

FOUGA ZEPHYR CM175



Version 1.1

*Flight Simulator 2004
(FS9)*

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<http://restauravia.com/>

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1 - THE FOUGA ZEPHYR AIRCRAFT :

11 - History :

Not as famous as his "grand-brother", the Fouga Magister aircraft (*), the Fouga Zephyr is the naval version of the Fouga.

At the beginning of the fifties, the French Navy managers, searching a national way for training their pilots, were very interested by the Fouga program in progress for the French Air Force. An adapted version for the Navy specifications was built and on 1956 July 31, the first Fouga CM170M prototype, named "Esquif", made its first flight. A purchase of 30 aircrafts was notified and the delivery was spaced between 1959 and 1961. This was the single purchase order of this aircraft version, renamed CM175 "Zephyr" in accordance with other French Navy aircrafts at this time (Aquilon, Alize) using winds' names. Moreover the Fouga Zephyr was used by the French Navy, mainly with the Foch and the Clemenceau carriers. During more than thirty years, the Zephyr has shown its reliability and robustness qualities under severe use conditions

An aerobatic team flying Zephyr was created in 1961 by the French Navy (see annexe 2)

12 - General characteristics :

Special feature of the airframe includes a 110° angle butterfly tail

Wingspan: 12,15m

Length: 10,20m

Height: 2,90m

Seemingly very similar to the Fouga Magister aircraft, the Zephyr is however characterized by important transformations. Essentially:

- airframe reinforcements
- reinforced landing gear including a special function for "over-inflate" nose gear shock absorber
- sliding canopies to authorize catapult launching and landing with opened canopies
- tail hook and devices for handing during the catapult launching
- angle of attack indicator (BIP) for an accurate carrier landing control

The Fouga Zephyr has two Marbore II engines

Maximum mass to catapult 3450 kg

Maximum thrust (sea level) 400 daN(x2)

Maximum RPM 22600 rpm

(*) the Fouga Magister for FS9 is also available on the Restauravia internet site

2 - THE FLIGHT SIMULATOR MODEL:

The Fouga Zephyr is presented in two configurations:

- "solo" configuration with one pilot
- "dual control" configuration, i.e. with two pilots on board, This model is piloted from the rear seat

Several differences between the real plane and these models were introduced to make its use easier for the virtual pilot:

- the nose gear wheel is steerable while the real Fouga was driven on ground with brakes
- a GPS, a VOR/DME and an automatic pilot are introduced in both models
- several supplementary lights are placed on the panel to ease virtual flying (flaps, landing gear, airbrakes)

Flight Simulator 2004 (FS9) installation:

First step:

To simulate catapult launchings and carrier landings, you must have a specific addon. Choose one of these two options:

Option 1:

By default, the model uses "rcbo-20" gauge by Rob Barendregt and Douglas S. Dawson to simulate the catapult launchings and carrier landings. This addon is available on major simulation sites (freeware) (rcbo-20.zip).

Once this addon is installed, you can use the Zephyr without specific settings.

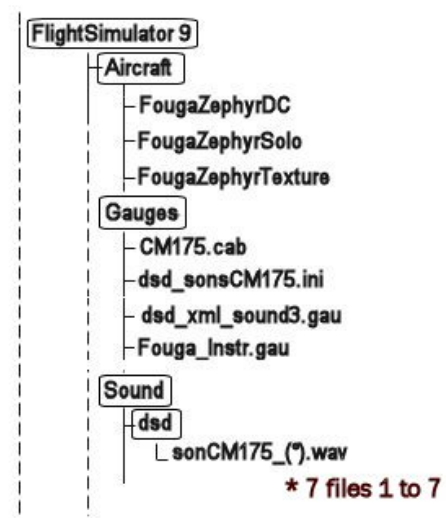
Option 2:

If you are a Richard Hogen ArrestorCables user, you must replace some files contained in each "aircraft" folder of each Zephyr's version by those included in the folder named "Pour utiliser ArrestorCables" of the archive you downloaded.

Second step:

- Unzip the archive in a temporary folder
- Place the contents of the different folders in the related FS9 folders so as to obtain the configuration illustrated here:

(don't modify folders names !)



