DASSAULT FALCON 900EX EASY

SYSTEMS SUMMARY

Flight Controls

INTRODUCTION

The F900EX EASy is controlled in flight by the primary flight controls:

- two ailerons, for roll control,
- two mechanically-linked elevators, assisted by one horizontal stabilizer, for pitch control,
- one rudder, assisted by a yaw damper, for yaw control.

Primary flight controls are of non-reversible type and hydraulically actuated.

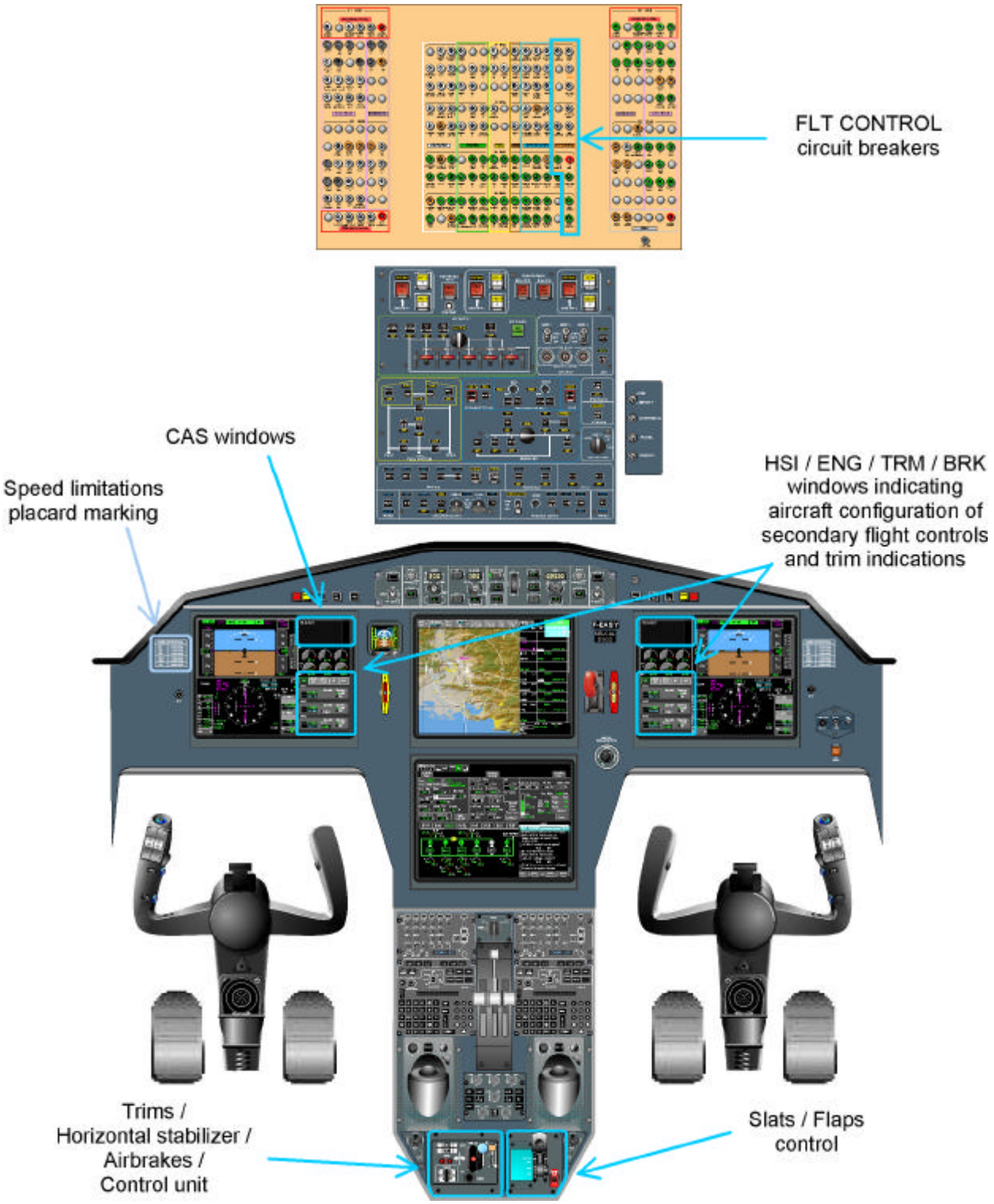
They are activated by both pilots and controlled by means of control wheels, control columns and rudder pedals.

These primary flight controls are assisted by trims (aileron trim, rudder trim, horizontal stabilizer trim).

Secondary flight controls include:

- the leading edge slats,
- the trailing edge flaps,
- the airbrakes.

