

SU 27 FLANKER

Turbine or electric ducted fan model for thrusts up to 35 N



Technical data

Scale : 1/16

Wingspan : 1000 mm (without weapon stations)

Length : 1400 mm

Weight of kit parts : approx. 1350 gramms

Expected flying weight : 3800 gramms (with MW 44 and 1 litre of kerosine)

Functions : Aileron, elevator, rudders, throttle, retracts, brakes

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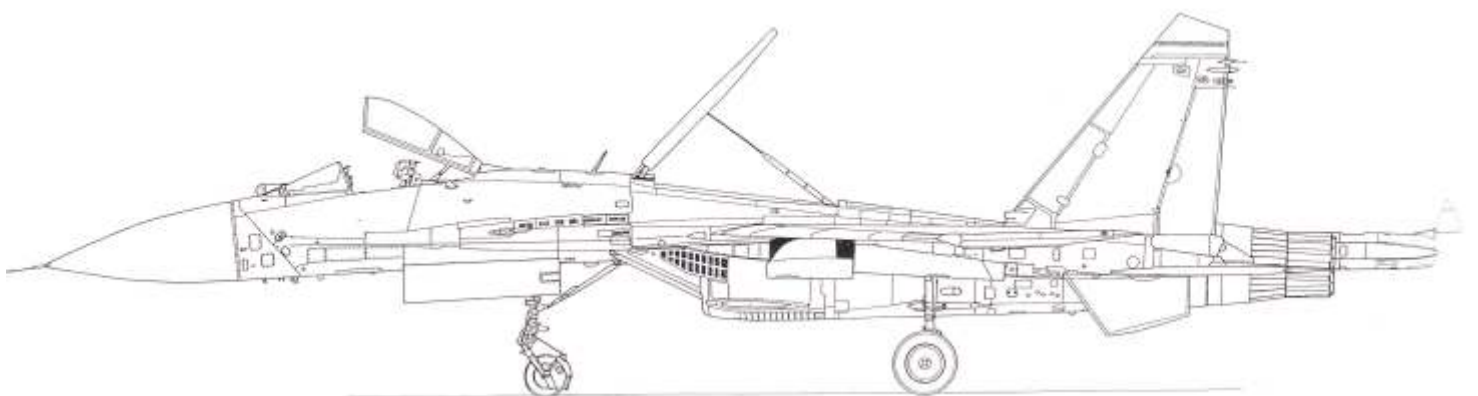
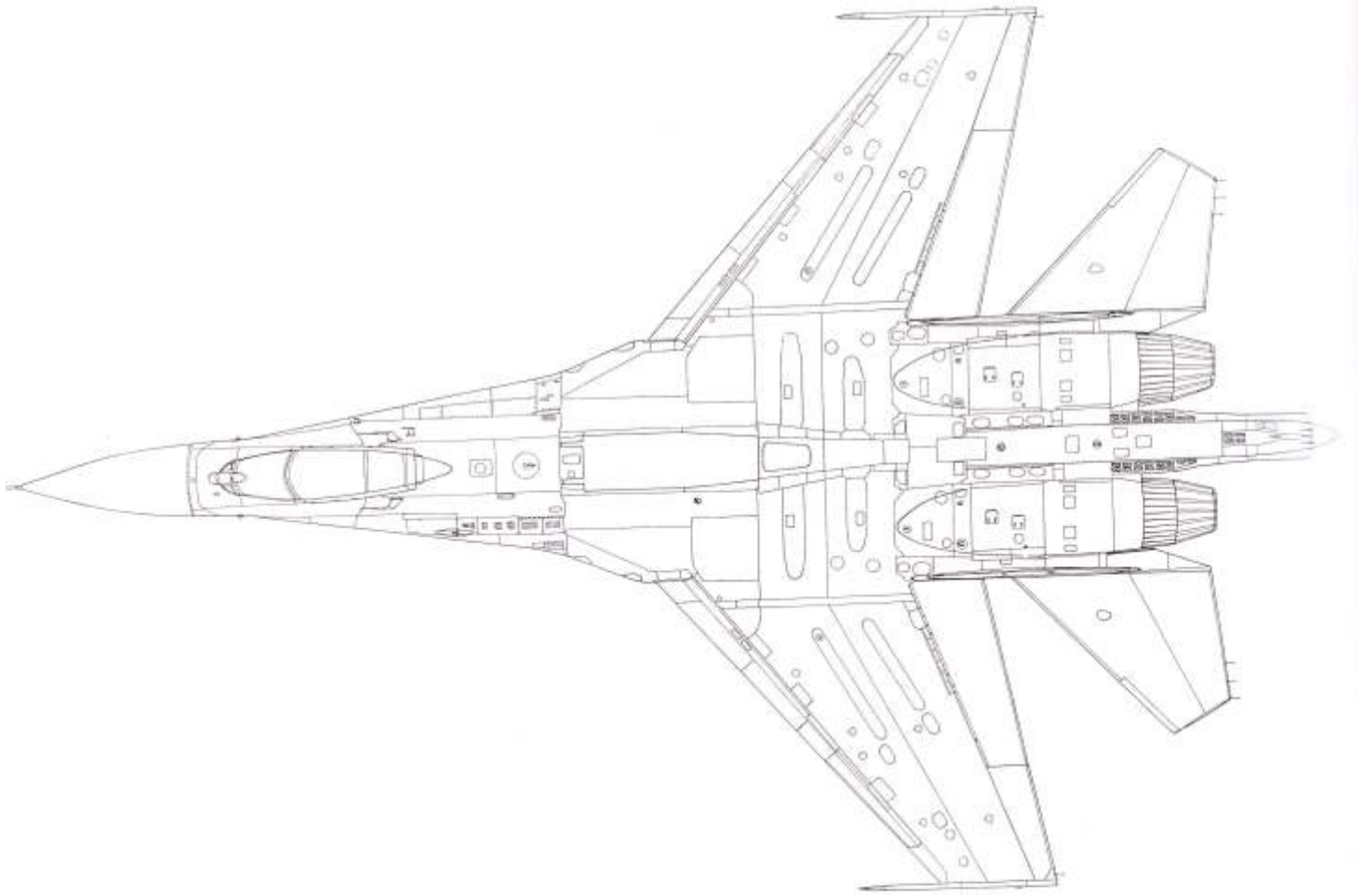
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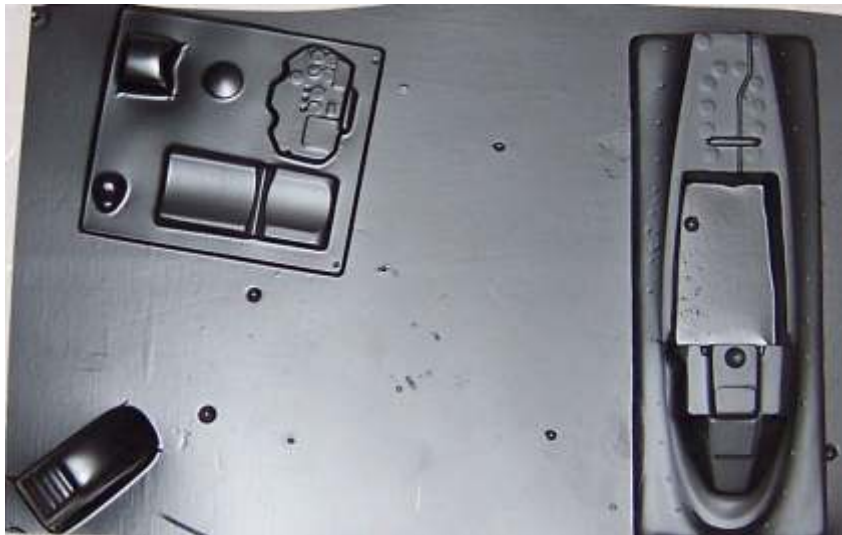
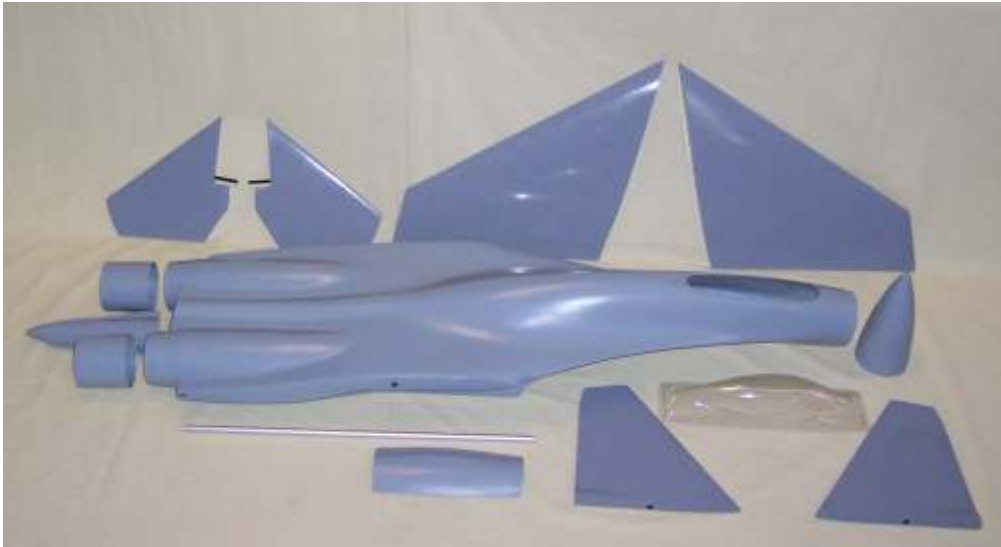
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Top and side view of late production Su 27 Flanker



