
MIRAGE IIIB
For FSX Acceleration or Prepar3D
(depending on installed version)
Version 1.2
Restauravia
LFLC Clermont-Ferrand (France VFR)

1 History of MIRAGEIII 4

Presentation - Characteristics 4

2 The Restauravia team 5

3 The MirageIII project 6

4 Cockpits

General controls 9
Front cockpit: Main panel 10
Left console 11
Right console 12

Rear cockpit Main panel 13
Left console 14
Right console 15

Radio COM 16
TACAN 17
Radio compass ADF 18
Pilot helpers: Adhemar (AOA) - Auto pitch trim - Approach auto throttle 19
Drag chute - Ministop (ABS) 20

Ground Control Approach GCA 21

5 Supersonic flight / Specific characteristics of the Delta wing

Overview of delta wing 23
Subsonic flights / Supersonic flights 25
Transonic flight 26
Drag 27
Lift 28
Drag / speed relation 29

6 Flying the Mirage III in FSX

Angle of attack gauge (AOA): ADHEMAR 30
Limitations 31
Turbojet and Afterburner 32
Automatic pitch trim 33
Drag chute 33
Ministop (ABS) 34
Performance 35
Setting panel 36
Starting procedure 37
Climb 39
Cruise / Descent 41
Landing approach 42

Thanks 44


227
41
2-FP

1 HISTORY OF MIRAGEIII

The history of the Mirage III began in 1954 when the French Air Force was looking for a light interceptor. The MD550 was Dassault's response to this contest. However, the aircraft needed to evolve much more before becoming the Mirage III capable of Mach2 with the ATAR jet engine. The III C was the first really operational version.

Early in 1961, the Mirage III C began to be used by French fighter units.The export success made it a very important aircraft after the war. Its participation in the Six-Day War was essential for the victory of the State of Israel.

The Mirage III B was ordered by the French Air Force at the same time as the first 100 III C aircraft. It was necessary in order to transform future pilots in the best possible way, for the FAF and other AF.

The prototype Mirage III B 01 flew for the first time on October 20, 1959 at the hands of test pilot René BIGAND. 76 units of the Mirage III B of all versions were produced, including 56 for the French Air Force.

Characteristics and performance

Span : 8,22 m
Length: 15,30 m
Height : 4,30 m
Loaded weight : 8 400 kg
Max. takeoff weight : 12 000 kg
Powerplant: 1x Atar 9B , Dry thrust 4 250 kg,
Thrust with afterburner 6 000 kg

Armament: Guns: 2 x 30 mm (1.18 in) DEFA 552 cannons with 125 rounds each.
Missiles: 2 Matra R550 Magics

Maximum speed: 730 kt
Maximum Mach : M 2
Service ceiling: 18 000 m (59 000 ft)
Maximum ceiling: 23 600 m (78 000 ft)



2 - THE RESTAURAVIA TEAM



Restauravia is more than just a team: primarily, it's a group of friends who sometimes likes to be around (or in) real planes.

It is also an association, where members works on a voluntary basis

To create a realistic FS aircraft, and to approach reality, you must have the following:

3D modelers: André Chancel, Gilles Faulmeyer and Philippe Penot are masters in the difficult art of taming Gmax !

A 3D model isn't very nice without a texture to cover:
Marc Hardouin, also webmaster and Gilles Mercier are there with their brushes!

Panels with realistic gauges: JeanPierre Langer.

Sounds are important for a good immersion: Jean-Michel Renaux.

The very difficult exercise to make the connection between real flight dynamic to those in Flight Simulator can be trusted only to specialists: Jean-Pierre Bourgeois (The BeeGee !) and Benoit Dubé.

Finally, to validate it all, real test pilots are needed, pilots who flew in the real aircraft, Michel Panattoni (also a member of the Royale French Navy) and Darcy Vegas.

Many consultants, often real pilots, come also to give their opinion.

..... And of course, we don't forget Emmanuel Geffroy, founder of Restauravia since FS 98, who ceased operations in FS and has moved into another form of restoration, automotive more real than this !

3 - THE MIRAGEIIIB PROJECT :

Model 3D Gmax: Philippe Penot (exterior) André Chancel (virtual cockpit)

Textures : Philippe Penot (with the contribution of Marc Hardouin)

Sounds : Jean Michel Renaux

Flight dynamics : JeanPierre Bourgeois (BeeGee) with the contribution of Benoit Dubé

Technical advices and flight tests: Darcy Vegas and Michel Panattoni

English translation of this manual: Gilles Faulmeyer

Adapting navigation datas of French military airbases (*) : Michel Panattoni

(*) in cooperation with the French Royal Navy that this system uses the work

This model is the property of Restauravia. It is distributed as freeware on the Restauravia website. Any diffusion of this model, or part of the model, modified or not, by any means is prohibited.

However, texture diffusion is allowed on any site, provided that it is free of charge as a complement to the base model.

Depending on the version installed, the MirageIIIB can be used on FSX Acceleration or Prepar3D. The features are the same. For simplicity we will speak in this document of FSX but the instructions and comments can be transposed to Prepar3D.

The FSX model is developed for FSX Acceleration. Its use on FSX + SP2, although possible, will not restore all the features especially with regard to supersonic performance.

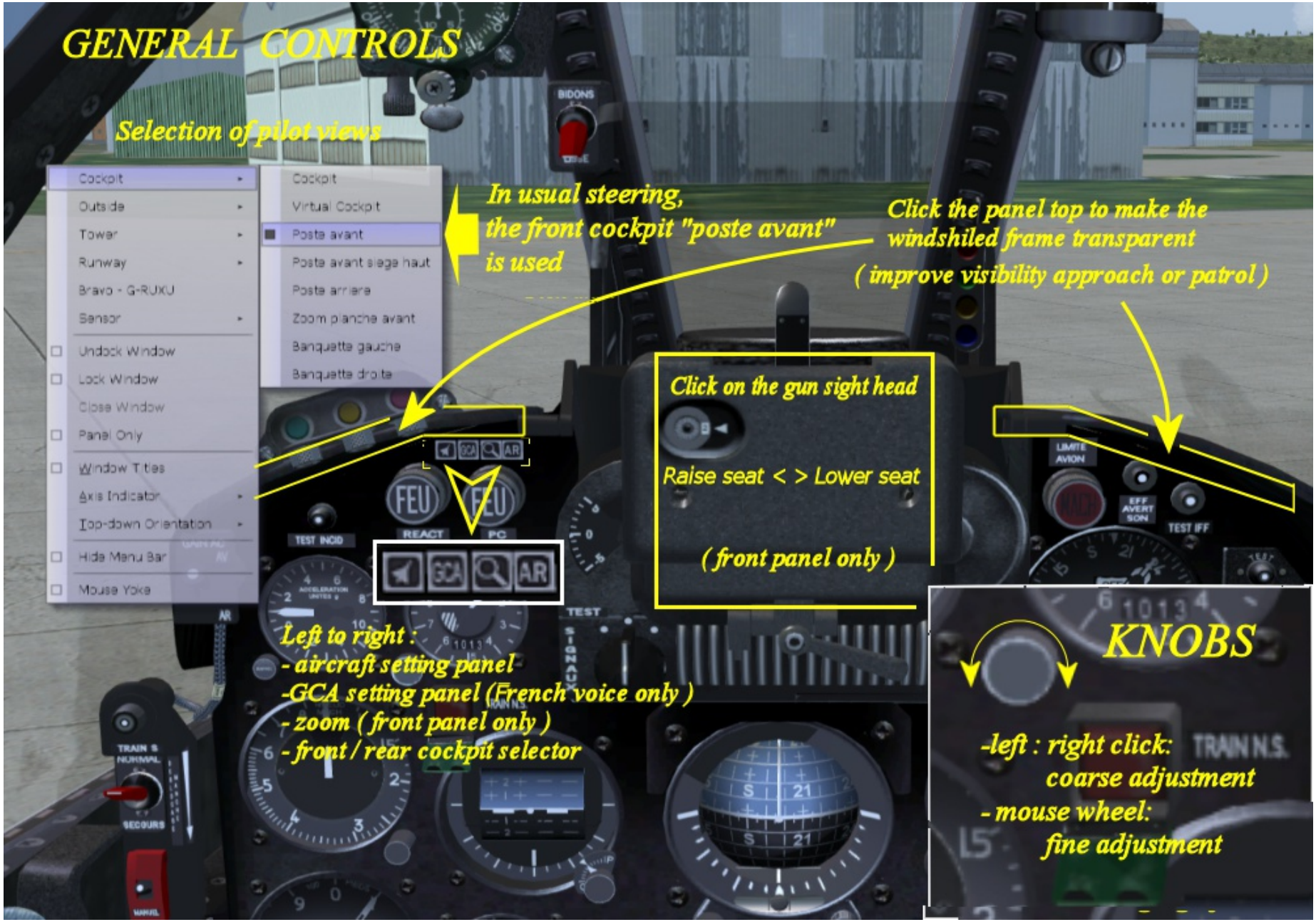
Pre-installation of FSUIPC (free or paid version) is required

If you have any problems in using the FSX MirageIIIB :

- See this documentation: The answer is probably here.
- Visit the forum Pilote Virtuel http://www.pilotevirtuel.com (French language) It speaks of MirageIII and you can find help. Or an English language forum (for instance SOH http://www.sim-outhouse.com/sohforums/forum.php)
- Last solution: contact us at : support@restauravia.fr