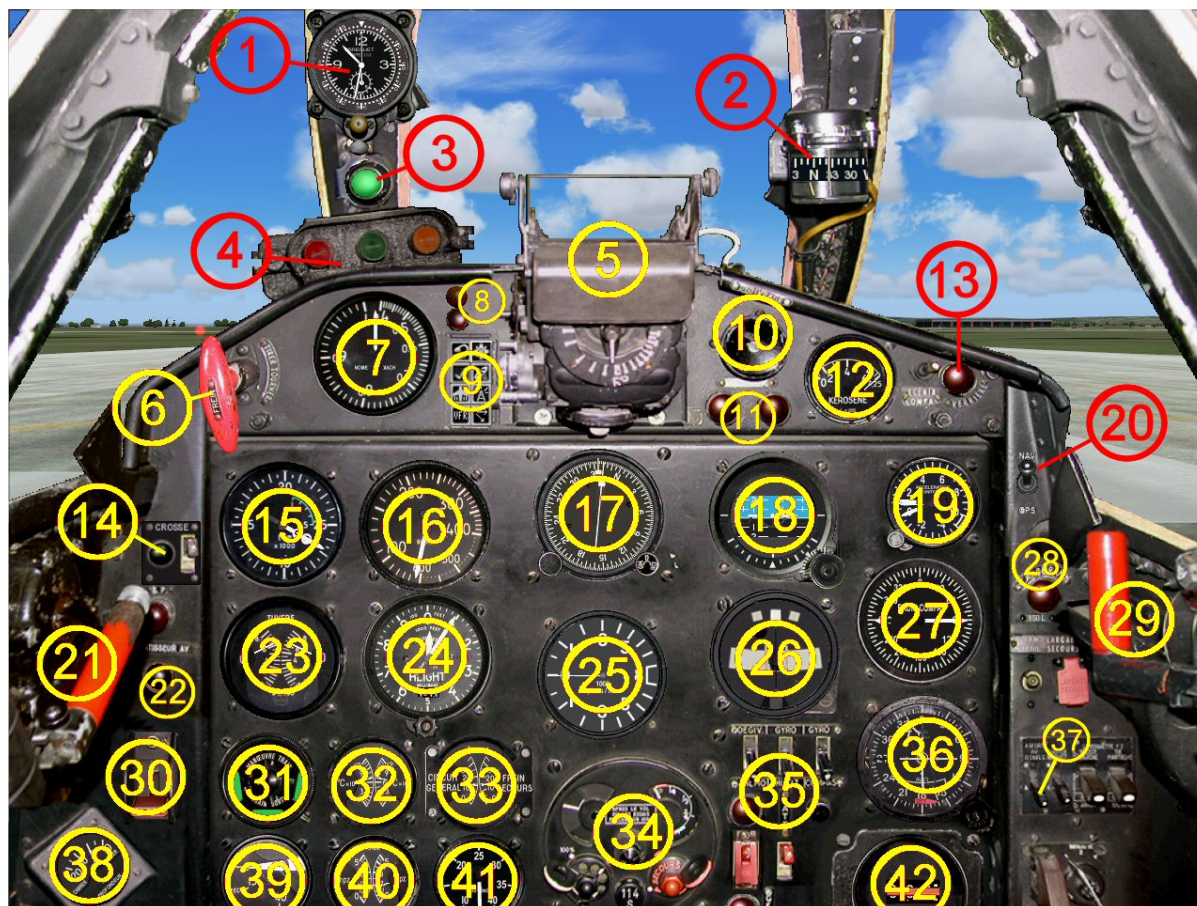
Third step:

The model does not include any specific sound folder (by default, the FS sound Lear45 is used). I strongly recommend to use Fouga sound effects from Mike Hambly (available in the Fouga package "foufinn1.zip" designed by Kari Virtanen and Miko Maliniemi). This package is available on major simulation sites (flightsim.com avsim.com simviation.com.....)

In FS9 aircraft selection screen, the Fouga Zephyr is placed into "Potez-AirFouga" manufacturer's list.