Glass fibre and moulded parts



Moulded cockpit parts, see picture of ready made cockpit

Overview of wood parts

Some of the shown parts have to be cut from supplied material, use the lengths mentioned in the text.



Nose former, No.1



Nose gear mounts

Front former ,No.2

Rear former, No.3

Side mounts, No.4 , two pieces

Beech mounts, cut two pieces, length 45mm

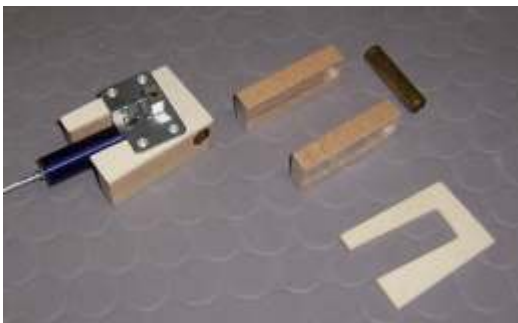


Fuselage root ribs, No 6, two pieces

Rear fuselage former, No 13

Not seen in picture:

Beech mounts for fins, cut two pieces, length 30mm



Main gear mounts

Retract mounts, No 7, two pieces

Assembled beech mounts, cut 8 pieces,
length 65 mm

Brass tube, inside diameter 10 mm, cut two pieces
length 45 mm



Turbine side mounts, No.8,
two pieces, beech mounts,
12 by 12 mm, cut two pieces
length 100 mm

Turbine front mount, No 9
and rear spacer , No. 10



Tank holder ,(turbine Sukhoi only)

Carbon tubes and beech stringers

Supplied with the kit are some uncut carbon tubes and beech stringers. The following spread sheet shows the lengths that need to be cut.

Beech wood & Carbon materials supplied in kit		
Part	Turbine kit	EDF - kit
Beech stringer 12 x 12 mm	900 mm (1x)	700 mm (1x)
Carbon tube, dia. 10 mm	500 mm (1x)	500 mm (1x)
Carbon tube, dia. 8 mm	235 mm (1x)	70 mm (1x)
Carbon tube, dia. 6 mm	270 mm (2x)	400 mm (1x)
Brass tube, dia. 10 mm inside	100 mm (1x)	100 mm (1x)

Beech stringers, lengths to be cut		
Part	Turbine version	EDF- version
Nose gear mounts	45 mm (2x)	45 mm (2x)
Main gear mounts	65 mm (8x)	65 mm (8x)
Turbine mounts	100 mm (2x)	none
Fin mounts	30 mm (2x)	30 mm (2x)

Carbon tubes, lengths to be cut		
Part	Turbine version	EDF version
Wing plug in, dia. 10 mm	500 mm (1x)	500 mm (1x)
Elevator axis, dia.6 mm	184 mm (2x)	100 mm (2x)
Elevator outer tube, dia. 8 mm	114 mm (2x)	32 mm (2x)
Fin plug ins, dia. 6 mm	80 mm (2x)	80 mm (2x)
Brass tube, dia. 10 inside	45 mm (2x)	45 mm (2x)

Overview of formers

Former No.	Quantity	Quantity	Name, Location
	Turbine version	EDF Version	
1	1	1	Nose former , approx. 2mm from front end of fuselage
2	1	1	Front nose gear former, in front of rear former (1)
3	1	1	Rear nose gear former, behind wheel well cut out
4	2	2	Side plates for nose gear assembly
5	1	0	Tank holder for standard 500 cc tanks
6	2	2	Wing root ribs
7	2	2	Main gear mounts
8	2	0	Main formers for turbine mount
9	1	0	Front former for turbine mount
10	1	0	Spacer for turbine formers (used as tool only)
11	0	1	EDF rear duct former, 150 mm from rear end
12	0	1	Rear fuselage former, in front of elevator axis
13	2	2	Fuselage fins, under Fins (cover servos)

(1) distance is given by formers No. 4

Starting

The build starts with making all necessary cuts in the fuselage.

These are:

1.The nose gear cut out - follow the panel line detail and use a diamond cut disc on your DREMEL to make a clean cut

2.The main gear cut out

Use the paper template to mark the cut out.Make straight cuts using the dremel, the round cuts have to be made with a fine saw blade. Make sure that the cuts are clean, you will need the cut out parts as wheel doors later !

3.Air brake cut out.

