

Fouga Magister

CM 170

*for AMT Pegasus
or Jet CAT P 120 / P160*

Assembly Manual

AVIATION DESIGN

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INTRODUCTION

The Fouga Magister from **AVIATION DESIGN** is designed for a single high thrust turbine. It is a scale kit, with all the panel lines and rivets engraved in the fuselage and wings . It is fully molded in fiberglass, carbon and epoxy. Up to 80% of the work is done in our factory. The flight characteristics are excellent with very good low speed capability. The model has plug in wings and stabs. The Fouga Magister will operate from prepared grass fields (70 meters long) or tarmac surfaces.

KIT FEATURES : ref ADJ 500

- High quality, grey gel-coated epoxy-glass fuselage. All the panel lines and rivets are engraved. The fuselage is in 2 parts for shipping. Main plywood frame are already glued.
- Front hatch for radio and engine hatch requiring no framework molded in epoxy glass
- 2 Canopy frames molded in epoxy-glass
- 2 Epoxy-glass inlet ductings
- Fully molded epoxy carbon wings with aluminium spar already glued.
- Fully molded epoxy carbon stabs
- Wing tip tanks
- All plywood and wood parts pre-cut to shape where necessary.
- 2 Clear formed canopy.
- Full size CAD plans & instructions in English.

To complete the kit :

The following items are not included in the kit. They are available from **AVIATION DESIGN**.

Hardware package : ref ADJ 503

Following items are included in the hardware package

For the fuselage :

All screws and nuts

M2 link for steering

Special tube for wiring

1 ball link M2

For the canopy and the hatch :

3 hatch latches + door hinge

For the stabs :

All hinges + ball link

Aluminium control arms

All screws

For the wings :

All hinges + link

All screws

Servo covers

Turbine :

1 AMT Pegasus turbine

or 1 Jet Cat P120 or P160 turbine

Kevlar Fuel tanks : ref ADJ 520K

2 Fuels cells molded in kevlar. Capacity : 3.8 liters

Includes tubing, nipples and clunks + 1 upper tank



Landing gear : ref : ADJ 505

AVIATION DESIGN scale retractable landing gear is specially designed for the Fouga Magister.

It is made in aluminium and steel.

It includes 3 retracts system, 3 scale oleo legs, 4 way valve, tubing, connectors, air tank, filling valve, ...



Gear doors kit : ref : ADJ 515

Includes 3 air cylinders, electronic gear door cycler, 4 way valve, tubing, connectors, door hinges, ball links.



Wheels set + brakes : ref : ADJ 510

This set includes:

2 x 115 mm diameter wheels + scale cover + brakes

1 x 85 mm diameter scale front wheel + scale hub

1 x 37 mm tailwheel + aluminium support

It includes also valve, tubing, connectors, air tank, filling valve.



Variable pressure brake control valve :

Twin exhaust, double walled stainless steel tailpipe : ref : ADJ 540

Air brakes : ref : ADJ 525

It includes 12 air brakes, plywood frame, ball links, linkage and screws.



Detail set : ref : ADJ 527

This set includes all ABS covers, plastic details, resin antenna, aluminium cast antenna,



Cockpit set : ref : ADJ 530

Including

- 2 instrument panel molded in resine with all scale details
- 2 x ¼ scale pilots + 2x french helmets. Pilots are molded in plastic, helmets are in resine with all scale details
- 2 pilot seats molded in resine and ABS parts
- 2 Instrument panels molded in resine with all scale details

2 x ¼ scale pilots + 2x french helmets : ref : ADJ 532

Pilots are molded in plastic, helmets are in resine with all scale details

2 pilot seats : ref : ADJ 533

Molded in resine and ABS parts

Kevlar Fuel tank for smoker : ref ADJ 521K

Fuels cell molded in kevlar. Capacity : 1.2 liters

Includes tubing, nipple and clunk

DISCLAIMER

AVIATION DESIGN assumes no liability for the operation and use of these products.

The owner and operator of these products should have the necessary experience and exercise common sense. Said owner and operator must have a valid Model Airplane license and insurance, as required.

FIBREGLASS PREPARATION

The inside of the fuselage should be sanded with fresh #80 grit paper for best glue adhesion where bulkheads and other attachments are fixed.

GLUING TECHNIQUES

All the plywood formers should be fitted with cyano adhesive and then glued with epoxy and glass fiber tape. All other parts should be glued with epoxy.