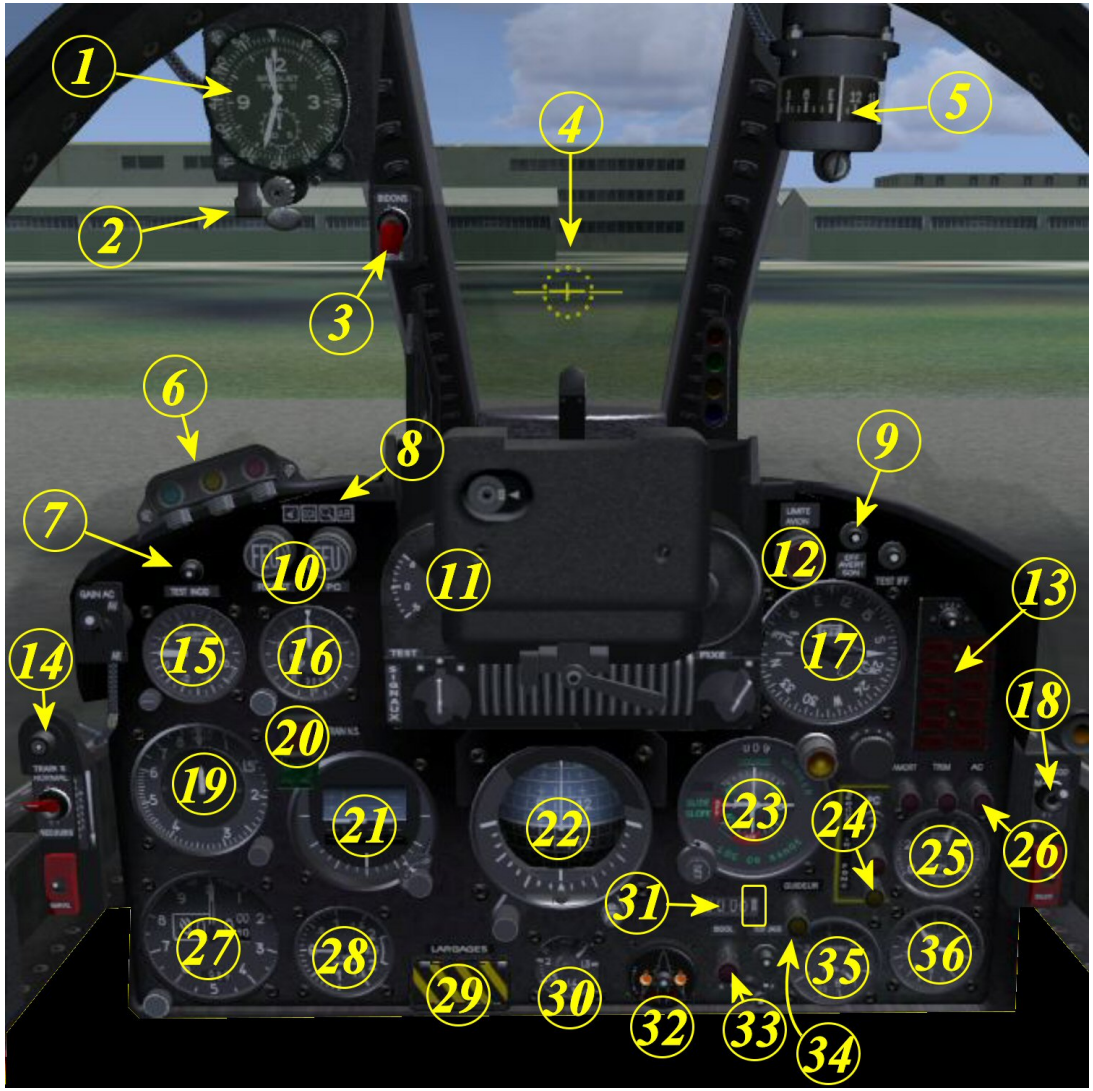

13PN

4 - COCKPITS :


GENERAL CONTROLS
Selection of pilot views
Cockpit
Outside
Tower
Runway
Bravo - G-RUXU
Sensor
Undock Window
Lock Window
Close Window
Panel Only
Window Titles
Axis Indicator
Top-down Orientation
Hide Menu Bar
Mouse Yoke
Cockpit
Virtual Cockpit
Poste avant
Poste avant siege haut
Poste arriere
Zoom planche avant
Banquette gauche
Banquette droite
In usual steering, the front cockpit "poste avant" is used
Click the panel top to make the windshiled frame transparent
(improve visibility approach or patrol)
Click on the gun sight head
Raise seat < > Lower seat
(front panel only)
Left to right :
- aircraft setting panel
-GCA setting panel (French voice only)
- zoom (front panel only)
- front / rear cockpit selector
KNOBS
-left : right click:
coarse adjustment
- mouse wheel:
fine adjustment

Front cockpit - Main panel

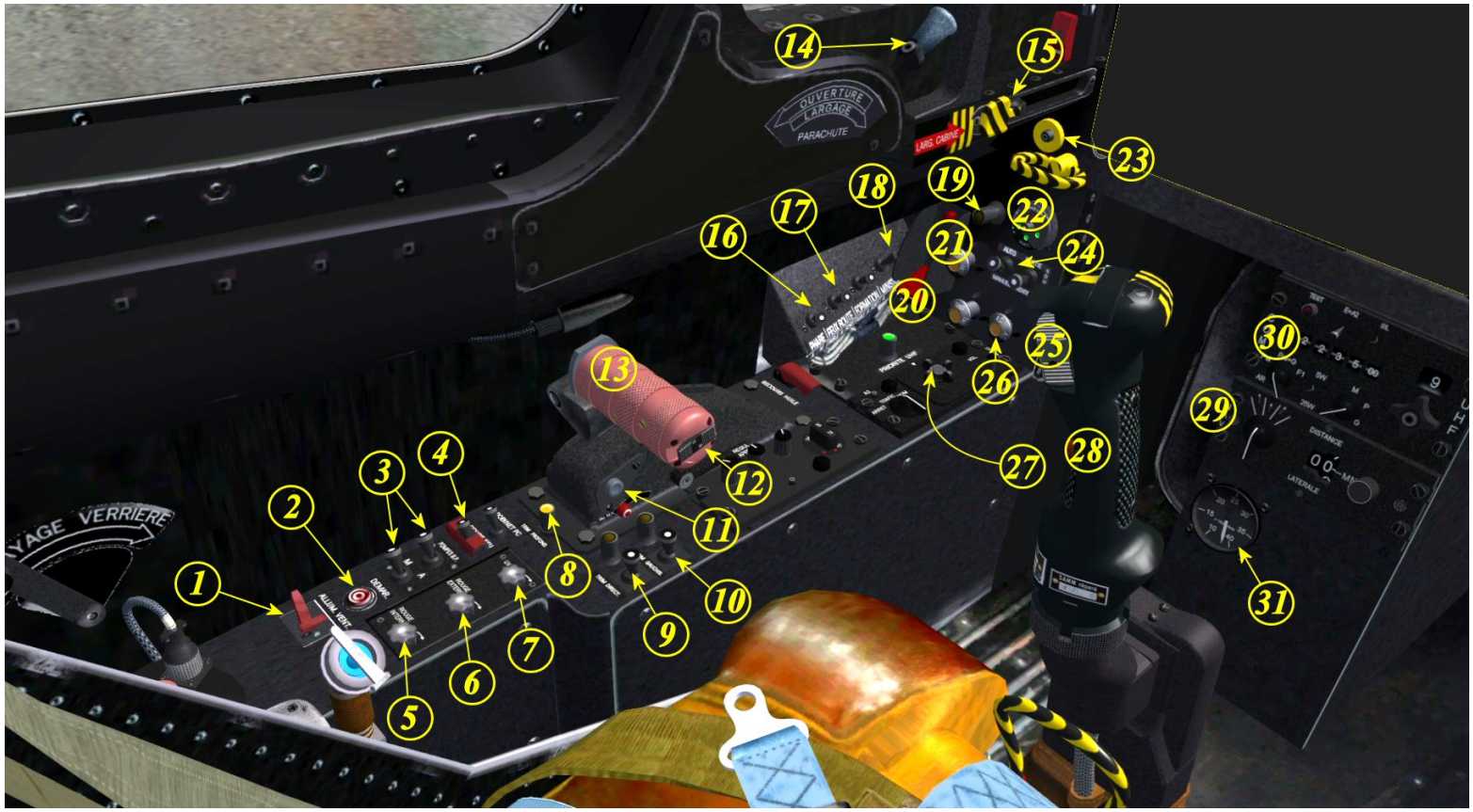
1 - Clock
2 - Clock and emergency compass lights
3 - External tanks alarm selector
4 - Gun sight head
5 - Emergency compass
6 - Angle of attack indicator (Adhemar)
7 - Adhemar indicator test
8 - Simicons
9 - Aural alarm reset
10 - Engine and afterburner FIRE indicator lights
11 - Rear aiming
12 - Limit indicator light (exceeded total temperature)
13 - Warning lights ans test buttons panel
14 - Down landing gear aural warning (BIP)
15 - Accelerometer
16 - Emergency altimeter
17 - Heading ADF - TACAN indicator
18 - Altimeter encoder switch
19 - Air speed and Mach indicator
20 - Landing gear alarm indicator light
21 - Emergency attitude indicator
22 - Main attitude indicator
23 - TACAN indicator
24 - Afterburner indicator light
25 - Nozzle temperature indicator
26 - Auto pitch alarm indicator (autocommande)
27 - Altimeter encoder (use switch 18)
28 - Vertical speed indicator
29 - Dropping tanks mask (right click)
30 - Shock cone Machmeter
31 - Remaining fuel indicator, with wheel
32 - Fuel transfer indicator
33 - Low level fuel indicator light (600 liters)