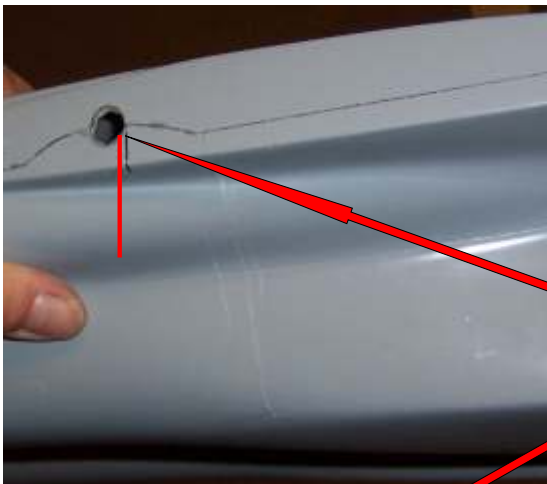
This is optional and not a must on the turbine version.Use the supplied glass fibre door as a hatch and make the cut out following the panel line detail.

4.Cut out for turbine mounts

Use supplied template and mark the cut out for the side rails of the turbine mounting system.

5. Duct openings

The duct openings should be cut full size for the electric ducted fan version. The turbine Sukhoi does not need the full size cut out as the turbine gets its air from the centre.The cut out can be made smaller, by leaving the rounded part (at the bottom of the inlet)uncut. This is making the fuselage stronger and avoids damage in case of wheels up landings.