They are hydraulically actuated and either controlled by control handles located in the flight deck pedestal or automatically controlled when specific flight conditions are met for slats or airbrakes operation.

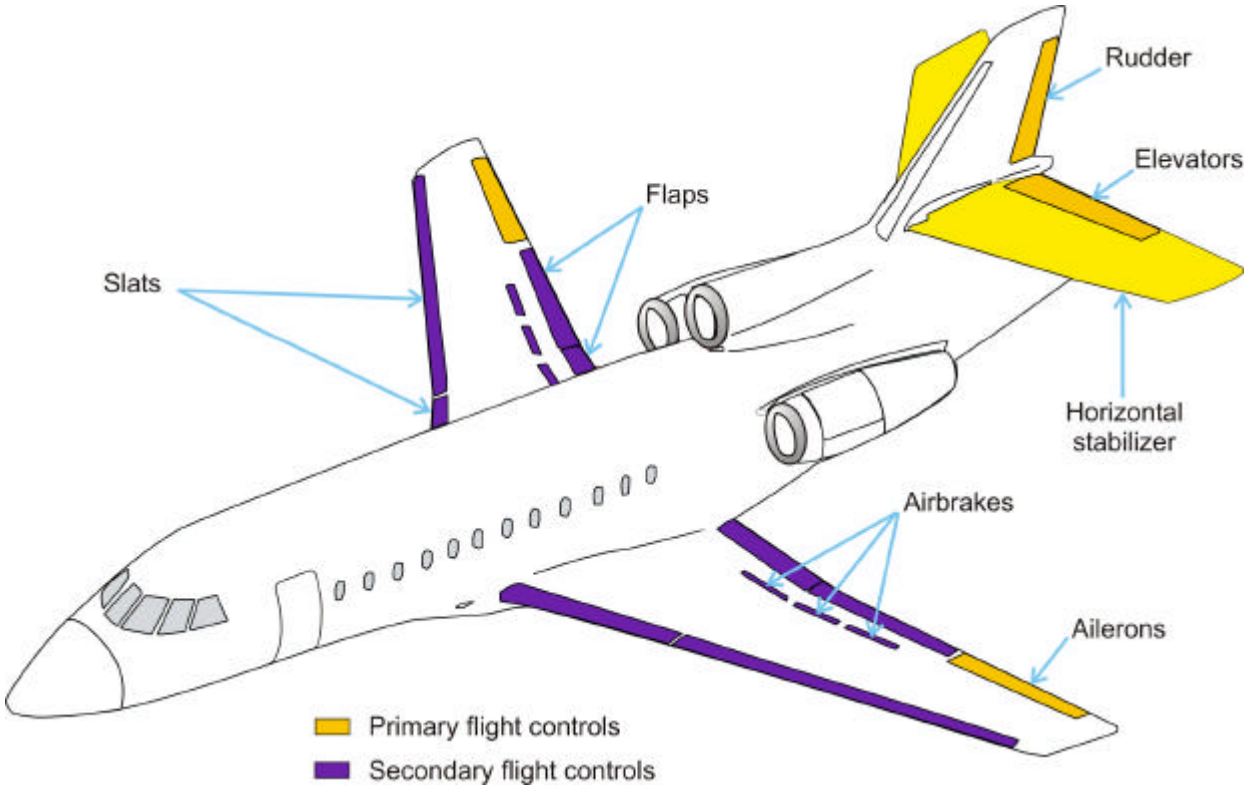


FLIGHT DECK OVERVIEW

FLIGHT CONTROL SOURCES

PRIMARY FLIGHT CONTROLS		
AILERON CONTROL SYSTEM	**RUDDER CONTROL SYSTEM**	**ELEVATOR CONTROL SYSTEM**
- Hydraulic No 1 - Hydraulic No 2 - A2 bus for aileron trim - B2 bus for emergency aileron trim - B1 bus for aileron Arthur variable unit	- Hydraulic No 1 - Hydraulic No 2 - A2 bus for rudder trim - B2 bus for yaw damper	- Hydraulic No 1 - Hydraulic No 2 (except for pitch Arthur variable unit) - B1 bus for normal pitch trim - A1 bus for emergency pitch trim - A1 bus for pitch Arthur variable unit
A		
LEADING EDGE SLATS	**FLAPS**	**AIRBRAKES**
- Hydraulic No 1 for normal slats operation - Hydraulic No 2 for emergency slats extension - A1 and B1 bus for slat operation - BATT bus for emergency slat operation	- Hydraulic No 2 - B2 bus for flaps control - A2 bus for flaps position indication	- Hydraulic No 2 - A1 bus for A/B control - A2 bus for A/B indication

PRIMARY AND SECONDARY FLIGHT CONTROLS



PRIMARY AND SECONDARY FLIGHT CONTROLS

INTRODUCTION

The ailerons, the rudder and the elevators are hydraulically powered and mechanically linked to flight deck controls and pedals.