3 - COMMANDS AND EQUIPEMENTS :

31 - Front panel (solo model - panel 2D or virtual cockpit mode):



- 1 - Clock
- 2 - Compass
- 3 - Landing gear position indicator (*)
- 4- Angle of attack indicator (BIP) (***)
- 5 - Gunsight (**)
- 6 - Parking brake
- 7 - Machmeter
- 8 - Flaps and airbrake lights (*)
- 9 - Simicons (*) (***)
- 10 - Click here for PA display/hide (*) (***)
- 11 - Engine fire warning
- 12 - Fuel tank gauge
- 13 - Canopy unlock warning
- 14- Tail hook switch and light
- 15 - Engine tachymeter
- 16 - Airspeed indicator
- 17 - Gyro-compass
- 18 - Attitude indicator
- 19 - G meter
- 20 - NAV-GPS switch(*)
- 21 - Canopy open/close
- 22 - Nose gear over inflate shock absorber indicator
- 23- Exhaust temperatures (EGT or T4)
- 24- Altimeter
- 25- Vertical speed indicator
- 26- Turn indicator
- 27- ADF indicator
- 28- Low level warning or low pressure warning
- 29- Canopy ejection
- 30- Landing gear lever
- 31- Landing gear lights
- 32- Engine oil temperature
- 33- Hydraulic pressures
- 34- Oxygen regulator (**)
- 35- Electric panel (***)
- 36- VOR/ILS indicator (*)
- 37- Over inflate nose shock absorber indicator
- 38- Pitch trim tab indicator
- 39- Flaps indicator
- 40 - Engine oil pressure
- 41- Cabin altitude pressure
- 42- DME (*)