CONSTRUCTION

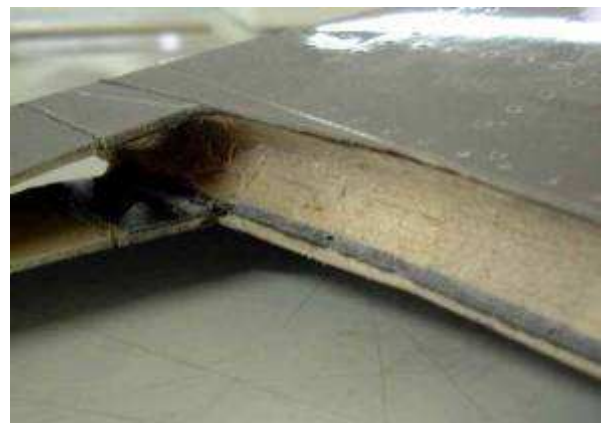
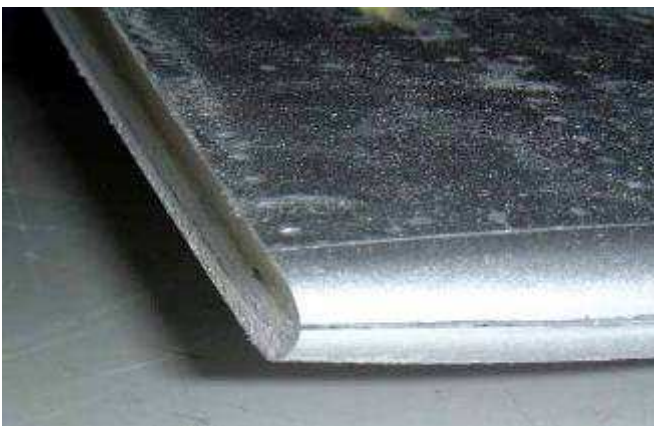
Stabs assembly :



Elevator control surface must be installed carefully. All hinges must be glued perfectly and there must be no play in hinges, linkage and servo

Cut the stabs according to the engraved panel lines and plan with a dremel saw (fine saw) or with a diamond disk

Sand the balsa inserted in the stab with a half round Perma Grit tool to have half round in the stab



Cut the holes in the lower skin of the stabs according to the engraved panel lines : servos location, main spar location, control horn location



Glue the 3 mm balsa spar on the control surface



Sand it half round



Make a slot in the control surface for the aluminium torque tube. See drawing on the plan for the location.

Insert the aluminium tube in the surface. Glue it with epoxy , checking that it is parallel to the leading edge of the control surface. It must be perfectly glued inside, check from the root.



Insert and glue with epoxy the 3 hinges in the surface according to the plan. Glue them perfectly (strong)

Drill the corresponding hole in the stabs.
Slide the brass tube on the aluminium tube. Fit some greas for best rotation. Check there is no play in tube

Insert and glue with epoxy the 3 hinges and the brass tube in the stabs. Check that the control surface can rotate freely. All hinges must be perfectly glued.

Insert the aluminium control horn in the aluminium tube. Drill a 2.5 mm hole and tapered M3 both parts together. Secure screws, horn and tube with threaded lock. There must be no play.



Joining the 2 stab :

Glue with slow epoxy the 2 V1 spars, fitting the carbon fiber between them
Let it dry

Sand the V2 block so the aluminium control horn don't touch it.

Prepare 70 g of epoxy + microballon
Insert and glue with epoxy and microballon the V1 spars in one stab
Insert and glue with epoxy and microballon V2 and V3 wood blocs in the stab

Fit and glue with epoxy and microballon the second stabs.

Hold it in location with tape, put the stabs on their trailing edge.
Check the distance between the 2 stab tip trailing edge : 1085 mm
Let it dry overnight.

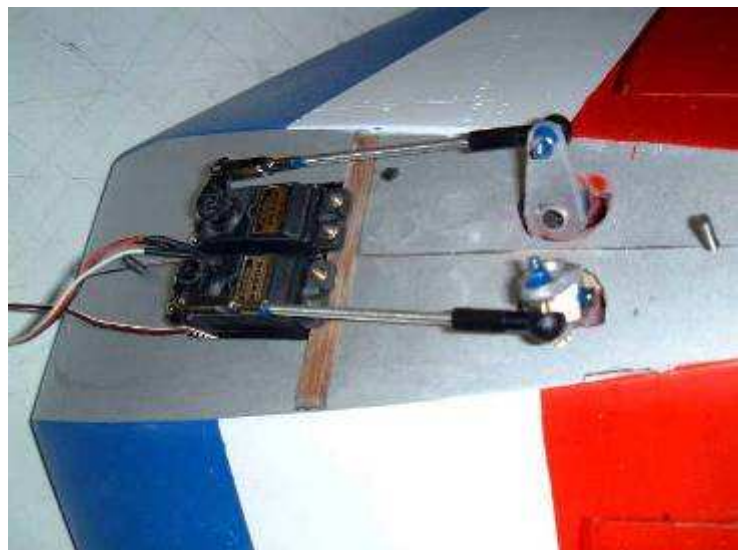




Screw the 2 servos on V1 and V3.

Connect them with M3 threaded rod, M3 link and M 3 ball link.

Secure ball link and linkage with threaded lock. There must be no play.



Wings :

Cut the ailerons according to the engraved panel lines and plan with a dremel saw (fine saw) or with a diamon disk

Sand the balsa inserted in the wings with a half round Perma Grit tool to have half round in the wings

Glue the 3 mm balsa spar on the control surface
Sand it half round



Cut the servo location in the lower skin of the stabs according to the plan.