34 - TACAN offset indicator light
35 - Remaining fuel indicator, with test button
36 - Tachometer

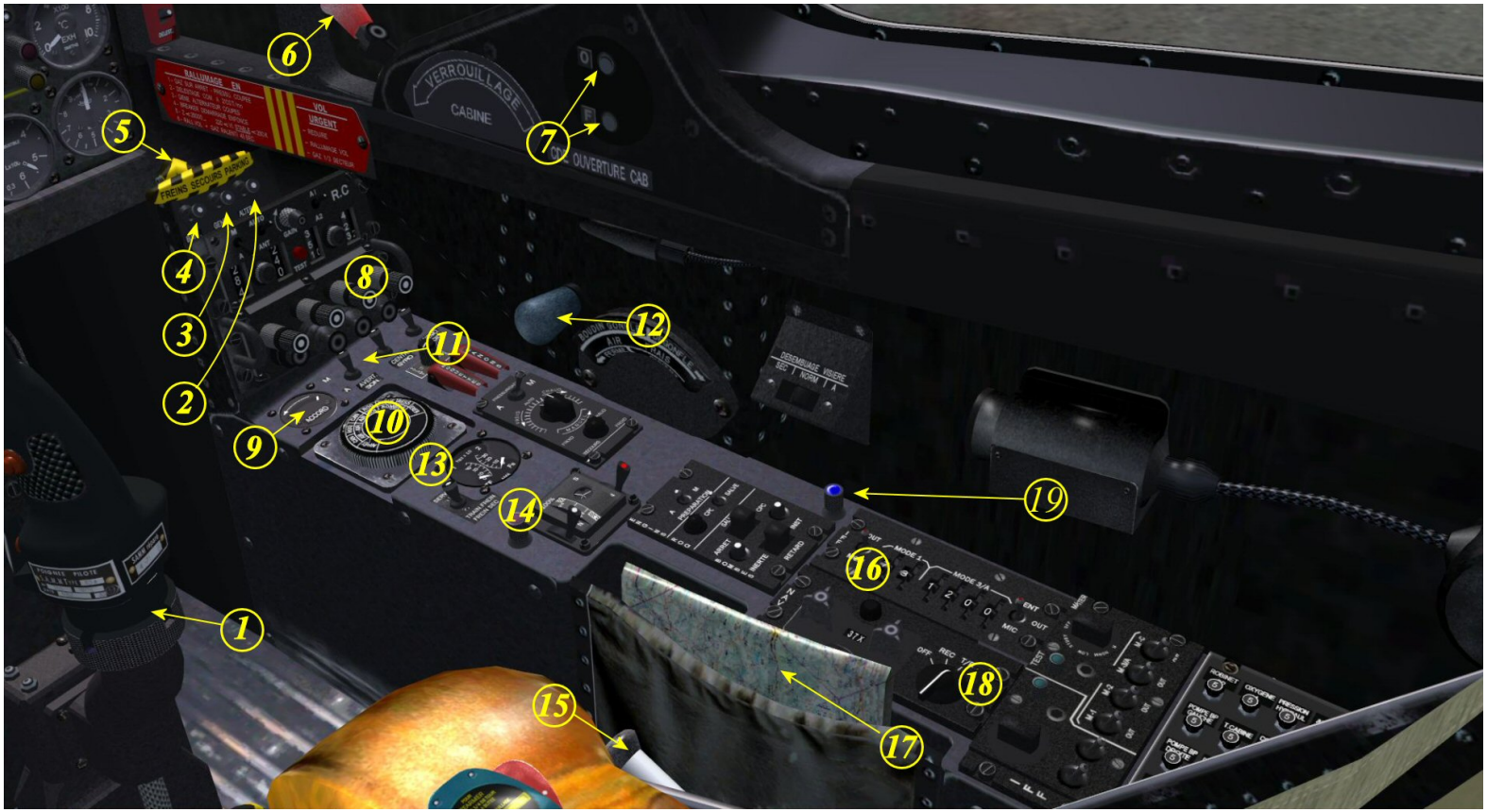
Front cockpit - Left console

1 - Ignition/ventilator switches (starter options)
2 - Starter
3 - Fuel pumps switches
4 - Fire cut off
5 - Internal red lights interne
6 - External red lights
7 - Internal UV lights
8 - Position pitch trim indicator
9 - Rudder trim
10 - Lateral trim
11 - Idle stop
12 - Spoilers
13 - Throttle
14 - Drag chute handle
15 - Canopy ejection button
16 - Landing beam
17 - Navigation lights switch
18 - Anti-skid braking system (ABS)
19 - Spoilers indicator
20 - Landing gear lever
21 - Yaw damper
22 - Gear indicator and test
23 - External tank emergency emptying
24 - Intake control switch
25 - Pitch trim
26 - Auto pitch trim (autocommande)
27 - Light UHF (FSX COM)
28 - Push-to-talk switch
29 - TACAN guider
30 - Heavy UHF (non functional)
31 - Cabin altimeter (Cabin pressurization)



Front cockpit - Right console

1 - Click here to hide the joystick
2 - Alternator switch
3 - Generator switch
4 - Battery switch
5 - Park and emergency brake
6 - Locking canopy
7 - Opening / closing canopy (*)
8 - ADF
9 - ADF tuner indicator
10 - Gun sight commodo (ON /OFF)
11 - Warning switch
12 - Fresh air flange
13 - Hydraulic pressure gauge
14 - Oxygen control box
15 - Seat height adjustment lever
16 - IFF
17 - Map (click to move)
18 - TACAN control box
19 - TACAN priority indicator



(*) To open the canopy:

- Unlock by clicking on the handle (6)

- Press the button (7-O)

To close the canopy:

- Press the button (7-F)

- Lock by clicking on the handle (6)