(*) model specific

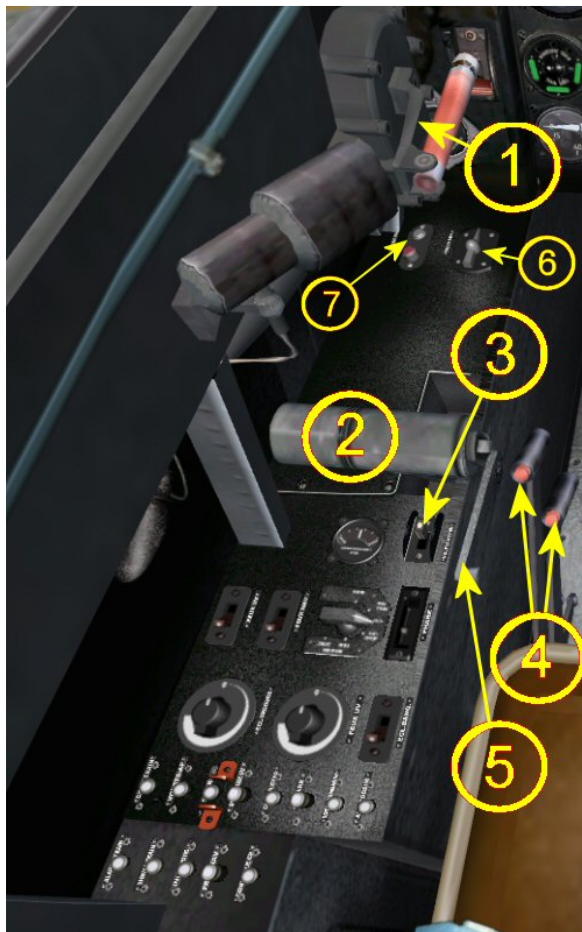
(**) non functional

(***) for details see below

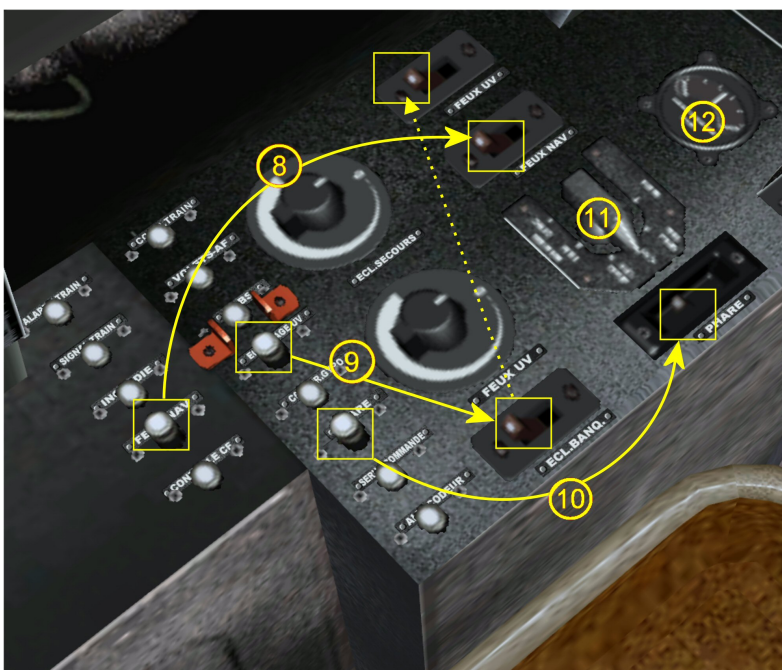
The BIP (number 4) (initials issued of the names of its inventors: Badin - Idrac and Périneau) allows a better approach before landing with an accurate control of the angle of attack. The optimum angle is obtained when the green light is on.

(see annexe 1 for more complete information about catapult launching and landing)

32 - Left console (solo model - virtual cockpit mode) :



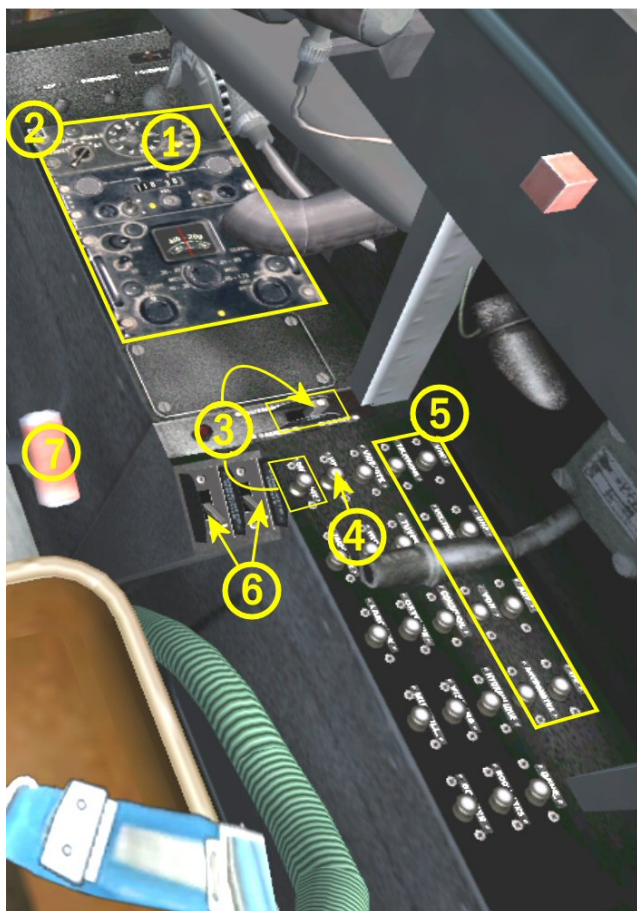
- 1 - Canopy open/close
- 2 - Throttle levers
- 3 - Flaps switch
- 4 - Fuel shut-off levers
- 5 - Throttle torque setting (*)
- 6 - Normal/emergency gear selector (*)
- 7 - Emergency brake selector (*)
- 8 - NAV lights switch
- 9 - Panel light switch
- 10 - Landing/taxi light switch
- 11 - Air conditioning selector (*)
- 12 - Air conditioning indicator (*)



(*) non functional

Breakers which are not named are non functional. They remain in ON position

33 - Right console (solo model - virtual cockpit mode) :



- 1 - Radios (except IFF/Transponder)
For a better reading, it is preferable to open the
radios window (simicon 2 or radios simicon on
the main panel)
- 2 - Radios simicon
- 3 - Starter (breaker + selector right/left)
- 4 - Fuel pump
- 5 - Radios and instruments breakers
- 6 - Dump valves switches (*)
- 7 - Manual emergency pump (*)