Just cut a square in the first fiber layer and remove the balsa so the servo cover can take place in the wing

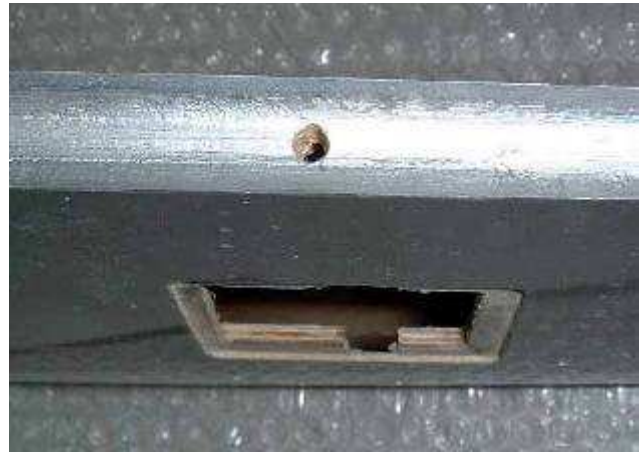
Insert and glue **IN** the wings with epoxy W1 and W2 plywood reinforcement for screw

Insert and glue with epoxy the 4 hinges in the surface according to the plan.



Drill the corresponding hole in the wings.

Insert and glue with epoxy the 4 hinges in the wings. Check that the control surface can rotate freely.

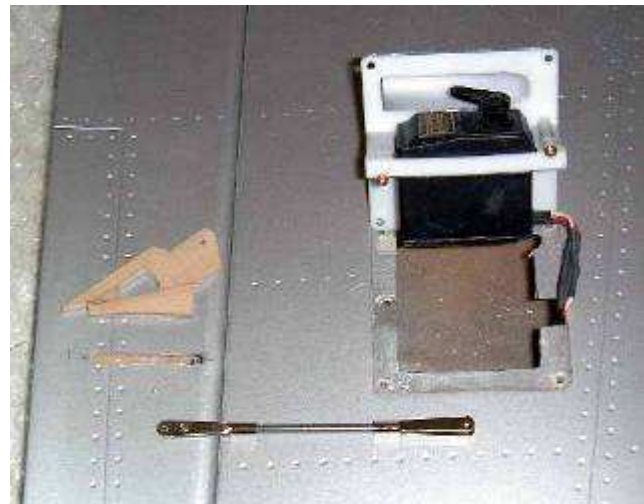


Cut a slot in the elevon and glue the ply control horn with a lot of epoxy
Connect the servo with 2 x M3 links and M3 threaded rod.
Apply thread lock.

Apply some silicone glue on the servo and screw it in the servo cover.

Screw the servo cover under the wing with the 4 screws.

Connect the control horn with the link.
Apply thread lock.



Front FUSELAGE

Assembling the nosegear

Cut the front gear door according to the engraved panel lines.

First, cut just one side of the door

Glue the 2 door hinges (position according to the plan and pics).

Finish to cut the gear door.



Cut out the front wall in the nose.

Glue 2 x C3 spars together with CA

Assemble the frame C1, C2 and C3 and glue them with CA. Take care that C2 has a slot on one side for the front door hinge.

Fit the front gear under C3 and drill some 4 mm holes for the 4 screws.

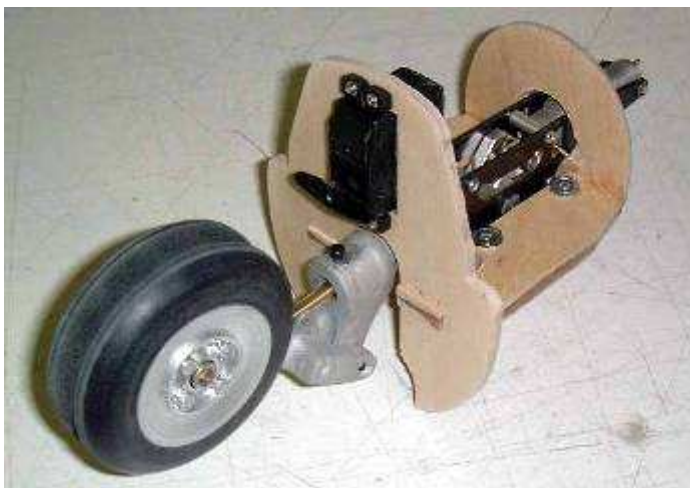
Remove the gear and insert 4x M3 blind nuts

Screw the gear on C4 with 4 M3x10 screws

Screw the steering servo on C2

Connect 2 x 50 cm air tubing to the gear

Connect servo to the steering arm (see pics and plan)



Insert all these parts in the nose

Check that the front wheel retract and extend without problem and the gear door close . Adjust position (forward or backward) if necessary

Fix them with CA

Epoxy all the bulkheads C1 and C2 in place

Cut some glassfibre tapes (30 mm large and 4 cm long).

Glue this tape with epoxy overlapping all the formers and the fuselage.