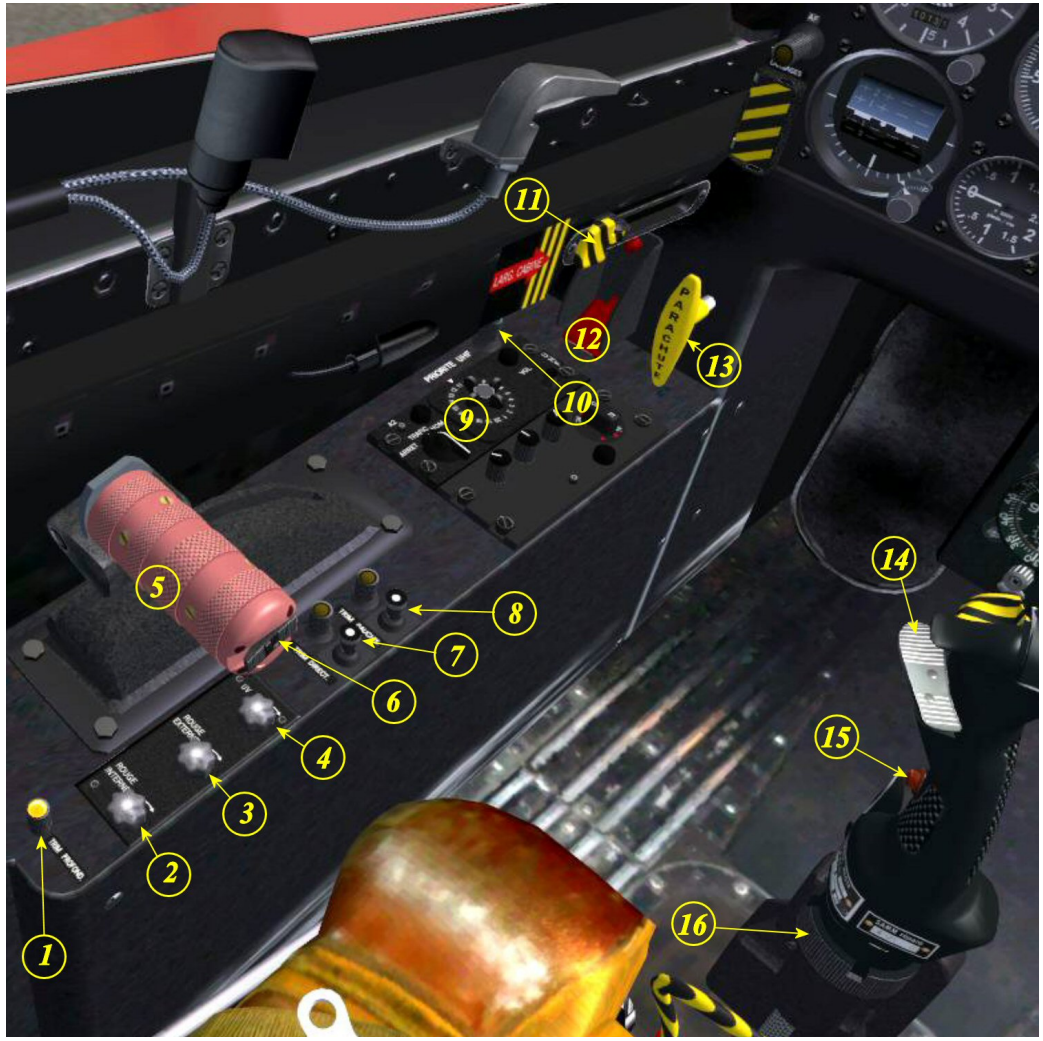
Rear cockpit - Main panel

1 -Angle of attack indicator (AOA) Adhemar
2 - Simicon additional views
3 - Engine and afterburner FIRE indicator lights
4 - Limit indicator light (exceeded total temperature)
5 - Hydraulic pressure gauge
6 - Auto pitch trim warning light (autocommande)
7 - ADHEMAR indicator test
8 - Shock cone machmeter
9 - Accelerometer
10 - TACAN offset indicator light
11 - Altimeter
12 - Air speed and Mach indicator
13 - Landing gear alarm indicator light
14 - Main attitude indicator
15 - Heading TACAN indicator
16 - Heading ADF TACAN indicator
17 - Indicator lights and test button panel
18 - Speed brake indicator light
19 - Dropping tanks protection cover (right click)
20 - Emergency attitude indicator
21 - Vertical speed indicator
22 - Landing gear indicator lights
23 - Fuel transfer indicator
24 - Level fuel indicator
25 - Low level fuel indicator light (600 liters)
26 - Remaining fuel indicator, with test button
27 - Tachometer
28 - Nozzle temperature
29 - Afterburner indicator light
30 - Clock
31 - Heading indicator



Rear cockpit - Left console

1 - Position pitch trim indicator
2 - Internal red lights
3 - External red lights
4 - Internal UV lights
5 - Throttle
6 - Spoilers
7 - Rudder trim
8 - Roll trim
9 - Light UHF (FSX COM)
10 - TACAN priority indicator
11 - Canopy ejection button
12 - Landing gear lever
13 - Drag chute handle
14 - Pitch trim
15 - Push-to-talk switch
16 - Click here to hide the joystick



Rear cockpit - Right console

1 - Rear cockpit - Right console

2 - TACAN offset

3 - TACAN control box

4 - TACAN priority indicator

5 - Oxygen control box



Radio - communication :



The MIRAGEIIIB used two UHF (light and heavy) for radio communication.

On the FSX model, only the “Light UHF” is functional (see control box on left console). It use the FSX COM frequency (VHF).

Only the pilot that has COM priority (GREEN LED ON) can set the frequency. Both pilots can transmit and receive.

We change the position of the COM priority by clicking on the GREEN indicator light.

When the GCA is activated (see page 21 - VALID green light) communications are automatically performed on the specific GCA frequency

TACAN







The MirageIIIB has a TACAN that give the VOR or TACAN beacon direction.
(The install of MirageIIIB in FSX automatically created TACAN beacons located on French territory)

Setting VOR frequencies or TACAN channels (and offset) is possible only in the cockpit that has the TACAN priority (see the indicator light item 2).

Reading headings and distances is possible in the two cockpits. It is possible to set an "offset" (item 5 and 6) which shifts the flight direction displayed by the chosen distance.

Note: Although this function is displayed on the compass, the GLIDE isn't functional on the MirageIIIB.

TACAN control box (right console):

- *1 - Turn ON the TACAN*
- *2 - Take the TACAN priority (click > blue light ON)*
- *3 - Set the channel (the tooltip shows the VOR frequency)*
- *4 - The corresponding TACAN channel appears*

TACAN Offset (Front cockpit / main panel or Rear cockpit / Right Console):

- *5 - Select the direction of the offset*
- *6 - Set the offset (NM)*

TACAN gauges (main panel)

- *7 - Offset indicator light, OFF if offset is zéro*
- *8 - Direction from the station*
- *9 - DME*
- *10 - OBS Course setting*
- *11 - Course deviation indicator*

Radio - compas (ADF) :

The MirageIIIB is equipped with a 4 channels ADF.
On the FSX model, only the first 2 channels are active.

1 - Switch ON the ADF (M)
2 - ADF test
3 - NDB signal indicator
4 - Frequency knob
5 - Active channel push-button
6 - Radio compass



Pilot helpers :



Angle of Attack gauge : ADHEMAR

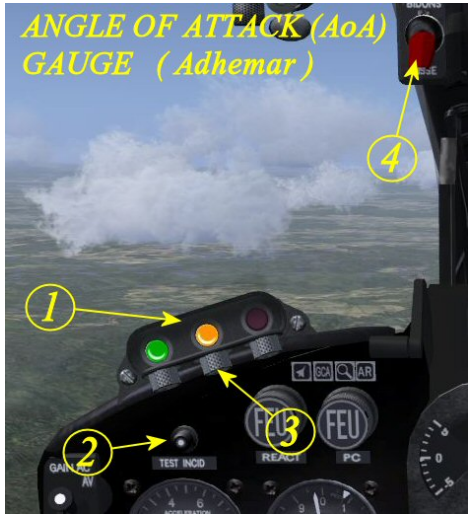
The lights activation (1) alerts the pilot when the incidence reaches predefined values.

The RED is lighted when a dangerous AoA involves an immediate reaction (stick forward - full throttle).

Depending on the aircraft is or not equipped with external tanks, the inverter (4) adjusts the lighting threshold setting.

2 Light indicator test

3 Day / night mask



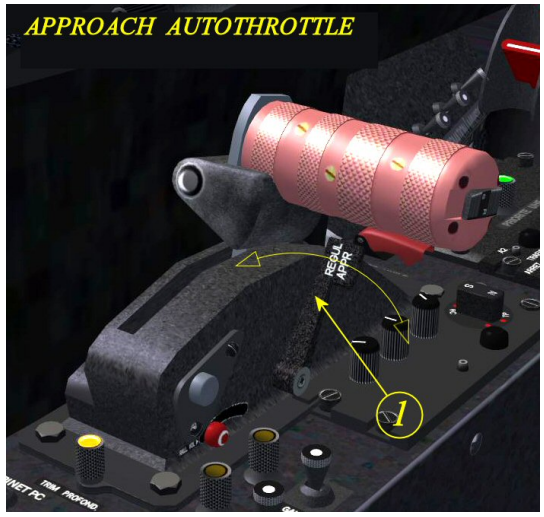
Automatic pitch trim:

The Mirage III has an automatic pitch trim ("Autocommande").

Click on 1 to activate.

Flight dampers:

The Mirage III has flight dampers (2) and (3) on pitch and yaw axis. On the FSX model, only the Yaw damper is functionnal.



Approach auto throttle :

When the landing approach control is activated (click on 1), the thrust is automatic to obtain the optimized speed for landing.

Quick disengaging

On the FSX model: Aircraft in flight, press the brakes to disengage all pilot helpers.

Drag chute - Ministop (ABS)

To open the drag chute:

> Right click on (1) or Key F8

To drop the drag chute:

> Left click on (1)

When the drag chute is dropped, an icon (2) appears to mean that the drag chute is unavailable.

You can reload the parachute by clicking this icon (2).





The switch (3) activate or disactivate the ABS (anti-skid braking system).

By default the switch is forward (ON)



GCA (Ground Control Approach)



The FSX model can be landing with a GCA function

GCA uses French recorded voices. Unfortunately, the english voices aren't recorded for technical reasons.

GCA uses the FSX ILS/DME datas and only works on an aerodrome equiped with the proper installations. During the installation of the Mirage IIIB, the French military airbases are automaticaly equiped with ILS/DME. (idem for some belgium / swiss airbases)

This function ignores the relief, some crash are possible near mountains (fortunately it's virtual crash !) especially at LSGS Sion.

Use of GCA:

The ideal situation to start the process is at the range limit of the ILS (23-30 NM) at altitude about 10,000 feet.

- Open the GCA setting panel (icon at left and hight of the main panel or Shift+2) and input data on the different sections.
To adjust numerical datas (ILS frequency, QFU, airport altitude) use mouse wheel.
You can choose "Afficher les messages pilote" to display the visual messages.
Then press "Valider" (Enter): the red button appears GREEN.

- To init contact with the controller or answer, use the keybooard's KEY 1 (not the numeric keypad !)

- Follow instructions: answers (KEY 1), QFE setting on altimeter (Atmospheric pressure at ground level), descent orders, heading to maintain.
During the breakthrough ("percée") you may at any time request a new course (KEY 2)

- At 10 Nm of touchdown point, give the controller the decision height (KEY 1)
Lower the landing gear and confirm its message when asked (see picture). A voice confirmation message will be sent automatically).



Press this button or Key 3

- If the BIP is not received, or in case of persistent bad alignment, the controller order a go around.

- Follow the instructions of the controller to the short final.

As applicable:

> You see the runway > KEY 1 and continue the landing.

> You don't see the runway > KEY 2 and go around.

After immobilization of the aircraft on the runway, or increased altitude if go around, GCA sequence is complete, and the system is reset.


2-FN
201

5 - SUPERSONIC FLIGHT SPECIFIC CHARACTERISTICS OF THE DELTA WING

by Jean-Pierre Bourgeois (BeeGee)

INTRODUCTION

The Mirage is designed to have excellent performance in transonic and supersonic flight.The delta wing is well suited to this, but disadvantaged by a high approach speed and specific steering approach and landing.

This is an uncompromising thoroughbred, that needs training to tame.