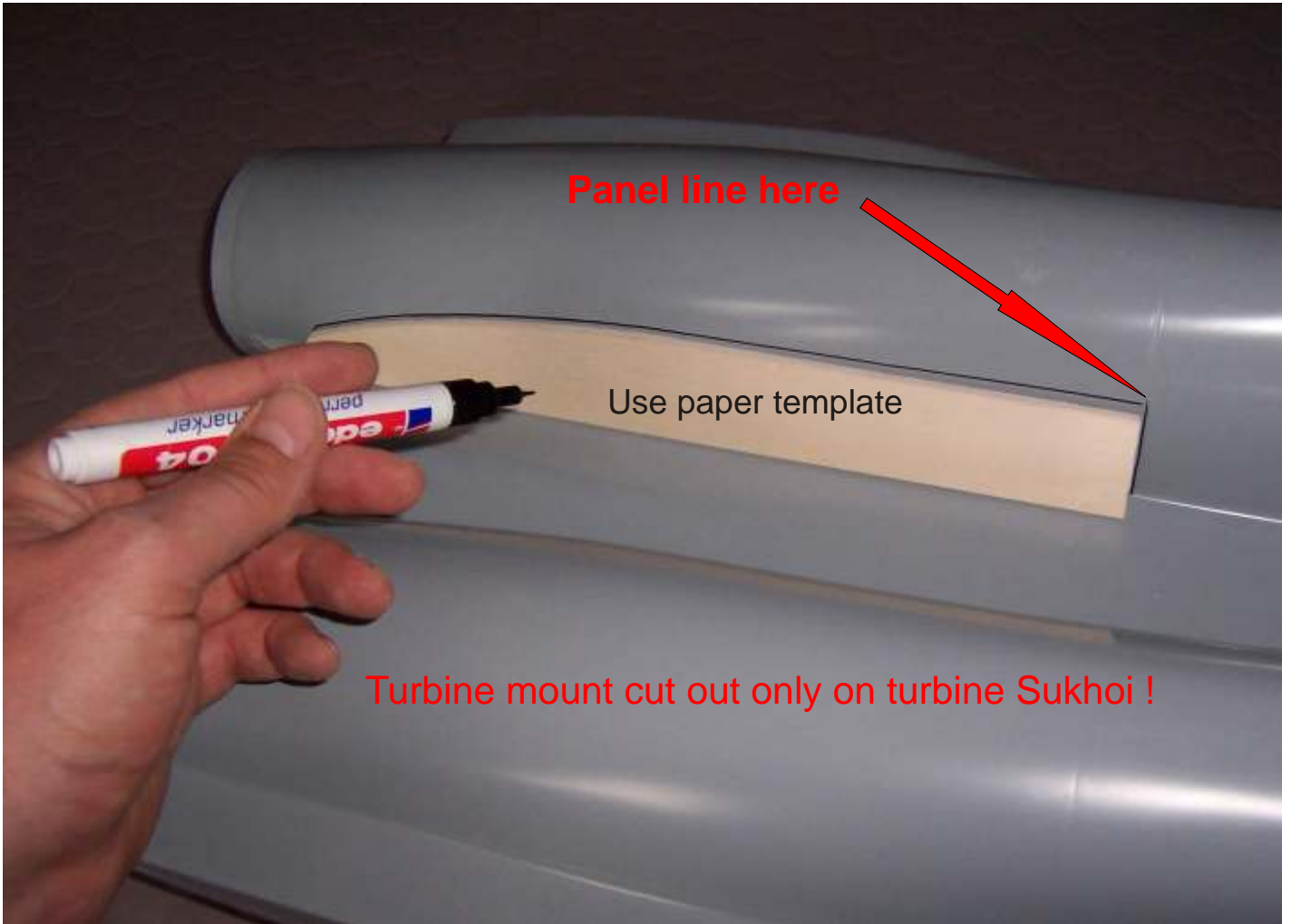


Location of cut out IN FRONT OF WING JOINER

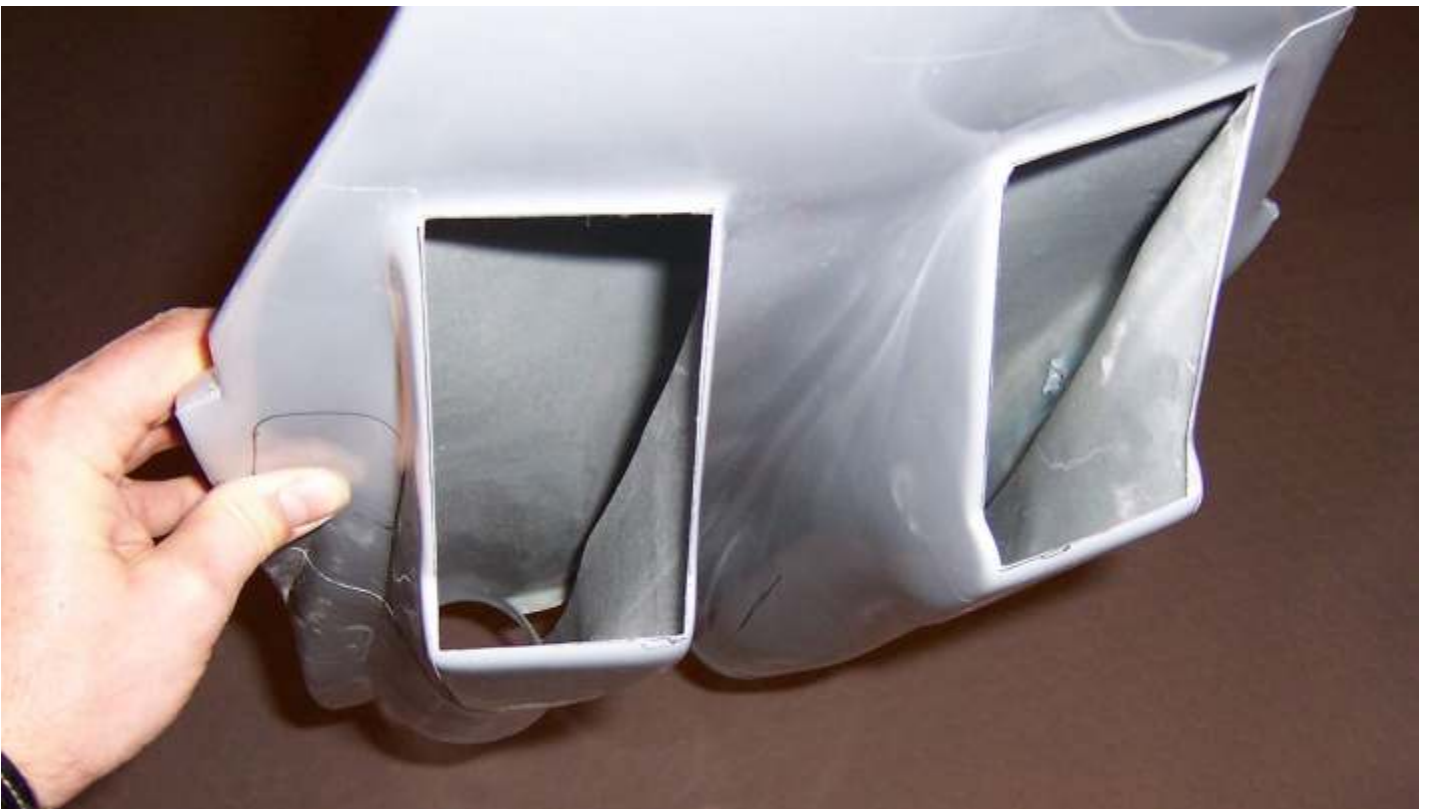


Templates for cutouts at the end of this manual

Cutouts



Templates for cutouts at the end of this manual

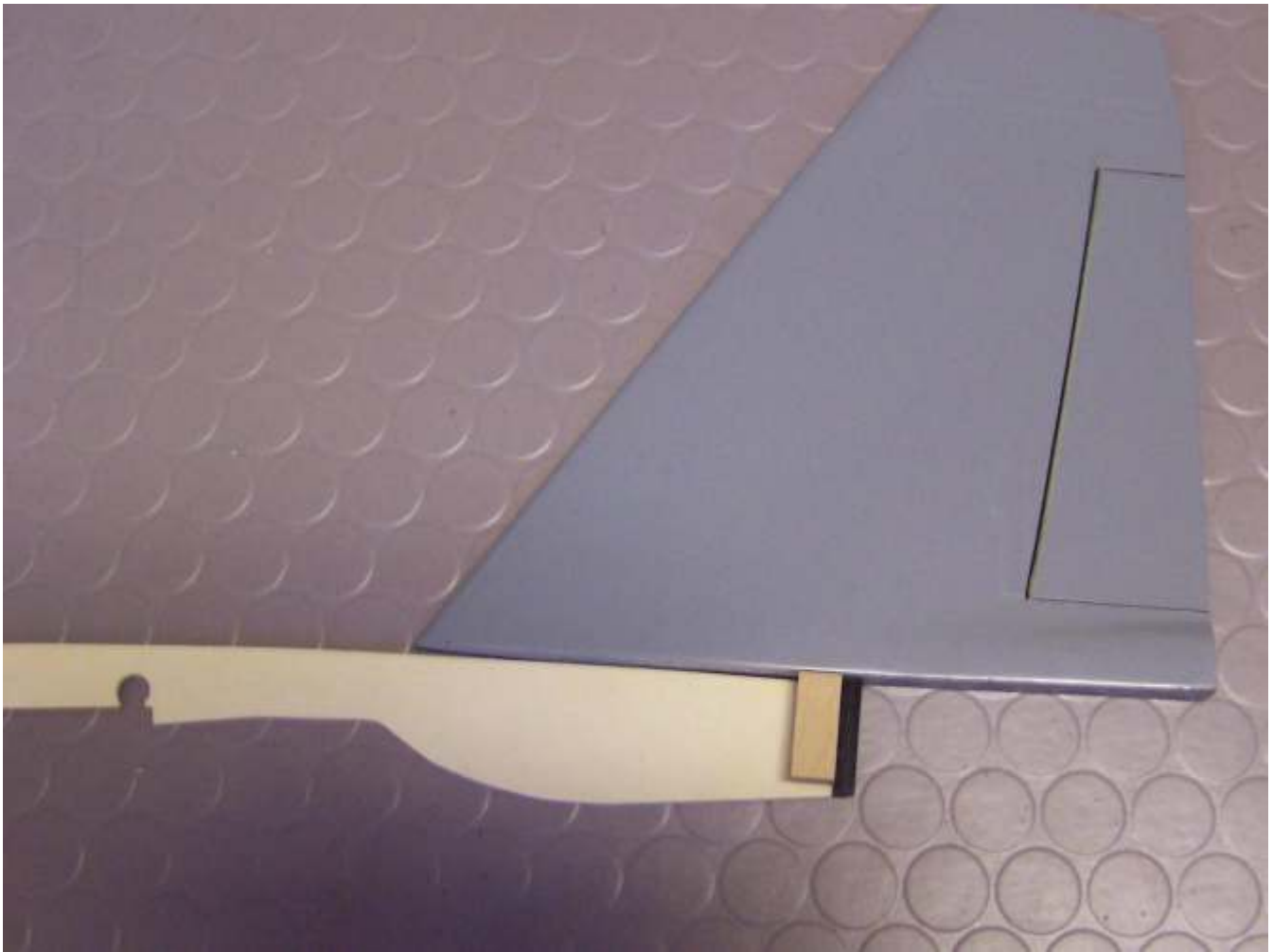


Fuselage root ribs

When you have made the main gear cut outs, sand off excessive resin and glass inside the fuselage so that the root ribs can be installed.

Trial fit these ribs in the fuselage and glue in place .It is suggested to do this with the wing joiner in place to guarantee exact position lengthwise.

Cut two pieces of beech (12 by 12 mm) with a length of 30 mm and glue it to the rot rib. The fins are glued to this beech block later. See picture.



Servos can be mounted directly into the fin, just cut out a door inside of the fins

Retract mounts

prepare the main retract mounts by cutting 8 pieces from the supplied beech stringers. (12 by 12 mm). Cut pieces with a length of 65 mm and glue two of these pieces on another to make a part with 12 by 24 by 65 mm

Make four of these pieces, then mark a centre for drilling a hole for the plug in.

The position is shown on the following pictures

Drill 12 mm holes (1/2 ") in the blocks.