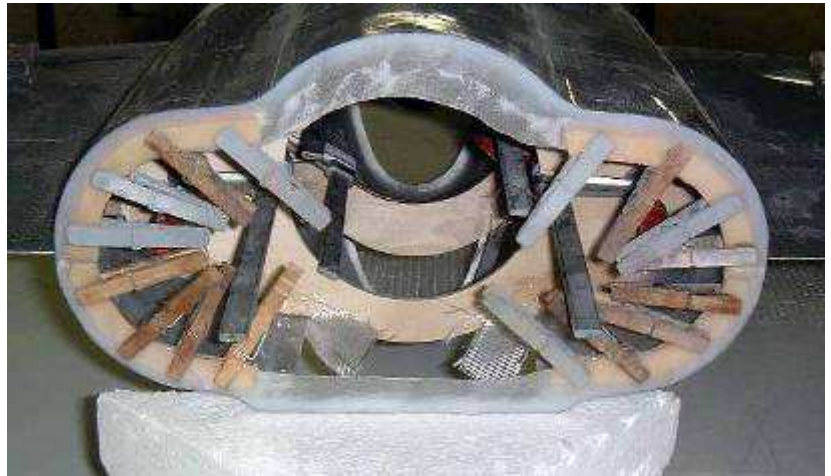
Cut the main gear doors according to the engraved panel lines (just the big one, see pic).

Glue the A16 / A17 plywood reinforcements inside the fuselage (back plate)

Put some clothes pegs all around the edge during drying.

Let them dry overnight.

Trim all the edge.

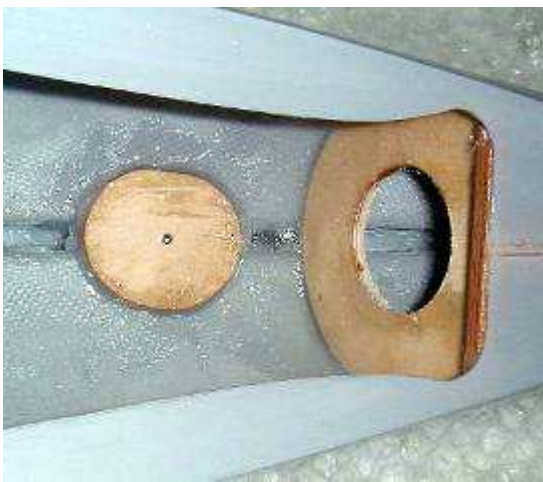
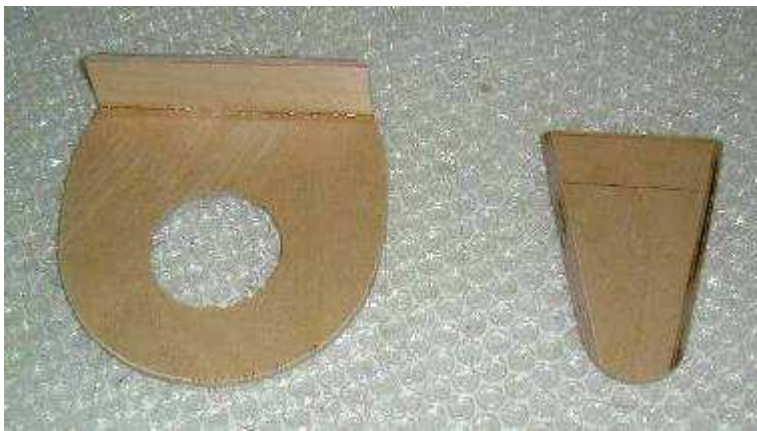


Rear Fuselage

Glue the A16 / A17 plywood reinforcements inside the fuselage (back plate)

Put some clothes pegs all around the edge during drying.
Let them dry overnight.
Trim all the edge.

Cut access to the rear frame according to the drawing and pic



Glue A20 on A21 with CA

Insert A20/A21 and A25 tailwheel support in the fuselage and glue them in position according to the plan.

Glue with epoxy A23 and insert and glue A22

Epoxy all the bulkheads

Cut some glassfibre tapes (30 mm large and 4 cm long).
Glue this tape with epoxy overlapping all the formers.

Assemble the front and rear fuselage

Assemble the 2 parts, hold them with tape or small screw clamps inside the fuselage.

Drill 4 x 3 mm diameter hole in the 4 corners in A16 and A17

Desassemble the 2 parts.

Increase diameter hole to 4 mm in the rear parts and insert blind nuts.

Inlets

Cut in the fuselage the air intake position.

Trim the air intake leading eadge so that you have about 2 to 3 mm of thickness for the edge

Insert the 2 air tanks (gear and brakes) in the wing root leading edge. Connect a 30 cm long air tubing on each bottle. Hold the bottles with double side tape. It will be impossible to have an access to them later.



Prepare some epoxy with micoballon.
Apply some epoxy in the fuselage in the air intakes

Insert the 2 air intake ductings in the fuselage.
Glue the leading edge with epoxy and microballon
Glue also the rear of the ducting to the air intake
Put some clothes pegs all around the intake leading eadge during drying.
Let them dry overnight.
Trim all the leading edge, sand the edge to have a radius.



Depending of the turbine, it could be possible to cut also the ducting inside the fuselage for the electric starter location or the intake of the turbine

Main Gear door

Cut the gear door according to the engraved panel lines.
First, cut just one side of the door
Glue the 2 door hinges (position according to the plan and pics).Finish to cut the gear door.