DELTA WING

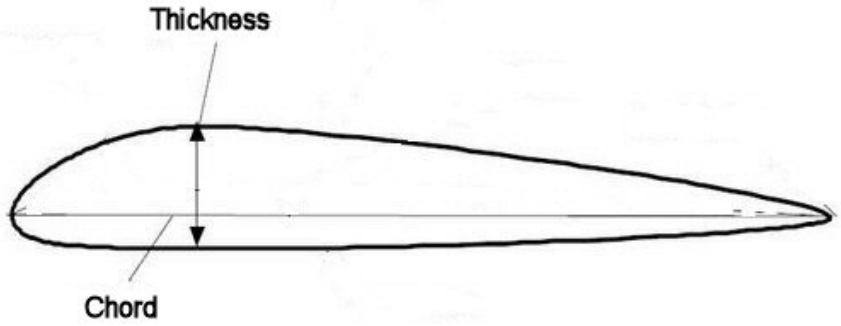
Before reading any further it's important to understand the features of this wing, that has advantages but also disadvantages:

Advantages :

In transonic and supersonic we need a wing with a very thin profile: what matters is the ratio between the thickness and the length of the chord line. On a subsonic aircraft, this ratio is about 12 to 15%, on a supersonic only about 4%.

This obviously raises many problems of structural strength.

The delta wing with a large root chord allows a relatively large thickness, which is favorable to the rigidity and strength of the structure, with the additional advantage of internal volume gain (wheel well, tanks....)



Relative thickness = ratio Thickness / chord

Disadvantages:

The delta wing in subsonic flight generates a little lift but a lot of induced drag at high angles of attack.



Subsonic vs supersonic :

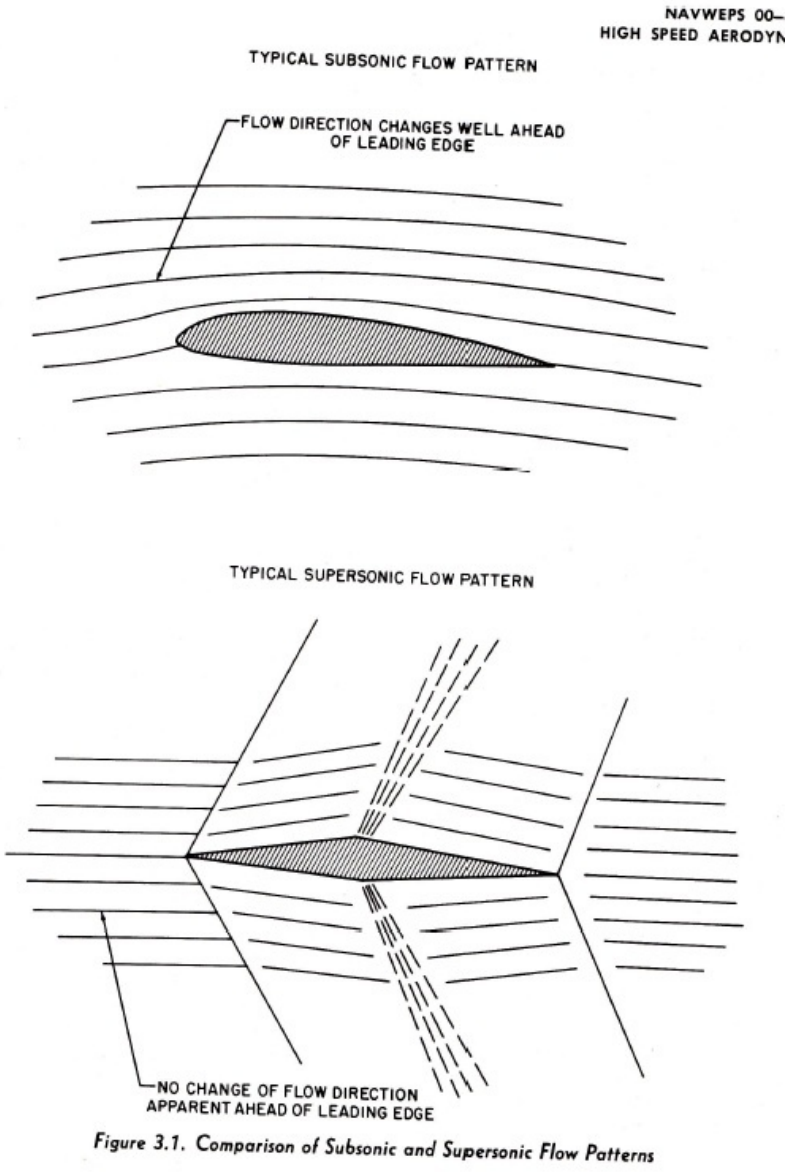


Figure 3.1. Comparison of Subsonic and Supersonic Flow Patterns

These two diagrams illustrate the difference in flow between subsonic and supersonic flight.

There is a considerable difference between the optimal shape of a subsonic airfoil and the supersonic one.

The first is thicker with a very rounded edge, the second has a diamond shape, very long, very thin, and with a very sharp edge.

We can summarize by saying that everything that is good for supersonic is bad for subsonic and vice versa.

It was therefore necessary to make a choice, at the time of the interceptors, the supersonic option was preferred.

And between the two? The transonic flight

This picture shows the variation of the air flow along an airfoil in the transonic flight, witch begins when the local velocity equals sonic velocity.

It starts at mach 0.72 for this airfoil.
We consider that the transonic-supersonic limit is achieved when all flow became supersonic, it is at about Mach 1.2.

On the most suitable profile the critical Mach number will be higher, probably around 0.90 for the Mirage.

During this transition the aerodynamic drag increases, the lift decreases, the center of lift moves back, the aircraft tends to dip , and sometimes with an unsuitable profile it is impossible to fly..

So-called "high stall" , the advent of a shock wave can give very characteristic vibrations.

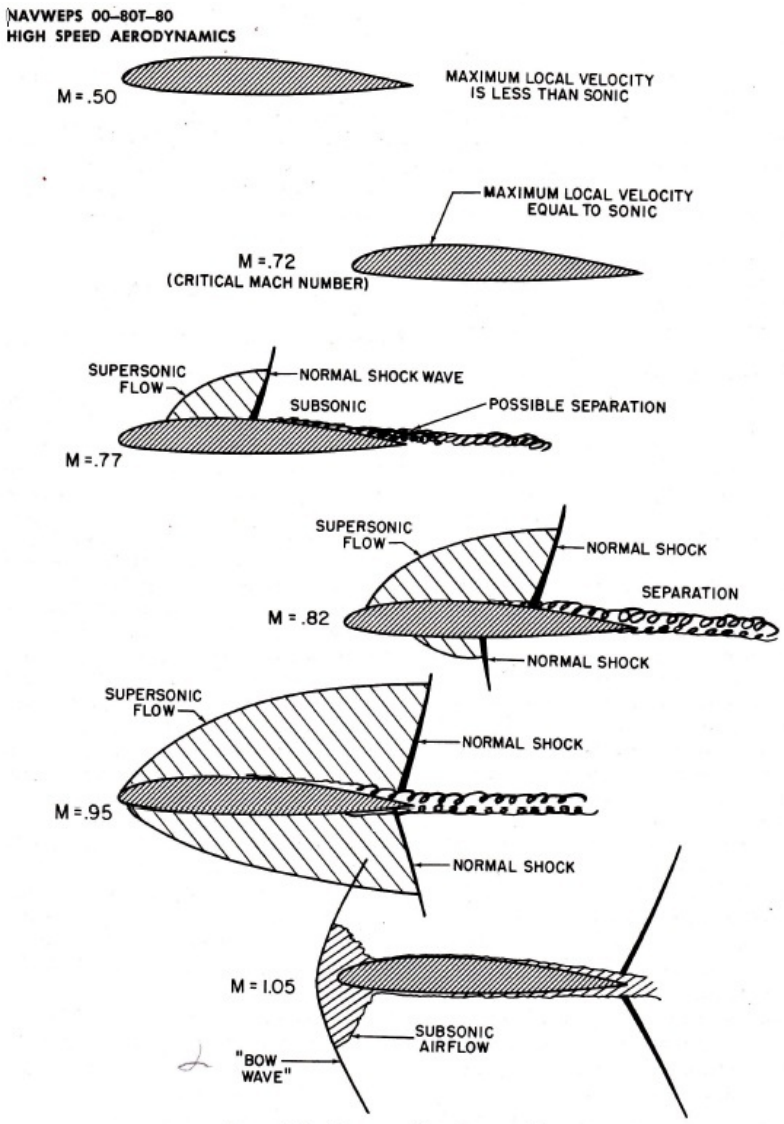


Figure 3.9. Transonic Flow Patterns (sheet 1 of 2)

Drag :

The drag can be divided into several factors :

- the Form drag, is that when the lift is zero. This drag is very very low on the Mirage III which gives good performance at max speed, can be summarized by the coefficient Cxf:

- the Lift-induced drag, Cxi, is generated by the lift. It mainly depends on the angle of incidence and the aspect ratio of the wing, the aspect ratio is the ratio between the span and the average chord of the wing. The aspect ratio is very low on the Mirage, the induced drag increases very rapidly with increasing incidence (approach, short turn, maneuvers, etc.)

- the Wave drag, Cxm, appears at the beginning of transonic at the same time as the shock wave begins. It reaches maximum around Mach 1 - Mach 1.10 then decreases in supersonic.