Glue the blocks to the retract mousing plates No. 7, using cyano

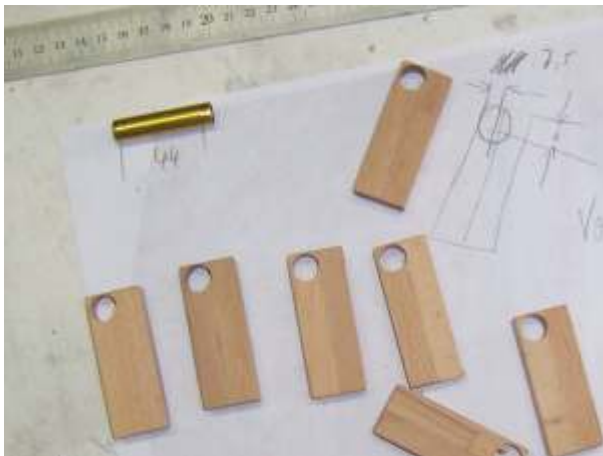
Make a left and a right version !

Sand off the beech blocks so that it follows the shape of the retract mounting plate.

Cut two brass tubes with a length of 44 and trial fit to wing joiner. Avoid sharp edges that could damage the carbon wing joiner !



Prepare four of these blocks



Position of 12 mm hole (1/2 ")
7.5 mm from top of beech block
6 mm from end of beech block



Sand beech to match
contour of retract mount

(The 12 mm holes are not shown in this picture)

Trial fit the brass tube in the beech blocks. There has to be plenty of play between the brass and the wood, this is to be filled with epoxy later.

Round off the edges of the beech retract mount assembly and trial fit in the fuselage. Roughen surface inside the fuselage for good adhesion.

Attention :If you build the EDF version, trial fit ducts and retract mounts together first. See "EDF version, special features", later in this manual.

Make a check with all parts fitted together, i.e. WITH brass tubes in place AND with the wing joiner. The wing joiner tube is holding everything together during glueing process. Make sure that everything fits without tension, when satisfied glue the blocks and brass tubes in place in one go and let glue set overnight (24 hour epoxy)



Rounded off edges to match fuselage contour

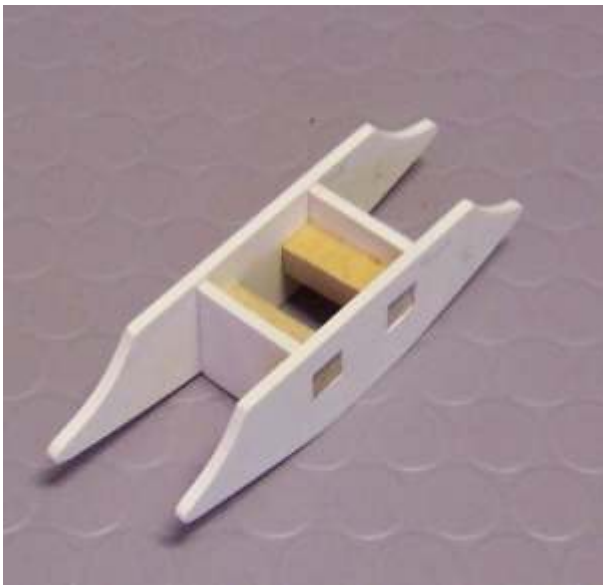


Retract mount group glued in place

Nose gear mount

The nose gear mount is consisting of the front former No. 2, the rear former No. 3, the side mounts No. 4 and two beech mounts. Cut 2 beech blocks with a length of 45 mm first.

Trial fit all these parts together outside of the model as shown on the following picture.



This assembly is later cut open to accept the nose gear retract body, but left uncut until glued in place.

Position the rear former so that it aligns with the rear nose gear cut out and glue it in place. Go on with the front formers and beech rails.

Trial fit retract body and work out front former to accept nose leg.



Fins

The fins can now be glued in place. Mark the position for 6.5 mm holes (1/4 ") on the fuselage. Then make the drills on top and bottom of fuselage.

Cut two pieces of 6 mm carbon tube to a length of 82 mm and slip it in the fins.

Trial fit fins on fuselage and work out holes until satisfied.

Glue tubes in place while fins are held in position using tape. When glue has set, take off fins. You can roughen the surfaces of fins and fuselage and glue the fins in place permanently OR glue some locating pins in the fins to make them detachable. For safety reasons, I suggest to glue the fins in place.



Holding fin with carbon plug in to fuselage and marking the position for the top and bottom holes (6.5 mm 1/4 ")



Position for holes approx. 11.5 mm from side

It is suggested to attach wings to the fuselage to align the fins. This should also be done later when aligning the elevators !

EDF -version ,special features



At this stage the building procedure differs between the turbine version and the electric ducted fan version. When you build the EDF version, the ducts need to be glued in place, before the elevators are attached.

The ducts are open at their top side and need to be glued together in two steps. (this is because the ducts need to be deformed while installing them from the fuselages back end) See pictures on the next page for duct preparation.

When the ducts are glued together at the back end, push them in the fuselage by deforming the square front end. Move the ducts out of the front end, so that they stand out about 100 mm. Now put the EDF duct holder , No. 12 through the canopy opening and shake the fuselage until the former appears at the back end.

Turn the former in an upright position from the back end.

The correct position for the duct holder is 150 mm from the back end of the fuselage Use a scrap piece of wood with this length as a tool to adjust the distance.

When this former is in place, the ducts can be moved back again. Glue former 12 and the ducts in place in one go. When glue has set, proceed with the carbon outer tubes for the elevators (Cut 2 carbon tubes: 8/6mm dia. , length 32 mm).

Glue the carbon tubes in place with attached elevators to align the exact position.

Step one

Trial fit your fan unit in the duct. It should be pushed in, until it is completely covered by the duct. Use tape to hold the duct together, push the tape until a tight fit of the fan is achieved. When satisfied with the fit take off the tape and get out the fan - THIS WAS JUST A TEST FIT-

Now wax the fan !

Mix some epoxy, and apply it to the glassfibre at the overlap. Do not epoxy the area in front of the fan !

Move the fan inside the duct again and tape the assembly like before. Also tape the duct at the front end so that it is squared. Wait until epoxy has set completely. Remove duct.



Step two

Squeeze the duct together at the front end to get it in the fuselage through the nozzles



Now make a trial fit of ducts and former 12 as described before. The wing joiner tube should also be in place when doing this !

When satisfied, remove ducts and former 12, mix some epoxy and apply it to the remaining -yet unglued- seam of the duct.

Repeat the installation procedure and glue ducts and former 12 in place. To avoid deformations of the ducts, tape them to the fuselage at the inlet. You can also put some pieces of foam inside the ducts to expand them.

When glue has set, go on with the motor and fan installation. The final fixing of the fan unit can be done by a single set screw from the bottom. Drill a hole through fuselage, duct AND fan unit and cut a thread in the fan. Use a short screw to fix the fan and secure the screw with "Loctite" or epoxy.

Supplied with the kit is a "speed brake panel". This part is an option on the turbine version (operational speed brake), but a must on the EDF version. Follow the panel lines on the fuselage to make a cutout for batteries and speed controllers.

Placing the batteries and speed controllers is depending on the used items.

A well tested setup, that has been used on the prototype Su27, gives plenty of power.