(*) non functional

34 - Forward central console (solo model - virtual cockpit mode) :



- 1- Voltmeter
- 2- Pedals position adjuster (*)
- 3- IFF/Transponder (usable by radios panel
§ 36)

35 - Rear cockpit (DC model only - virtual cockpit mode):

The rear cockpit, only visible with DC model and virtual cockpit mode, has the major part of the controls and instruments of the front cockpit. However, on the real airplane, all the commands are not available from the rear seat and the flight control requires front pilot actions. To make possible a complete flight from the rear seat in the model, a "pop up window" is available with essential controls and instruments. Clicking on a shoulder of the front pilot activates this view.

Because of a reduced visibility, the rear seat cockpit of the Fouga is equipped with a periscope. Click on the eye glasses to activate the periscope view and on the bottom of this view to return to the previous view.

36 - Others windows (all models) :

- Other windows selection simicons :

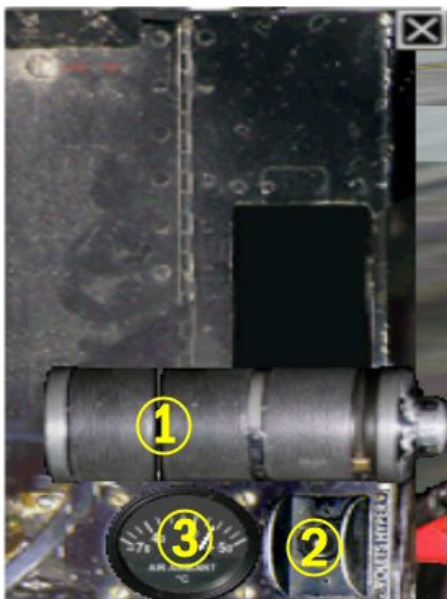


- 1 - ATC window
- 2 - Map
- 3 - Tablet
- 4 - GPS (*)
- 5 - Left console
- 6 - Radios
- 7 - VFR/IFR selection (**)
- 8 - Landing view (**)

(*) model specific

(**) 2D panel only

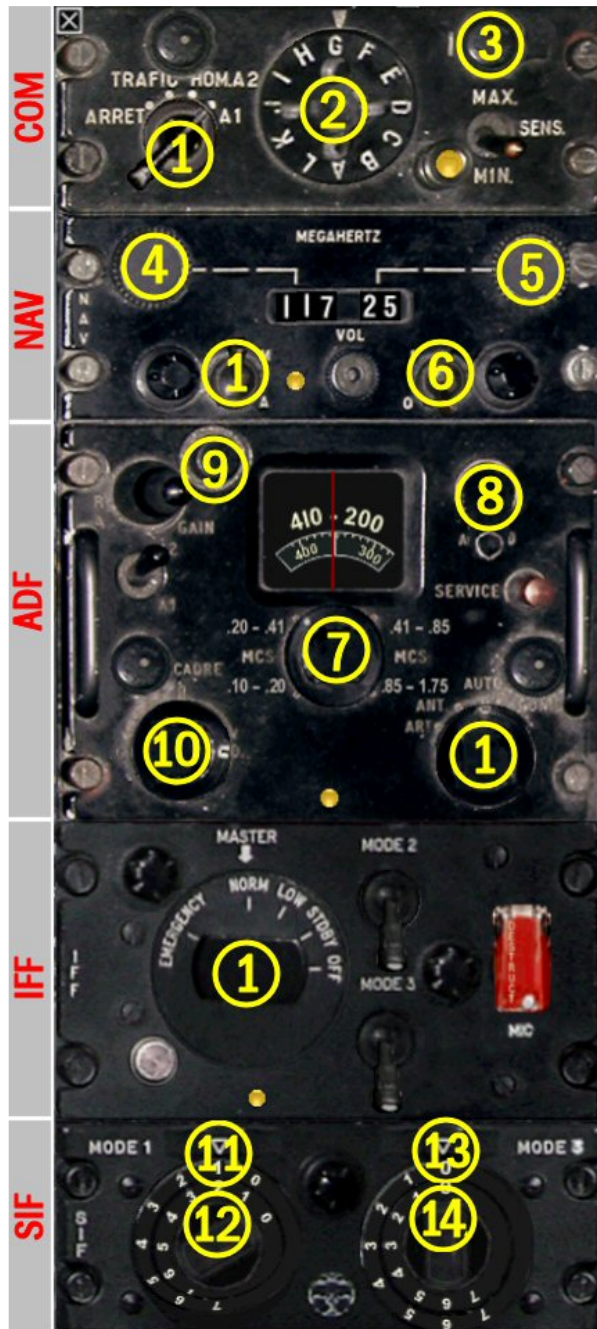
- Left console:



- 1- Throttle levers
- 2- Exterior temperature (*)
- 3- Flaps switch

(*) model specific

- Radios panel :



1 - ON/OFF switch

COM

2 - Frequency setting

Left click +/- 25Khz

Right click +/- 1Mhz

3 - Selected frequency display (3 seconds)

NAV

4 - Frequency setting +/- 1Mhz

5 - Frequency setting +/- 25 khz

6 - Tune switch

ADF

7 - Band selector

8 - Frequency setting

9 - Selected frequency display (3 seconds)

10 - Tune switch

IFF/Transponder

11 - Code setting +/- 1000

12 - Code setting +/- 100

13 - Code setting +/- 10

14 - Code setting +/- 1

- Automatic pilot :

The Fouga had no automatic pilot. This option is added to keep model's use easier.
To see the autopilot window:

- solo model: look at "front panel" (page 5) number 10
- DC model: on the panel, click on "dégivrage" (de-icing button in the real plane)



- 1 - ON/OFF switch
- 2 - Altitude control
- 3 - VOR navigation control
- 4 - Heading control
- 5 - Yaw damper
- 6 - Heading setting +/-
- 7 - Radial setting +/-

- Catapult launching and carrier landing:

Option 1:

By default, the model uses "rcbo-20" gauge by Rob Barendregt and Douglas S. Dawson to simulate the catapult launchings and carrier landings.

- Catapult launching:
 - select the carrier (1)
 - adjust the speed (2) to 90 kts
 - pull the parking brake and apply "full throttle"
 - when the engines speed is stable, arm the catapult with (3)
 - to release the catapult push the parking brake



- Carrier landing:
 - lower the tail hook using the switch (14) of the main panel (see §31) or (4) above
 - control the approach using the BIP (3.1 page6)
 - you can use the meatball with (4) (model specific)

Option 2:

If you are a Richard Hogen ArrestorCables user, refer to this addon's manual to make catapult launchings and carrier landings. Note that, in fact of the relatively light mass of the Zephyr, it is recommended to set the "options" to:

- terminal speed 90kts
- acceleration 350
- deceleration -200

IMPORTANT: To play correctly catapult launchings and carrier landings, it is essential to read the documentation of your carrier's operation gauge and the procedure of the annexe 1

4 - THE AIRCRAFT CARRIER OPERATIONS WITH FS9:

Usually, the Fouga Zephyr operated from the following French Navy carriers in use at this time:

- Arromanches when modernized
- Clémenceau and Foch

Currently, there are no carrier models for FS9 in fully accordance with these boats. However, many carrier models available from internet sites are very appropriate for this use. For example, you can find very fine french aircraft carriers realizations by Joël Maillot here: <http://joel.maillot.free.fr/>

In order to simulate perfectly the conditions met during the catapult launching (carrier's speed + wind's speed), it is highly recommended to adjust the wind around 25 kts in the axis of the catapult launching heading

4- REFERENCES :

41- Bibliography :

"Le Fouga sous toutes ses couleurs "

By Ltcl Jean-Loup Rambeau, Eric Moreau and Patrick Audouin (ADDIM editor) (in french)

<http://d520.online.fr/livres/fouga/accueil.html>

A superb book, remarkably informing, very valuable for the design of this model

42 - Internet links :

- Fouga's informations :

You can find a lot of information about the Fouga on the net. A great part of the elements used to realize the model are coming from numerous excellent sites, in particular:

A site about the realizations of Robert Castello and Pierre Mauboussin whose cooperation was the beginning of the Fouga program. <http://pletav.free.fr/>

AirFouga <http://air.fouga.free.fr/>

Jets for ever <http://perso.orange.fr/jets.for.ever/>

Friends of "5° Escadre" (a French Airforce unit) <http://www.musee-a5e.com/>

"Conservatoire de l'Air et de l'Espace d'Aquitaine " (the preservation and promotion of our aeronautic and space heritage) <http://caea.free.fr/index.html>

- About the Zéphyr :

Informations on the Zephyr and on the carriers

<http://www.netmarine.net/>

History and characteristics of the Zephyr

http://frenchnavy.free.fr/aircraft/zephyr_fr.htm

A collection of photographs in detail of the Zephyr

http://www.master194.com/phto_avion/zephyr/index.htm

5 - THANKS :

First, I thank the members of the Restauravia team who are contributing to this work, particularly:

- Jean-Pierre Langer for his major work about the panels and gauges
- Marc Hardouin who realized the textures of this package and offers many other ones
(<http://virtua-aerodesign.net/>)
- Jean-Pierre Bougeois and Benoit Dubé who set the flight dynamics model and ground setting, so that the model works like a real Zephyr and also all persons which gave me information and documents about the Zephyr airplane.

A special thank to Claude Marie, a former French Navy pilot and Fouga Zephyr instructor, for his implication in this project and his always relevant advice for the better realism of the model. His substantial experience on flying the Fouga Zephyr was a real advantage for us. Another special thank to Joe Ruchala, a former US Navy fighter pilot and LSO who flew Zephyr for a few hours while in France (1964) to instruct french pilots how to fly the brand new Crusader. His work on rewriting this notice in correct English has been greatly appreciated.

Finally, I would like to address cordial thanks to Mr Ramon Josa and Mr Claude Séménadis who authorized us to approach the N° 28 Zéphyr (in flight status thanks to a motivated team) and take photographs which were very useful for us.

6 - LEGAL MENTIONS :

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VISIT RESTAURAVIA SITE



BRIEFING BEFORE YOUR FIRST CATAPULT LAUNCHING AND CARRIER LANDING:

by Claude Marie, a former French Navy pilot, Fouga Zephyr instructor

You are ending your tour at the 59S on Hyeres Navy base and, within the framework of your carrier landing qualification and before your appointment to an operational squadron, you are about to experience your first catapult launch in a Fouga Zephyr

Following the orders of the catapult officer, you are in place on the catapult. The flight deck technician has secured the catapult sling which will draw you forward and the hold back which will retain the airplane until it beaks under the catapult traction.



From now on, you should keep your eyes on the catapult officer who stands a few feet on your right side. Raising his green flag, he beckons to you to increase power.

At this time:

- you put your feet on the floor in order not to take the risk to apply the brakes during the catapult running
- you over-inflate the nose gear shock absorber
- you set the pitch trim tab to 3° up
- you check:
 - that the canopy is open
 - that your harness is tightened and locked
 - that your parachute is unhooked (chest and thighs)
 - that flaps are full down
 - that the BIP lights are functional
- You increase full power and you tighten the throttle lever
- You check:
 - N= 22600 rpm
 - T4 (or EGT) = about 600°C
 - Oil pressure = between 3 and 4.5 hpz
- You place your left hand behind the throttle lever
- You press your head on the head-rest



Then, the catapult officer lowers his green flag and, in the following two seconds, you are catapulted under a 5 g acceleration.

As soon as you are flying off of the ship you take control of the A/C (stick, rudder and throttle) and you enter the pattern under the orders of the Landing Ship Officer (LSO)

You climb, at 100 kts (i.e. BIP light amber), on the axis, up to 600', You keep the same configuration: gear down, full flaps, canopy open, parachute unhooked (to evacuate quickly the plane in the event of a ditch), harness tightened and locked

Stabilized at 600', you adjust throttle to fly between 90 et 95 kts (BIP green/amber). After one minute of flight on the catapult axis, you can turn down wind

When you are steady down wind, you trim your airplane so that it flies "free hands" without any altitude change. This is absolutely essential for keeping a stable attitude during the approach.