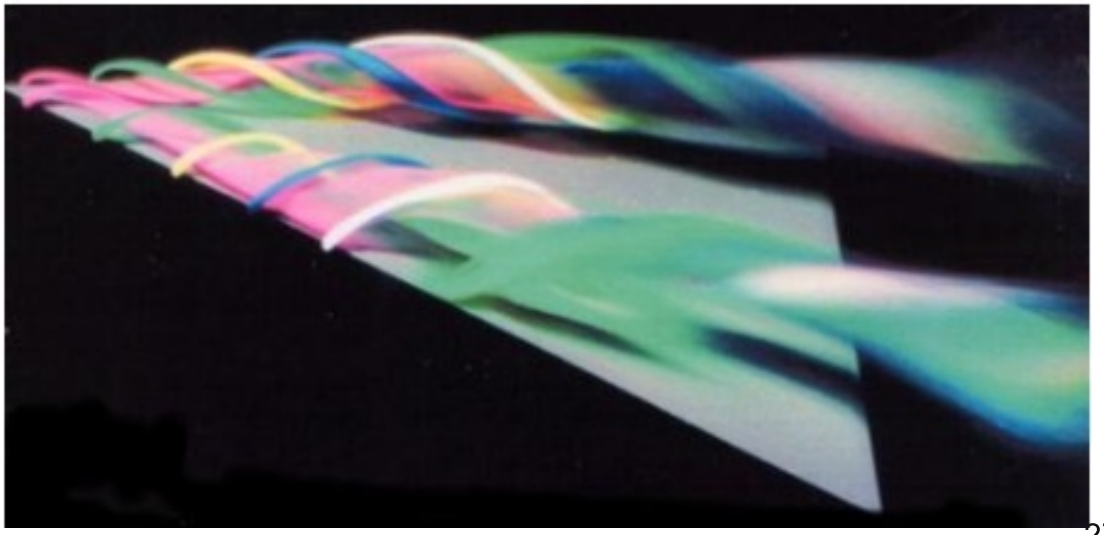
It takes a lot of energy to cross this area, the use of the afterburner is necessary to break the sonic speed barrier to fly supersonic in the Mirage. Fuel consumption becomes very important.

$$Cx = Cxf + Cxi + Cxm$$

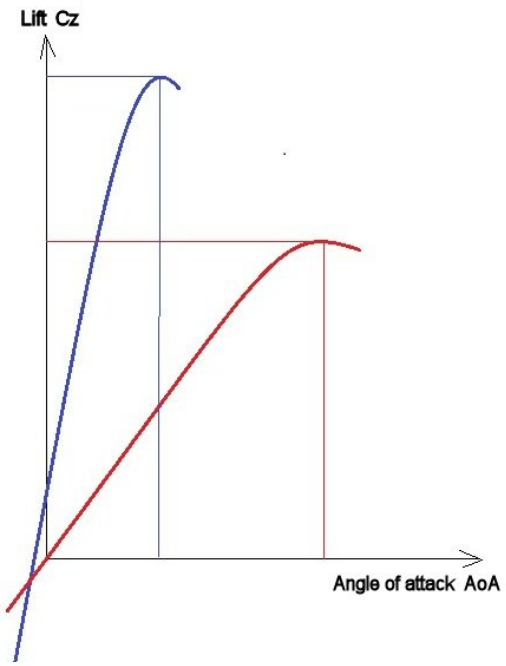
It's in this way that FS continuously calculates drag in airplanes.

Vortex = induced drag

Vortex = induced drag



Lift :



This diagram shows the relation between the lift and the angle of attack (AOA), for a straight wing "classic" in blue and a delta wing in red.

The straight wing generates a large increase of lift for a small increase of AOA, maximum lift is produced for an AOA about 15 °

The delta wing produces less lift, maximum lift is lower but it can get to a higher AOA, about 30 °



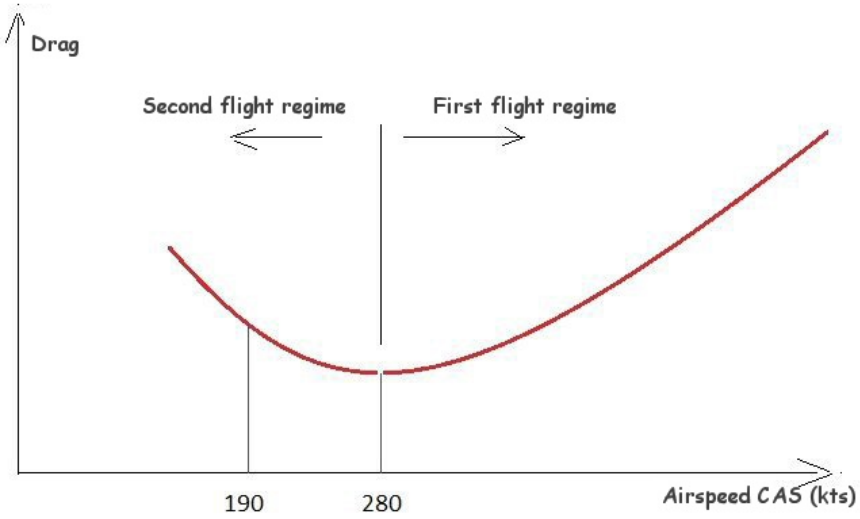
Drag / speed relation :

This curve shows the evolution of the drag depending on the speed, in stabilized horizontal flight. We can see that the minimum drag is achieved around 280 kt (depending on weight !).

This point gives the speed with the best glide angle, and also the optimal speed for the minimum fuel / time consumption.

It forms the borderline between the 1st and 2nd flight regime. In the first regime, the speed keeping is stable,

The pilot keeps an engine rotation speed, the airplane will tend to return itself to the equilibrium speed, of course, if it remains in stable horizontal flight.



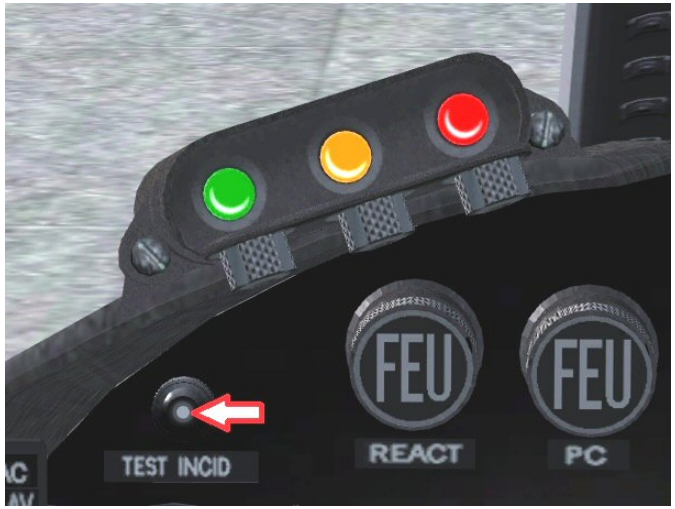
The approach speed of the Mirage at maximum landing weight is about 190 kt. We see on the curve that this speed is in the 2nd flight regime, which is characterized by high instability of propulsion. The pilot must act without delay on the thrust lever to restore the balance.... we will return to this later....



6 - FLYING THE MIRAGEIII IN FSX

Angle of Attack gauge :

The AOA is an important parameter of aircraft, particularly on a delta wing. On the Mirage, an AOA probe transmits information to ADHEMAR, that gives the pilot the AOA by a set of 3 lights, amber green and red.



The button "TEST INCID" enables to check the proper functioning of the three lights ADHEMAR.

A shutter "night" (Click one of the 3 wheels) is used to decrease intensity of the LEDs.

When the AOA is low (high speed straight flight), the 3 lamps are OFF .

Gradually increasing AOA (decreasing speed - maneuver with load factor) will show successively :

Green
Green – amber
Amber
Amber – red
Red

The ADHMEMAR can to be used during maneuver and also during the landing approach, as we will see later.

Limitations :

Some non-specialists often confuse limitations and performance:

..... these are two totally different concepts :

- Limitations are mainly related to the structural strength and or the operation of systems.

- Performance depends on the thrust and aerodynamic drag

On an aircraft of this generation the pilot has the responsibility to maintain the aircraft in its flight envelope.

	Vi - kt	Mach	N	Maximum altitude
Clean	730	2	+7,2 -3,8	72000
Supersonic tanks	730	2	+7,2 -3,8	60000
600 L tanks	600	1,5	+6,0 -3,0	50000
1300 L tanks	600	1,2	+5,0 -2,4	45000

Minimums speeds:

Maximum AOA:

- Without external tank (LISSE): ADHEMAR display pure red light

- With external tanks (BIDONS): ADHEMAR display amber + red lights

An aural warning alerts the pilot that he has reached the limit.