2* 69 mm Het fans

2* 2w25 Het motors

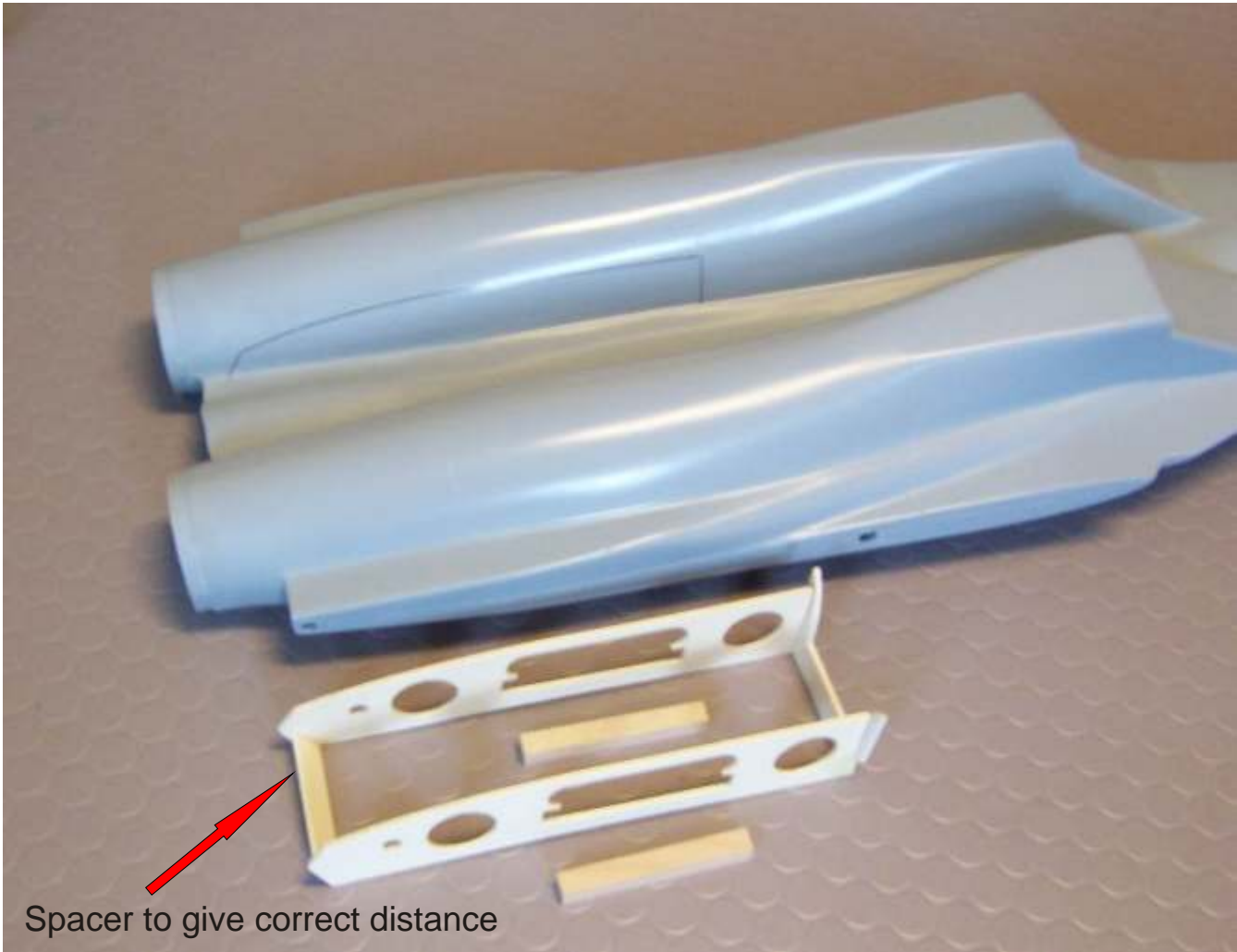
2* speed controllers with minimum .60 amps , better 80amps

2* 4500mAh lipo batteries 3s

Turbine version

The rear fuselage former, No. 13 is not needed if you build the turbine version.

Trial fit the turbine mount, No. 8, the front mount, No. 9 together with the spacer, No. 10 in the fuselage. Cut two pieces of carbon tube (dia. 8/6 mm) with a length of 114 mm and slip these through the holes in the fuselage and the formers No 8. Check the exact position of these tubes by attaching the elevators with two axes (dia. 6 mm, length 184 mm) and work out holes until satisfied. Glue formers and elevator axes in place in one go.



Glue the two engine bearers 12 by 12 by 100 mm in turbine mounts No. 8.

The Sukhoi does not need a thrust tube, a simple sheet of stainless steel (0.1 mm) with a „U“- section is enough to protect the fuselage from the turbines heat. It can be fixed, using six servo screws. The separate fuselage end piece has to be cut open on the underside to make place for the thrust channel. Cut away at least half of the”

Retracts

The Sukhoi can be equipped with retracts. The already installed retract mounts may need some trimming to accept the retract bodies. Trial fit the retracts with legs & wheels attached to adjust the correct track. The formerly cut out glass fibre parts can be used as wheel doors. These are simply screwed to the retract mounts, using servo screws.



Set of retracts
(different sets available)



Cut out glass fibre used as wheel door



Simple wheel door

Picture shows 4 mm wire leg which is suggested for permanent grass field operation



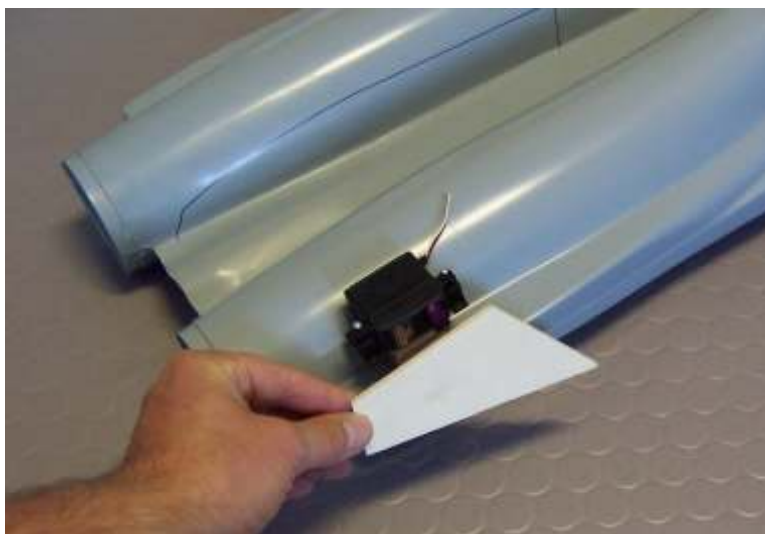
Some scale detail can be added by using
the supplied moulded plastic fender