As part of the carrier qualification program, you will fly two approaches without lowering the tail hook or touching the deck. This is done in order to fix the ideal trajectory and to consume fuel to bring your aircraft down to the landing weight.



Your approach will consist in carrying out a turn which will lead you "in the groove" (about 200 m behind the ship on the oblique deck axis,). This turn will be detailed in four parts:

- the 180° position (600' at the end of the down wind leg - IAS=green/amber BIP). You start your turn while passing astern the ship, at a 30° bank. You ease back throttle so that you are "in the green of the BIP" and you loose about 50'.

- the 90° position (550' - IAS= green BIP). Remain 90° to go

- the 45° position (350' - IAS = green light - you just start seeing the optical landing system).

As soon as you identify the "meat ball" (the bright amber luminous point which indicates the correct glide slope) you would say: " Zephyr - ball - and your remaining fuel"

-- now you are "in the groove" when you arrive about 200 meters behind the ship and on the axis of the oblique runway. Your IAS is stable with green light on the BIP. Your attitude should be stable (if you correctly adjusted the pitch trim tab while flying down wind !); you keep on flying your approach towards the deck following "the meat ball" indications

During the two first approaches, you will wave off while arriving at the stern by applying full power and levelling off. After each "wave off", you climb back up to 600' staying on the axis during one minute then you turn left again toward down wind



After these two approaches, you may lower the tail hook. Respect scrupulously the previous instructions that you must memorize.

Remember!! at the very moment you touch the deck, you must apply full throttle until completely stopped. This procedure allows you to go around if you have missed the arresting wires (this is called a "bolter")

After 8 successful carrier landings, you will be declared "carrier landing qualified" by the LSO

THE FRENCH NAVY AEROBATIC TEAM



by Claude Marie, N°2 of the French Navy Aerobatic Team
(left wing man and solo)

Photos Pierre Delfour

The “Patrouille de voltige de la Marine” was established December 1961 by the Commanding Officer of the escadrille 59S at Hyeres (a Navy base in southern France). This squadron, in addition to basic flight training in the Fouga Zephyr , trained new pilots in both instrument flying procedures and carrier qualifications.



Seasoned pilots with more than 2000 flight hours in various aircraft were selected as members of this demo team and constituted the framework for the 59S instructors. The main purpose of this team was to further the training and improvement of team members rather than to be a competitor for the famous French Air Force “Patrouille de France”.

Indeed, the Zephyr, with two Marbore II engines delivered only 400kg of thrust each and unlike the Magister, was not equipped with power assisted controls. The Magister of the Patrouille de France not only had the power boosted ailerons but additional thrust of 100kg from each of its Marbore VI engines. This loss of additional thrust limited the Zephyr in performance especially in formation climbing manoeuvres. Not only were these aircrafts used for the aerobatic team but also for the flight training program. Initially the team was assigned four aircraft but later increased to six to further expand the team’s flight demonstrations.

The team took off with six aircraft in close formation (4 + 2 at 15 sec) climbing to 5200' minimum calculated altitude to commence the program manoeuvres. Due to the handicap of low thrust/weight ratio, the program was limited to classic maneuvers of wing-over, loops, barrel roll, lazy eight and the four leaf clover (a loop with a quarter of a roll while climbing).



During the program, the two outside wingmen would split off of the formation and conduct some low level crisscross manoeuvres. The remaining four aircraft would then perform classic figures in diamond, echelon and box formations. The finale was the star burst where the four aircraft would split off on the decent from their loop.

Depending on weather conditions, the aircraft would approach for landing either for a 300' peel off, a brake without interval at 1000' (fan brake) or in a diamond patrol landing.

The logo, a black wolf face on the sides of the fuselage with red flashes on the wing, was the creation of one of the team's pilots and painted with great enthusiasm



During its short existence, from December 1961 to December 1962, the aerobatic team performed 62 flights with about 10 of them before a public audience. This shortened existence was brought about by the introduction of the brand new F8E FN Crusader which all the teams pilots would eventually fly.

And fly they did!