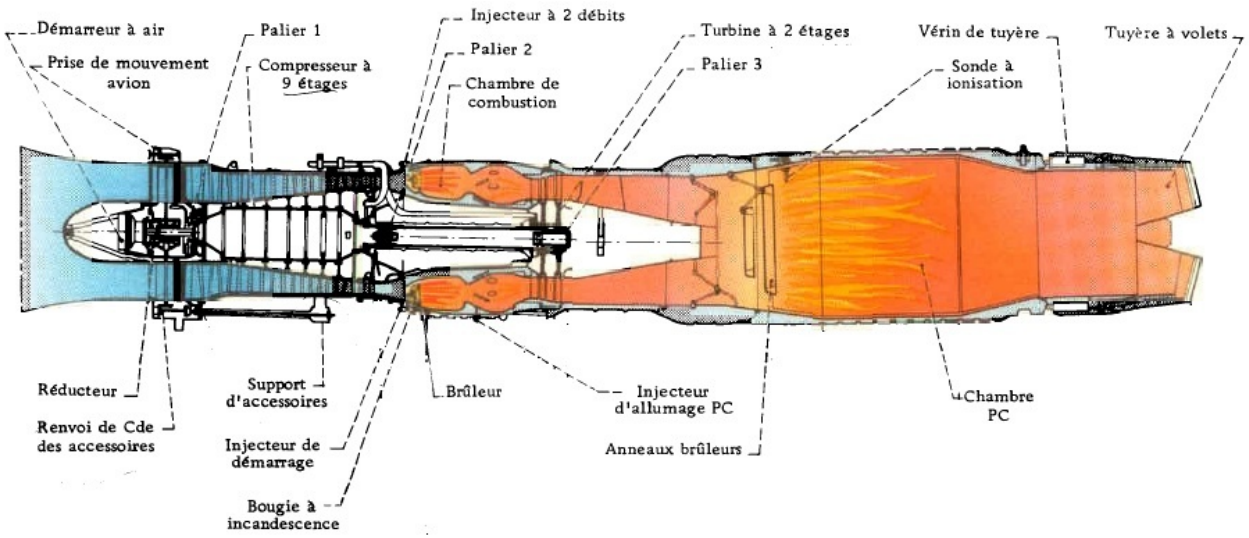
A switch allows to select the alarm threshold, with or without external tanks.

Upper FL 300: Minimum air speed = 200 kt



Turbojet SNECMA ATAR 09B

Single-shaft turbojet engine with afterburner.



Dry thrust: 4250 kg at 8440 rpm +/- 50 rpm

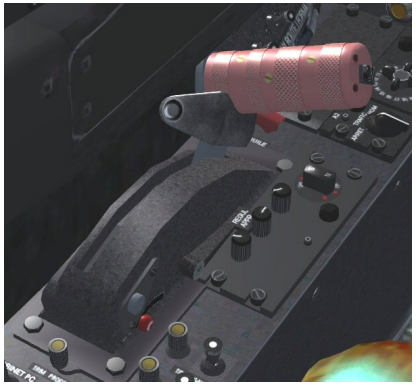
Minimum afterburner thrust: 5050 kg at 8440 rpm

Maximum afterburner thrust: 6000 kg at 8440 rpm

WARNING: Only FSX + acceleration expansion pack make a realistic performance on this Mirage.
FSX+SP1+SP2 isn't equal in this area: With SP2, the airplane flies, but without the calibrated performances of the Acceleration Expansion Pack.



Full throttle dry engine



Minimum afterburner

The afterburner must be used sparingly, fuel consumption increasing significantly: about 300 liters/mn with maximum afterburner.

For the afterburner to work, BP fuel pumps switches must be ON !

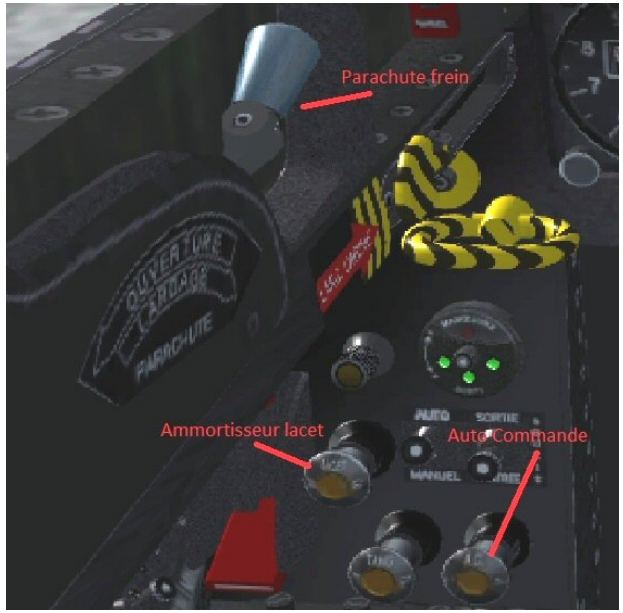
Flight controls - Automatic pitch trim (autocommande)

To facilitate control, the Mirage is equipped with an automatic pitch trim: it's the "autocommande".

Its role is to help the pilot stabilize the trajectory of the plane holding the pitch.

When the pilot releases the joystick, the aircraft is automatically trimmed, which is an advantage during transonic acceleration or deceleration, which generate variation of the position of the aerodynamic center.

More than a long speech, just a test !



Drag chute :

The high speed of the approach requires the use of a drag chute on ground.

It's triggered by the F8 key or by clicking on the appropriate lever (look at page 20)

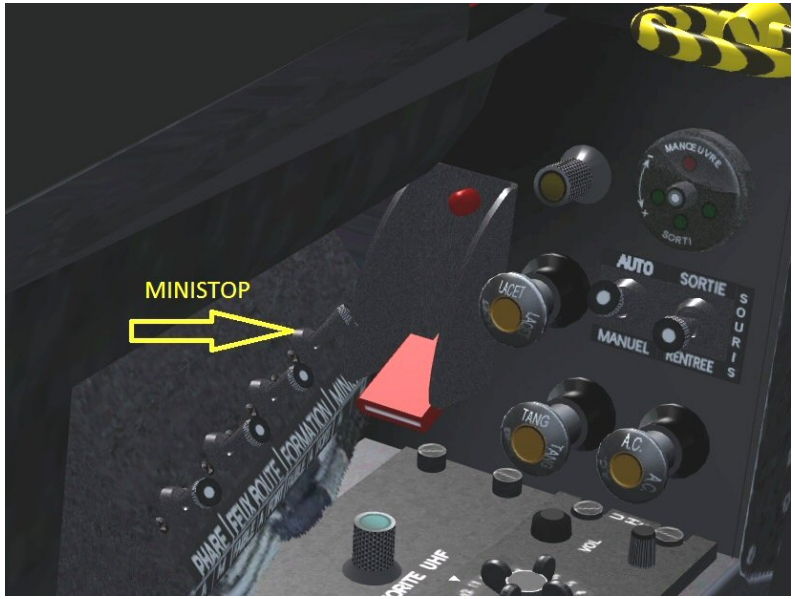


Anti-skid braking system (ABS - Ministop) :

Equivalent to the ABS on a car, it is a wheel anti-lock, it provides maximum braking without danger of bursting tires.

It is important to check that it is ON during the preparation.

In FSX, a wheel lock is unconsequential, however, the braking is more effective with the ABS activated.



This option exists in FSX but is little used.

See in: Settings / Controls / Buttons-Keys / Systems / Brakes anti skid On-Off

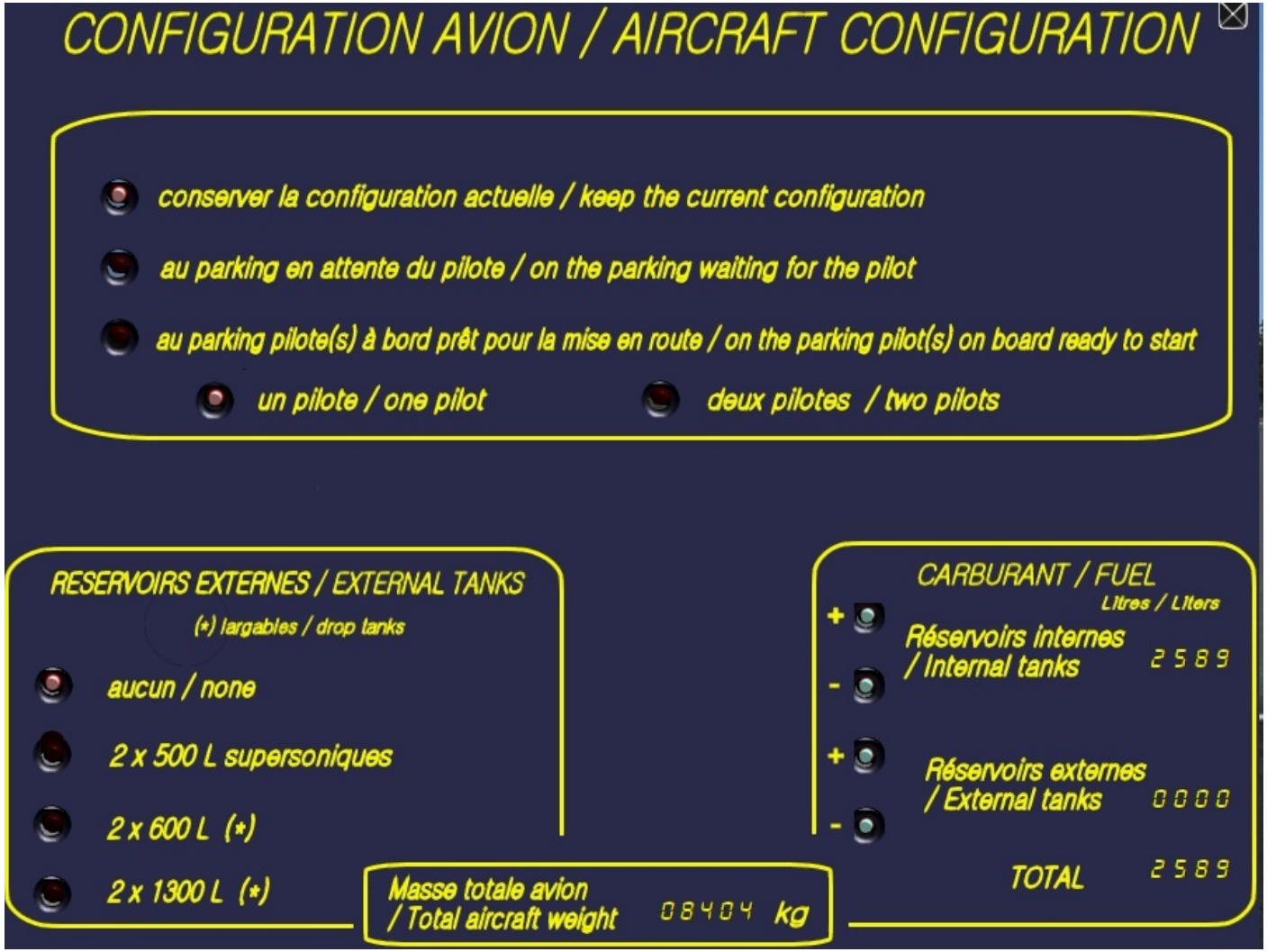


Performance :