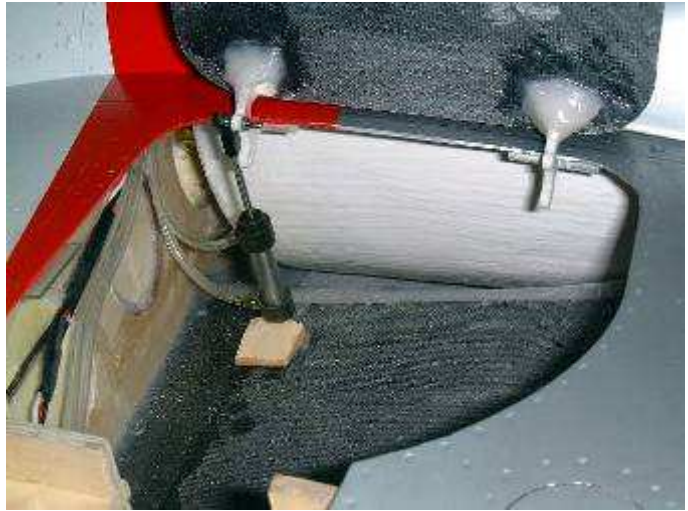


Drill a 2 mm hole in the front door hinge (see pic for position)
Screw the steel ball link on the hinge

Screw the ball link plastic end to the 1'' air cylinder
Screw the air cylinder on a obechi block with the parker screw

Extend the air cylinder
Fit the plastic ball link on the metal ball.

Glue with CA the obechi wood block in the fuselage to have gear door closed when cylinder is closed
Check that it open and close without problem



Front gear door :

Drill a 2 mm hole in the front door hinge (see pic for position)

Screw the steel ball link on the hinge
Screw the ball link plastic end to the 1'' air cylinder
Extend the air cylinder
Fit the plastic ball link on the metal ball.

Screw the air cylinder with the parker screw on C2 to have gear door closed when cylinder is closed

Check that it open and close without problem



Landing Gear :

Fit the main retracts unit in the wings. Screw them with M4 x 20 screws.
Fit the wheels on the gear.

Retract and extend the legs to check that the wheels fit well in the fuselage and wings.

You have now to connect all the gear, door and brake tubing.

The gear and gear doors servos should be 2 x 1 kg.cm servo

Kevlar Fuel Tanks :

You will now have to install the 2 fuel tanks and the smoker tank in the fuselage before to continue the assembly.

The keval fuel tanks are pre build.
Connect the tubing and clunk.
Check that the clunk can move freely.

You have now to check that your fuel tanks have no leaks.
Fill them fully with kerosen and let them during 1 hour full of fuel.
Check **carefully** that your fuel tanks have no leaks.

It will be very difficult later to repair them.
Remove the fuel from the tanks

Insert the smoker tank in the fuselage.
Insert the 2 kevlar fuel tanks.
Secure them with silcon glue

Insert the A14 plywood spar between A10 and A12.

Glue A14 with epoxy
Glue some glassfiber tape with epoxy overlapping the formers.



Double walled twin exhaust pipe :

Cut in the fuselage the 2 exhausts with Dremel and Perma Grit tools
Send the edge so that the thickness is as small as possible.

Cut with diamond disk the 2 exhausts fairing.

Insert the twin exhaust pipe in the fuselage and trim all resine excess so that the exhaust pipe can exit few millimeter from the fuselage.

If necessary, cut few millimeter of the fuselage exhaust to increase the diameter for the pipe.

Hold the front of the pipe with the 2 A18 frame.

Screw A18 against A 17 and A16 with 4 parker screws 3x10

Check that the pipe is in the middle of the fuselage. You an also check that your turbine fit just in front of the pipe (assemble the fuselage).

Slide between the fuselage and the pipe exhaust the 2 aluminium plate fairings.





If everything fit perfect, it is now time to glue all the parts with high temperature silicone glue

Remove the frame and pipe and insert some silicone glue in the fuselage. Slide the pipe, hold it in position with A18 frame
Glue and slide the 2 aluminium cover plate between the fuselage and the exhaust

Hold the plate in position with a small balsa stick (170 mm long exactly) slide in the fuselage between the 2 aluminium plates



Glue with high temperature glue the front of the pipe on the 2 A18 frame.

Let it dry overnight. Trim the silicone excess.

Insert, cut and glue with CA the bakelite tube between A17 and A20.
This tube will protect stabs wirings from the exhaust heat.

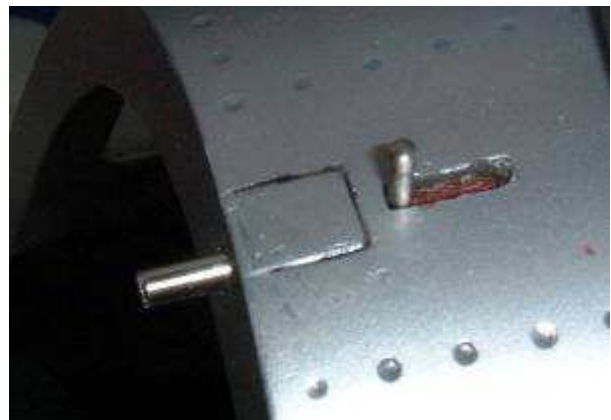
Wing tip tanks :

Fit the wing tip tanks on the wing tip wings. Glue them with silicone glue

Engine hatch

Trim all the hatch corners.
Keep a 10 mm step all around the hatch.