An artificial feel system on each primary flight control system allows the pilot to have a feedback with aerodynamic forces.

Trim systems are also integrated to the flight control channels (aileron trim, rudder trim and horizontal stabilizer). They are electrically powered.

The secondary flight control surfaces are electrically controlled and hydraulically actuated.

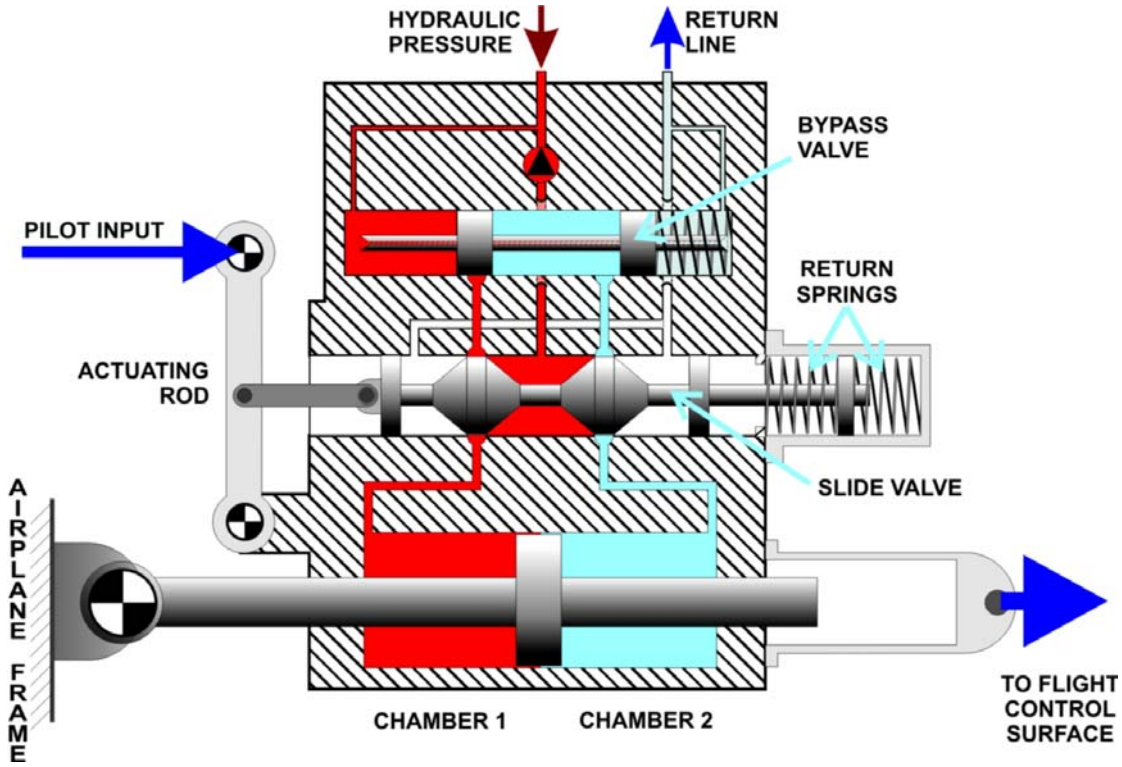
PRIMARY FLIGHT CONTROLS

Typical control channel between the flight deck control and the control surface is composed of:

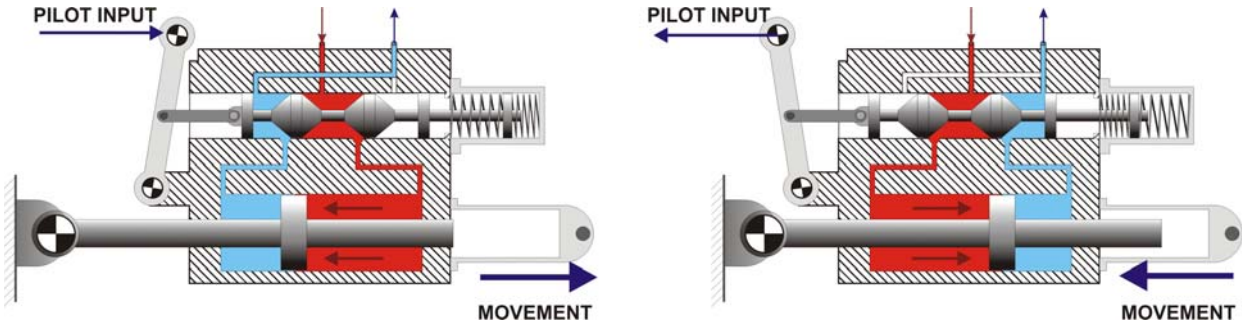
- a series of push-pull rods acting as the mechanical link between the control column and yoke and the servo-actuator,
- a main Artificial Feel Unit (AFU),
- a variable bell crank, or Arthur, for roll and pitch feel control,
- a trim system,
- an auxiliary Artificial Feel Unit,
- a servo-actuator.