Servos

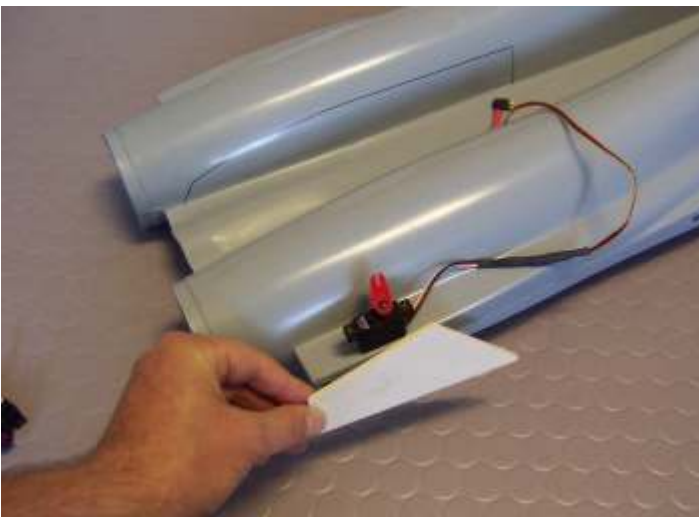
Depending on the servo size, you can mount the servos in a horizontal or vertical position. It is suggested to use high power servos with metal gears. The turbine powered Sukhoi requires servos with a torque of approx. 8 Kg. Use only high quality products ! Linkages should be at least 3mm in diameter. Use good quality servo lead that is drilled. Keep leads away from hot areas or devices that produce electrical noise !!! Secure leads over their whole length



Horizontal mounting



Servo position behind Fin (glued to fuselage)



Micro servo in vertical position (screws in fuselage)

Horns and linkages

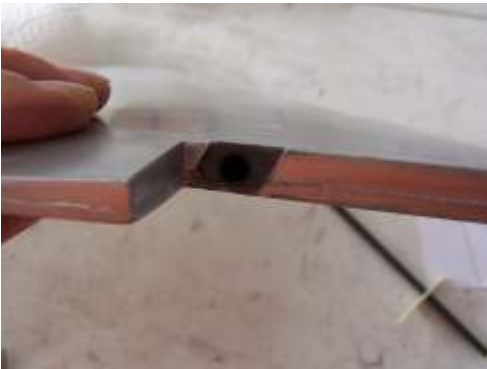
There are two possible horn types that can be used. The following pictures show how these can be mounted.