Glue 2 wood hatch pins with CA.
Glue the hatch latch in the fuselage and drill the corresponding hole in the hatch.



Radio hatch

Trim all the hatch corners.
Keep a 10 mm step all around the hatch.

Glue the 2 hatch latches in the hatch and drill the corresponding holes in the fuselage.

CANOPY :

Cut all the canopy location in the fuselage and hatches with a Dremel tool and diamond disk.

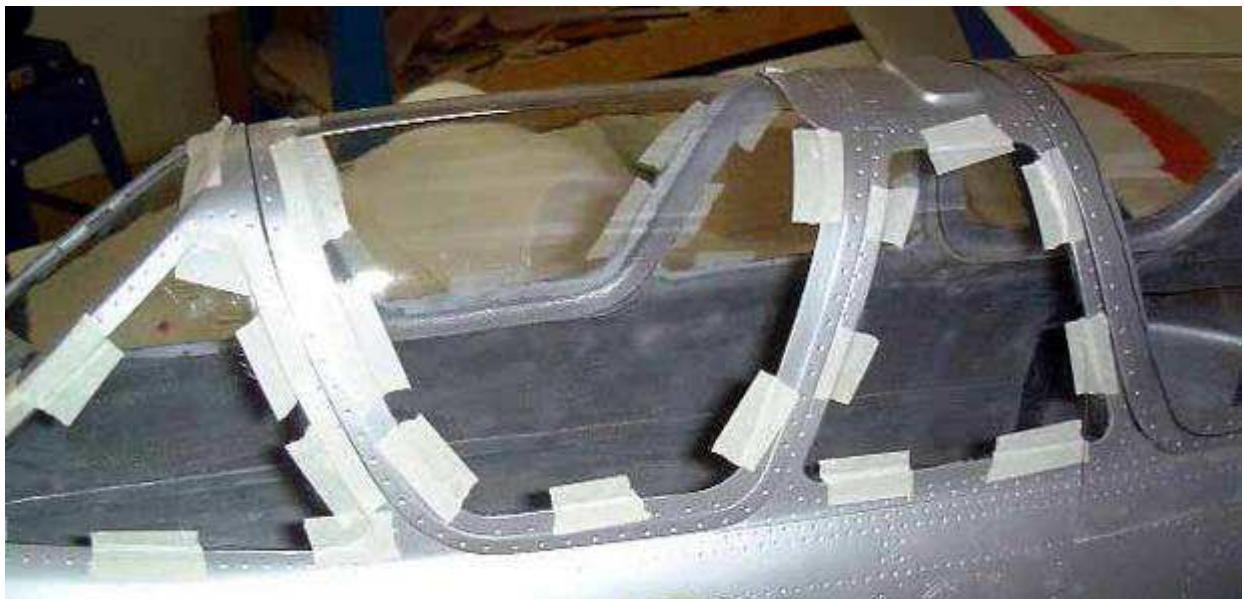
Cut the clear canopy few milimeter bigger that the normal canopy.

Fit the glear canopy **INSIDE** the fuselage and hatch.

Hold them with tape outside

Slide some Zap canopy glue inside between the fuselage and the canopy

Let it dry overnight.



Front canopy hinges:

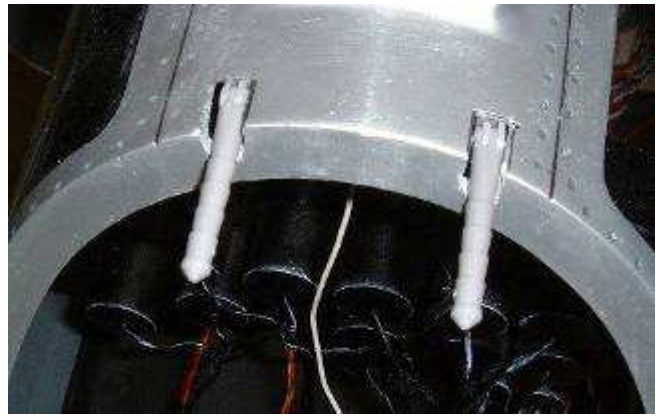
Cut the hinge positions in the fuselage (see pic and engraved position)



Glue the robart hinge with epoxy in the fuselage.

Drill a 5 mm hole for the Robart hinges
Insert the hinges in the canopy frame and glue them with epoxy

Glue the hatch latch in the front fuselage and drill the corresponding hole in the canopy frame.



Rear canopy :

Cut the hinge positions in the fuselage (see pic and engraved position)

Glue the robart hinge with epoxy in the fuselage.

Drill a 5 mm hole for the Robart hinges
Insert the hinges in the canopy frame and glue them with epoxy

Drill a hole through the frame and the fuselage and insert a parker screw to hold the rear canopy frame closed.