Note : The overall performance of the model are close to the real aircraft. The values displayed at low altitude accurately reflect reality.
Only at high altitude the values diverge, due to the specificity of operation of the ATAR engine.
(the movable nozzles aren't accurately reproduced in flight dynamic by FSX)

Settings panel

First must open the Control Panel: Shift +2 Key or clicking on simicon (Left high on the main panel)

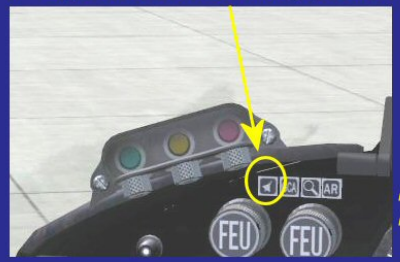


In this way, you can configure the start mode, the crew, the external tanks and the amount of fuel.
The drag index is automatically configured.

Ready for the starting ?

Engine starting procedure

1- Open the setting panel



Choose one on the two park position.
Choose the external tanks and the fuel amount

If FSX is in pause, P Key



The airplane comes with ladder, wedges and support carriage of compressed air

2 - Close and lock the canopy

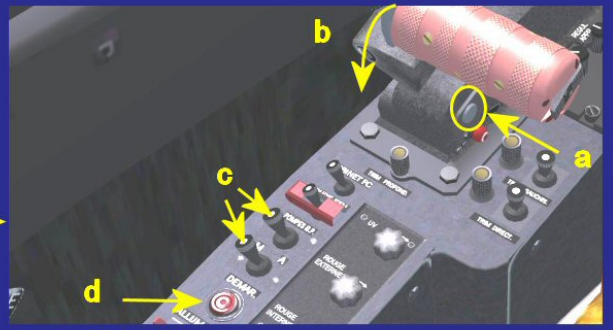


a - Battery ON
b - Close
c - Lock

3 - Starting



The ladder and wedges disappear



a - Push the idling stop
b - Move the lever to full idle
c - BP pumps ON
d - Press the starter

N>600 rpm
Slightly push the lever to release the stop

Turbojet started:
- Air Bottle is disconnected
- The carriage is disengaged
- Hydraulic pressure is established, the gear doors close, the elevators and spoilers go to neutral.



At the beginning of rolling, accessories disappear.

In what follows the concept of energy is important, the total energy is the sum of the kinetic energy (related to the velocity) and the potential energy (due to the altitude)

Climb law:

The climb law is the relation between the IAS and the altitude, that offers the best performance.
The transition altitude is the step, during a climb, to change the unit reading IAS: knots in Mach.
At this altitude, error of Mach indication is the lower.

Example: Climb law 450 kt / Mach 0,90

This table shows that 17 000 ft is the transition altitude for this law :

- *below 17 000 ft maintain IAS 450 kt*
- *at 17 000 ft 450 kt = Mach 0,90*
- *upper 17000 ft, maintain Mach 0,90*

Z feet	Indicated speed	Mach	True speed
0	450 kt	0,68	450 kt
5000	450 kt	0,74	480 kt
10000	450 kt	0,80	510 kt
15000	450 kt	0,87	544 kt
17000	450 kt	0,90	558 kt
20000	423 kt	0,90	552 kt
25000	384 kt	0,90	541 kt
30000	345 kt	0,90	530 kt
36000	302 kt	0,90	515 kt

We also see that below 17,000 ft, true airspeed increases as it maintains airspeed 450 kt.This is logical, true airspeed increases with altitude.This increase needs energy that is taken on the rate of climb. At 17,000 ft was the maximum true airspeed. The true airspeed decreases during climb with constant Mach 0.90. It's logical, because the speed of sound decreases with temperature, and it's colder at 36,000 ft rather than 17,000 ft. We have a temporary improvement of the climb rate above 17,000 ft, by simple energy transfer.

Reading mach indicator isn't very easy !

Click on the glass of the airspeed indicator: you will see a numeric value of the Mach



Climb :

Maximum dry throttle climb :

- Without externals tanks or with supersonic tanks : 450 kt then Mach 0.90 - Transition 17 000 ft
- With externals tanks: 400 kt then Mach 0.90 - Transition 23 000 ft

Maximum afterburner climb:

Exceptional climb, without externals tanks or with supersonic tanks :
- 450 kt , then Mach 0,90 until 36000ft, then supersonic level fligt acceleration to Mach 2
Without tanks, need less 3 minutes to reach this altitude, and about 4 minutes to reach Mach 2.
At this moment, it remains just enough fuel to return at the nearest airbase.
This flight type needs an exact planing.

- Direct supersonic climb: 450kt, then Mach 1.6 Transition 47000 ft

Operational ceiling:

The ceiling and climb performance of an aircraft depends on two main parameters:the density and the temperature of the atmosphere.
In FSX , we fly for most of the time in standard atmosphere,

- Subsonic ceiling without external tanks: Mach 0.90 Full throtlle : 45,000 ft
- Subsonic ceiling without external tanks: Mach 0.90 Full afterburner : 50,000 ft
The ceiling with external tanks is lower.
-Supersonic ceiling Mach 1.6 Full afterburner 58,000 ft+

It may be noted that the supersonic ceiling is higher than subsonic ceiling.

Zoom climb:

It is done in exchange "Mach against altitude". The maximum altitude is reached by initially accelerating Mach 2 + at the tropopause (36,000 ft). By this way we have the maximum total energy. By pitching on a slope of 30° , follows a parabolic flight, whose top altitude may potentially greatly exceed 72,000 ft (authorized maximum altitude)....

Militarily it has no benefit and creates many problems of engine operation.... and survival of the pilot lay in the integrity of its spacesuit. In FSX, for the fun, we can go watch safely stars during the day.

Seeing the stars in broad daylight is an unusual spectacle !



Cruise:

Low altitude

	Clean		Tanks 600 L		Tanks 1300 L	
Vi	N	C-l/min	N	C-l/min	N	C-l/min
400	7600	52	7650	61	7750	60
500	7900	61	7950	78	8000	79

Descent:

Usual descent = 1 NM / 1000 ft
N = 7000 rpm
IAS = 300 kt
Speed brakes open

Economic descent :
N = 7000 t/min
IAS = 300 kt
Speed brake closed

Military descent
N = 7000 t/min
Attitude = - 20°
Speed brakes open

Landing approach :

Now begins the trickiest flight phase :

Preparation of the approach

- *Check that the weight is below the maximum landing weight, which corresponds to 1200 L of remaining fuel in the IIIB.*
- *Make the windshield frame transparent.*



<<<< For this, click the panel top.

Place the seat in the high position. Click on the gun sight head (yellow arrow): >>>



Great !! We see the runway !

For the final approach:

Use the nose pitot pole as an attitude reference
Engine speed: 7600 rpm
Use the AOA Adhemar.
Ideal AOA = Amber or Amber-red
Red = too slow
Green-amber = too fast



Check the speed, which depends on the weight: 180 or 200 kt, according the plane is light or heavy

The delta wing characteristics require that the approach is controlled more with the throttle than the stick. Keep a constant attitude, correct very little with the stick, control the landing with the throttle.

This requires anticipation, training, quiet. A bad approach requires throttle up and a new landing approach.

Special thanks

The modeling team thanks a lot :

- The pilots who supported the project, Michel Panattoni, Jean-Pierre Putod and especially Darcy Vegas, which by his great experience of the MirageIII and by its always relevant advice has greatly enriched this achievement.

- All those have provided us documentation, particularly Jean-Pierre Langer and Jean-Marie Collard

- The "Musée de l'Air et de l'Espace" (MAE) located at Le Bourget near Paris, the "Musée Européen de la Chasse" (Montelimar) and the "Conservatoire de l'air et de l'espace d'Aquitaine" (Bordeaux) for their hospitality, always friendly.

- Evelyne and Jeff, which lending their voices to the recordings messages allowed JeanMichel Renaux to complete the achievement of the GCA.

- John Haughney for the assistance in the English translation of this manual.

- Sylvain Parouty of RFN who never spared his help as often as he was asked.

- Jardy (Praetorians-Fs) for its help to improve this model in multiplayer mode

- All enthusiasts who, often volunteer, help improve FSX, especially Pete Dowson, whose modeling MirageIII uses several additional modules.



http://restauravia.fr

with the cooperation of the "Royale French Navy"

(http://royalefrenchnavy.restauravia.fr/)