a safe starting point. The proto-type is being flown at about 2" behind this point. Start at the forward CG and move back slowly at your own risk.

Control Throws

A starting point only is listed below. Adjust the throws to suit your flying style and personal preference

Ailerons	Low rate	24 degrees	30% expo
	High rate	Max throw	50% expo
Elevator	Low rate	15 degrees	30% expo
	High rate	Max throw	50% expo
Rudder	Low rate	2 1/2" Right and left measured at counter weight	30% expo
	High rate	Max throw	50% expo

Mixing:
The Sukhoi requires very little mixing to keep it tracking nicely. There are lots of things that will influence the amount of mixing required. But as an indication, the only mix we required during our test flight was 5% up elevator for knife edge flight, no aileron mixing was required.

We hope you have enjoyed assembling your CARF-Models Sukhoi SU-31 and you have many years of happy flying with it. We have strived to cover as many area's as possible to ensure the assembly process flowed as smoothly as possible. If you have found yourself in difficulty and need some assistance, your sales rep is only an email away. Please contact your rep and they will endeavour to assist you, and get you back on track. Alternatively you can contact us via the emails below. We also welcome your feedback, please contact us if you would like to see something added or altered. We are always looking to improve our products and the information we supply.

Technical support; ordersupport@carf-models.com

www.carf-models.com

Preflight Check and First Flight

This Aerobatic-Aircraft is a high-end product and can create an enormous risk for both pilot and Spectators if not handled with care and used according to the instructions. Make sure that you operate your Sukhoi according to the AMA rules, or those laws and regulations governing the model flying in the country of use. The engine, servos and control surfaces have to be attached properly. Please use only the recommended engines, servos, propellers, and accessories supplied in the kit. **Make sure that the 'Centre of Gravity'** is located in the recommended place. Use the nose heavy end of the CG range for your first flights, before you start experimenting with moving the CG back. If you find that you need to relocate your batteries or even add weight in the aircraft to move the CG to the recommended position, please do so and don't try to save weight or hassle. A tail heavy plane, in a first flight, can be an enormous danger for you and all spectators. Fix any weights, and heavy items like batteries very securely to the plane.

Make sure that the plane is secured properly when you start the engine. Have at least 2 helpers hold your plane from the tail end or from behind the wing tips, before you start the engine. Make sure that all spectators are behind, or far in front, of the aircraft when running up the engine. Make sure that you range check your R/C system thoroughly before the first flight. It is absolutely necessary to range check your complete R/C installation first WITHOUT the engine running. Leave the transmitter antenna retracted and check the distance you can walk before 'fail-safe' occurs. Then start up the engine, run it at about half throttle and repeat this range check with the engine running. Make sure that there is no range reduction before 'fail-safe' occurs. Only then make the 1st flight. If you feel that the range with engine running is less then with the engine off, please contact the radio supplier and the engine manufacturer and DON'T FLY at this time. If you fly with 2.4 GHz technology, please follow the radio manufacturer's instructions for range checking. Always check range before a flying session!

After starting your engine the first time, check for vibrations through the whole throttle range. The engine should run smoothly with no unusual vibration. If you think that there are any excessive vibrations at any engine rpm's, DON'T FLY at this time and check your engine, spinner and propeller for proper balancing. Please follow the engine manufacturer's run-in recommendations and make sure that the engine is running properly before you attempt the first flight. The light-weight sandwich composite parts don't like too much vibration and they can suffer damage. The low mass of all the parts results in a low physical inertia, so that any excess vibrations can affect the servos and linkages. Check that the M3 bolts retaining the horizontal stabilizers on to the aluminum tube are installed and tight, and that the hinge wires for the rudder cannot come out. Make sure that your main and stab tubes are not damaged.