For both canopy, insert and glue on both side a 2 mm aluminium pin (10 mm long).

This pin is designed so the canopy can not open in flight (both parts draw aside) due to the negative pressure on the canopy

Drill the corresponding hole in the fuselage so the canopy can be freely open by hand with the latch .

Tailwheel



Cockpit

Glue the plywood cockpit floor in the fuselage

Instrument panel :

Paint the instrument panel in black.
Glue the clear ABS under the instrument panel
Glue the instrument decal under the ABS
Glue a carton under the instrument decal
Cut the bakelite tube in 20 mm long pieces.
Glue the tube in front of the instrument
Glue a ABS part, 20 mm large on the top of the instrument panel



Glue the instrument panel in the fuselage according to the plan
Cut the vaccum part according to the photo

Glue the plastic parts on the vacuum parts according to the photos.



Seats

Cut the ABS part according to pic.
Glue the resin parts on both side
Glue a 30 mm height balsa block under the rear seat and a 20 mm height balsa block under the front seat
Paint it in brown



Fit the seat in the middle of the cockpit



Pilot :

Paint the 2 pilots

Fit the helmet and oxygen mask on them.

Fit pilot in the cockpit

Hold pilot in place with elastic rubber band.



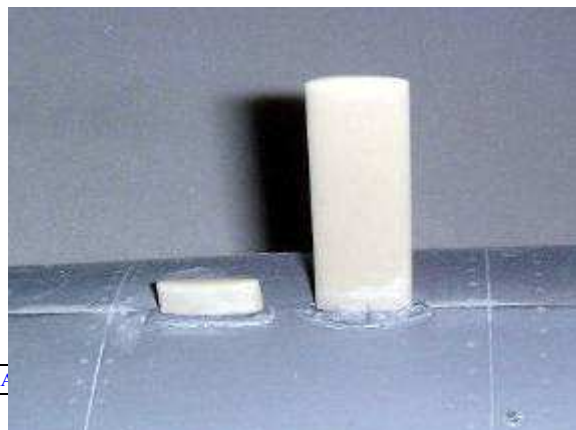
Detail set :

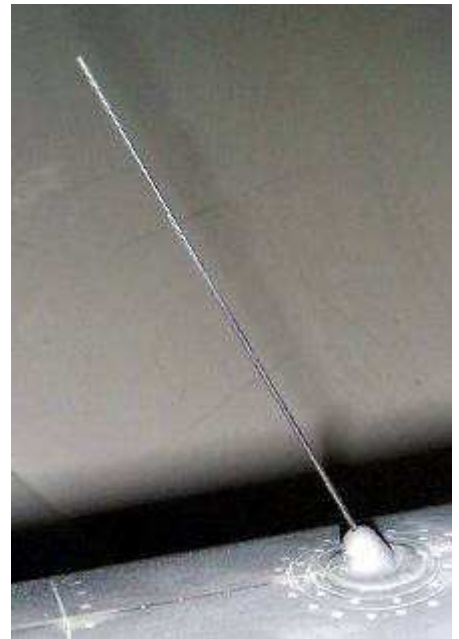
Cut the vaccum part according to the photo

Glue vaccum parts and resine parts according to pics



For all the resin parts and aluminium horns, drill first a 2 mm hole in the middle and glue a small piece of M2 threaded rod inside. Drill a 2 mm hole in the fuselage before to glue them. You can add some epoxy on the rod inside the fuselage so the parts can be removed





Air scoops

Glue all air scoops. Drill the corresponding hole in the fuselage for cooling.



Engine installation.

Screw the engine on A14 with



Air brakes

Insert the M2 x 20 screw in all the 12 small 2 mm hole



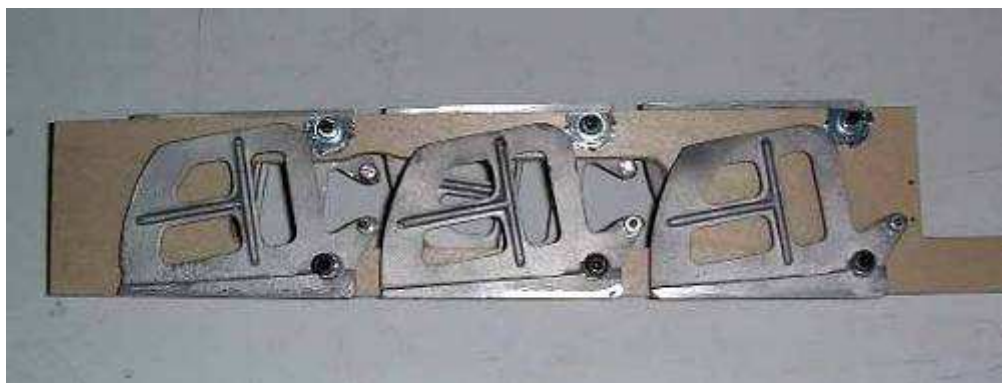
Screw **ONLY** 3 air brakes with M3 x 20 screw.