Screwed type



Glued glass fibre type



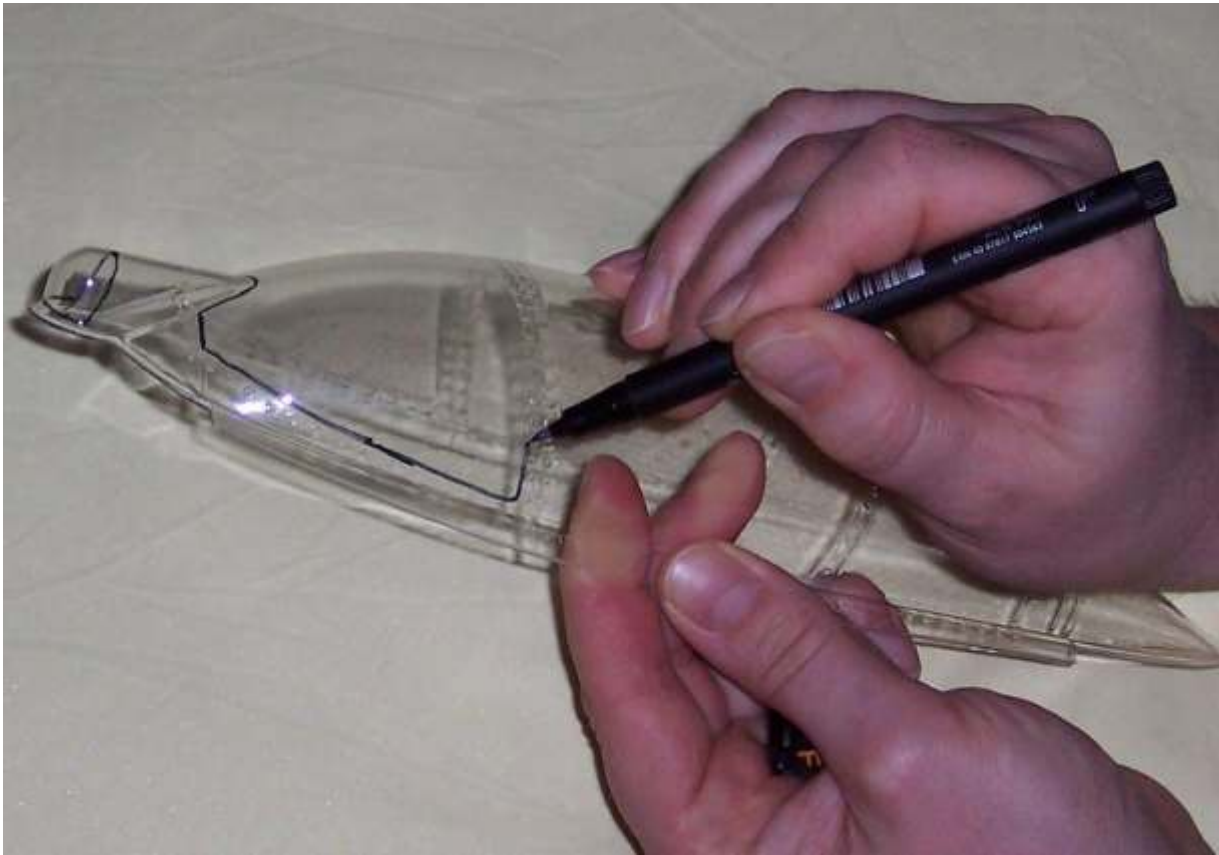
Note : slot worked out to hold horn



Check free movement, sand paper used for correcting disalignments

Canopy & Cockpit

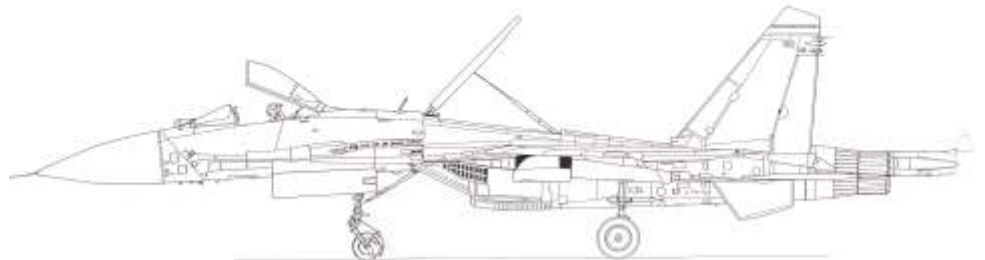
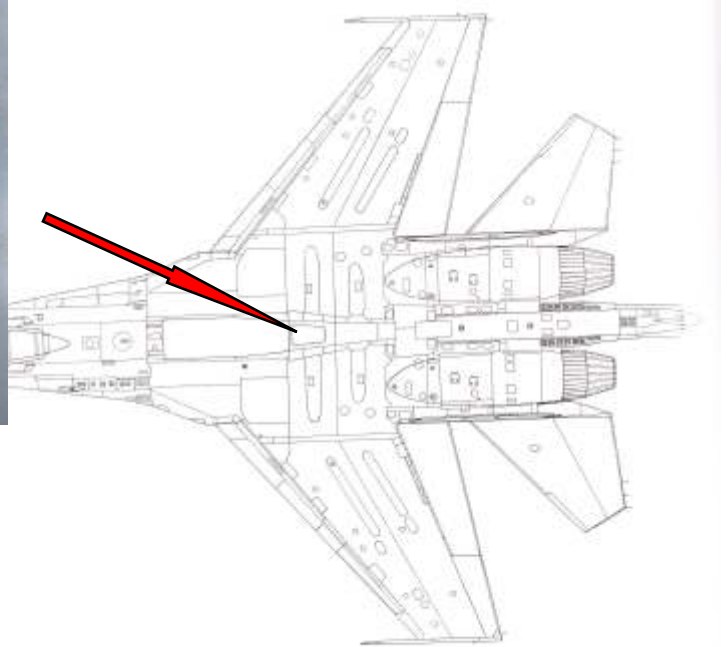
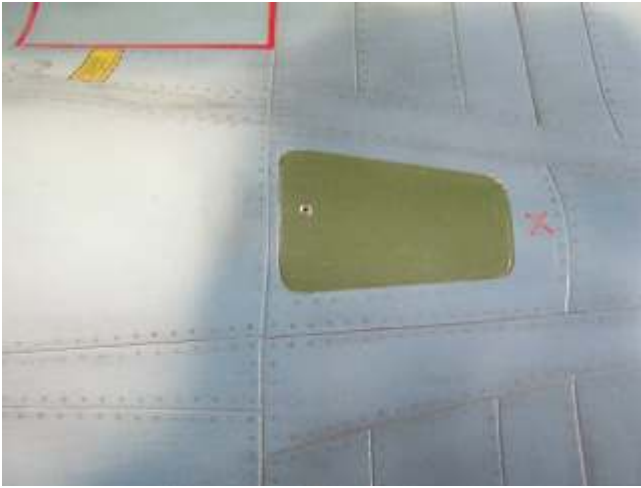
Cut out the canopy, then mark the scale panel lines, tape the glassed parts and use a plastic primer (available in spray cans) before painting the frame. The kit comes with some moulded parts for building a scale cockpit. Some extra detail can be made using wires that are glued to the mouldings



Cockpit part can be a loose fit, the canopy should be fixed using the traditional hatch catch method.

Centre of Gravity and movements

The centre of gravity is about 12 mm behind the front end of the little panel on the fuselage topside (white or green coloured on full size Flanker). You can try to get it further back after the first flights. Do this very carefully step by step until the desired flight characteristics are achieved. Note that a nose heavy airplane is very



Taileron movements :

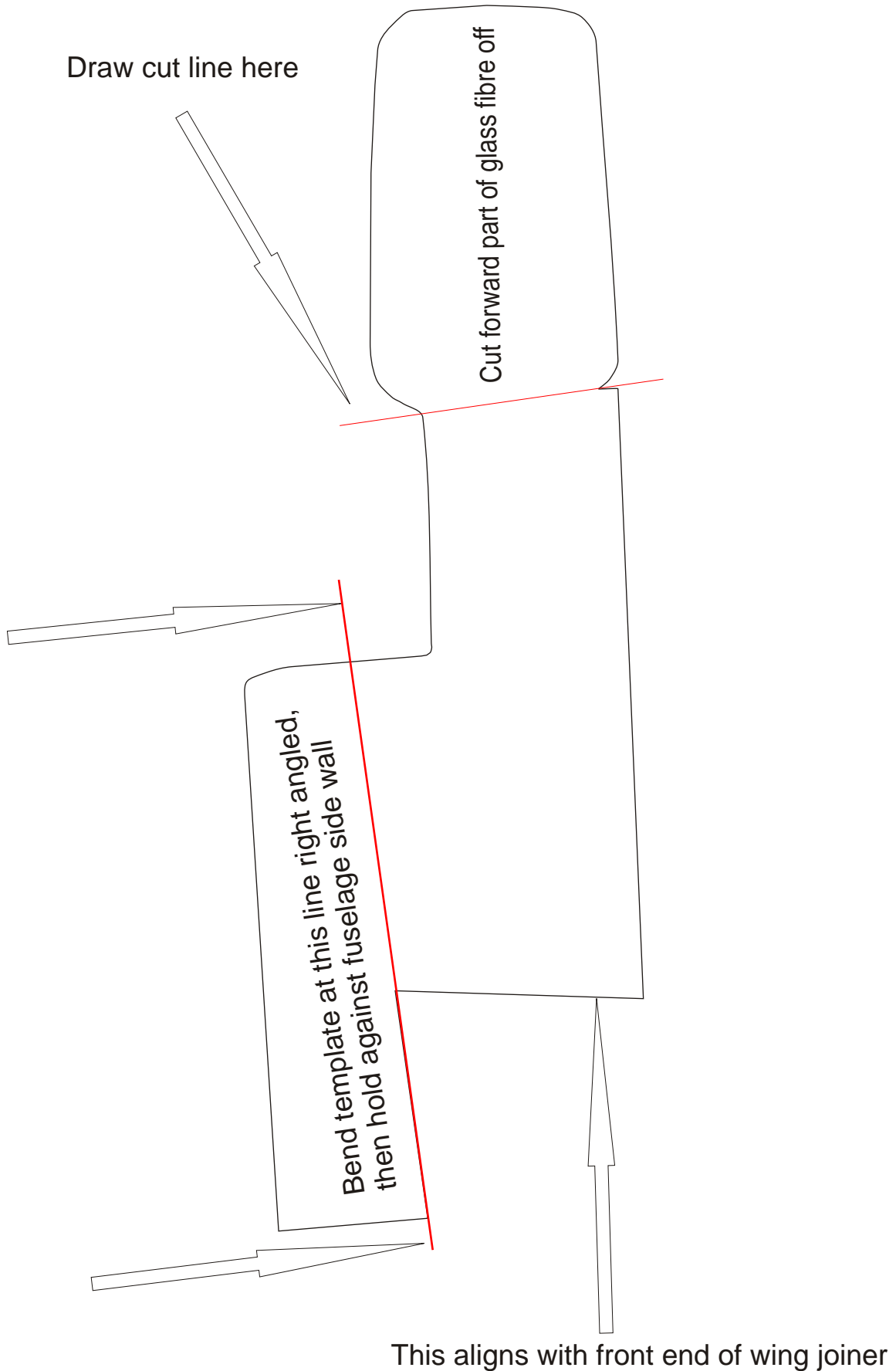
As been flown on the prototype models, the neutral point for the elevator has to be adjusted at 18 mm measured from the topside of the fuselage to the nose of the elevator.

Elevator movement is 40 mm for up and 30 mm for down. The movement for the aileron function is 26 up and 23 down. This is for a smooth flying style, if you want to fly extreme angles of attack, you will probably need to cut or sand the tailerons/fuselage to allow more movement. It is vital to set your radio to 70% exponential for the aileron and about 40 % for the elevator. If the nosewheel is steerable set the steering wires very close to the servo centre, and put 60 %

Cut out templates

Cut out the templates and mark the cuts on the fuselage

Main gear cutout



Turbine mount cutout