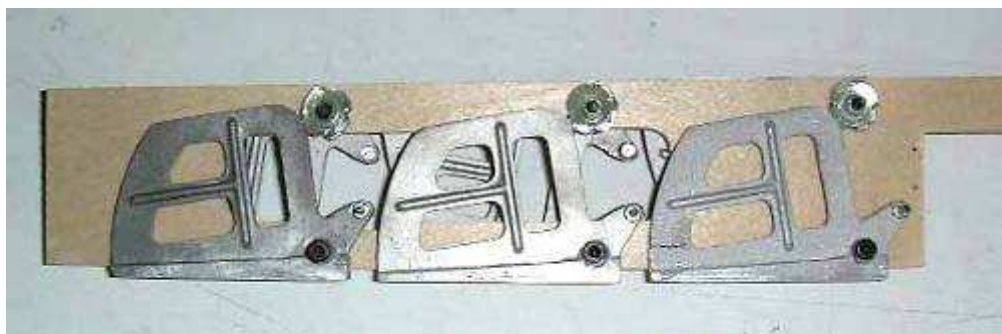
Insert 3 blind nuts on the opposite side as the pic



Screw **ONLY** 3 air brakes with M3 x 20 screw on the opposite side.



Insert 3 blind nuts on the opposite side as the pic Glue all blind nuts with quick epoxy



Prepare all linkage as the pic and plan attach in the manual



Install the linkage on the screws. Adjust the length of each ball link so that the air brakes are perfectly flat on a table (see pic) Connect both side in the same manner

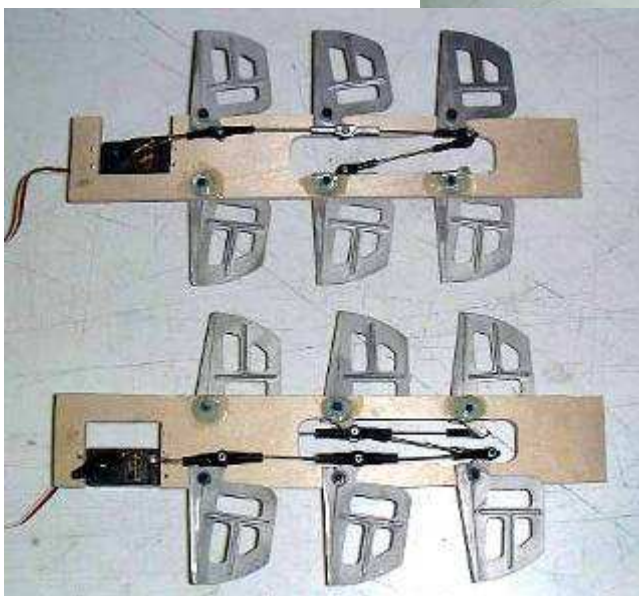


Connect the 2 side together with ball link.

Adjust the length so the 2 sides extends and retracts in the same time

Assemble the second air brake in the symetrique way

Connect the servo on one side arm on the first air brake, and on the opposite arm for the second air brake, so that when you connect the 2 servos with a Y lead, both airbrakes extend together.



Installation in the wings

Cut UNDER the wing (lower surface) the access hatch according to drawing and pic

Cut on the upper surface only the slots for the air brakes

Fit the air brakes system in the wing from the wing root.

It can be necessary to increase a little bit the wing root hole size to fit the system (servo size)

Adjust the exact position of the air brakes so that they can open and close freely without any problem.

Glue the plywood plate with CA inside the wing

Cut the slot for the air brakes in the epoxy cover plate

Cut the cover plate location in the lower skin of the wings according to the engraved panel line.

Just cut the first fiber layer and remove the fiber layer. Sand a little bit the balsa so the cover can take place in the wing

Glue the cover plate on the lower surface with CA.

Check that the air brakes can open and close freely without any problem.

If necessary, increase the slot in the upper or lower surface with a small file



FINISHING TIPS

Now you have to remove the wax from all the parts to paint.

The best way to do this is to sand all the surfaces with a "scotch brit" scouring pad used to wash up the crockery

All the parts can also be sanded with #400 grit paper to remove wax.

Do not apply primer on the fuselage, wings and fins.

They must be directly painted.

Think light : excessive paint build-up will add unnecessary weight to the model. Apply light, thin coats of paint and sand between coats to avoid excess weight.

Radio, ECU, batterie, tubing... installation :

Connect all the engine tubing to the fuel pump.

Connect the fuel pump to the fuel tank.

Connect all the engine connector the the ECU.

Connect all the retract tubing according the manual to the air valve.

Connect all radio wire

Fit the radio and ECU close to the cockpit

Fit the ECU batterie and radio batteries as forward as possible

Secure all the screw with threaded lock.



RADIO

The Fouga Magister needs very good servos :

For the 2 ailerons, we recommend to use 2 servos with metallic gears : 9 kg torque

For the 2 stabs, we recommend to use 2 servos with metallic gears : 9 kg torque

NG steering : 1 servo 4 kg torque

Air brakes : 2 servos 3 kg torque

Retracts + gear doors : 2 micro servos 1 kg torque or 2 electro valve