SERVO-ACTUATOR

Each primary flight control surface is actuated by its associated hydraulic servo-actuator. The servo-actuator consists of two independent barrel and piston assemblies operating in parallel. Each of No 1 and 2 hydraulic systems independently supplies a barrel and piston assembly.



SERVO-ACTUATOR SCHEMATIC (ONE BARREL)



SERVOACTUATOR OPERATION

The servo-actuator body is attached to the control surface and connected to the airframe by its rods.

When a pilot input is given, the slide valve is operated in the set direction. It then connects chamber 1 or chamber 2 of each cylinder to the hydraulic pressure line and the opposite chamber to the return line. As the piston is stationary, the servo-actuator body moves in the set direction to deflect the control surface.

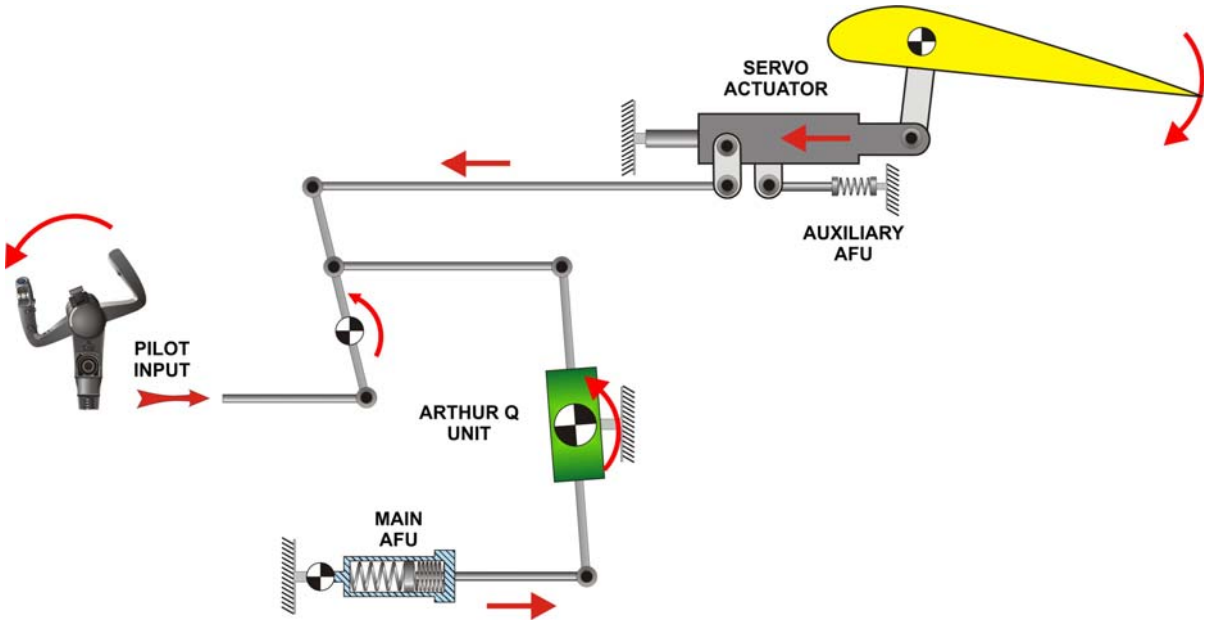
In case of drop of hydraulic pressure in one system, the by-pass valve of concerned barrel moves thanks to its return spring and connects both piston chambers to the return line. This keeps possible the movement of the inert barrel by the active one.

Should both hydraulic system fail, both barrels of the servo actuator are de-activated by the same way (bypass valves connecting piston chambers to the return line). The control surface is still operative thanks to the mechanical link: pilot inputs move the entire servo actuator assembly and deflect the control surface.

An anti-gust calibrated valve is also included within the elevator and aileron servo-actuator. It allows these control surfaces to resist gust loads on the ground.

ARTIFICIAL FEEL UNIT

As control surface deflection is controlled by non-reversible servo actuators, an artificial feel system is installed upstream from the servo actuator to simulate aerodynamic loads. The main AFU provides an aerodynamic artificial load feel to pilot's directly proportional to the input movement and to the resultant spring compression of the AFU. It works together with the Arthur variable bell crank.



FLIGHT CONTROL SCHEMATIC (TYPICAL)

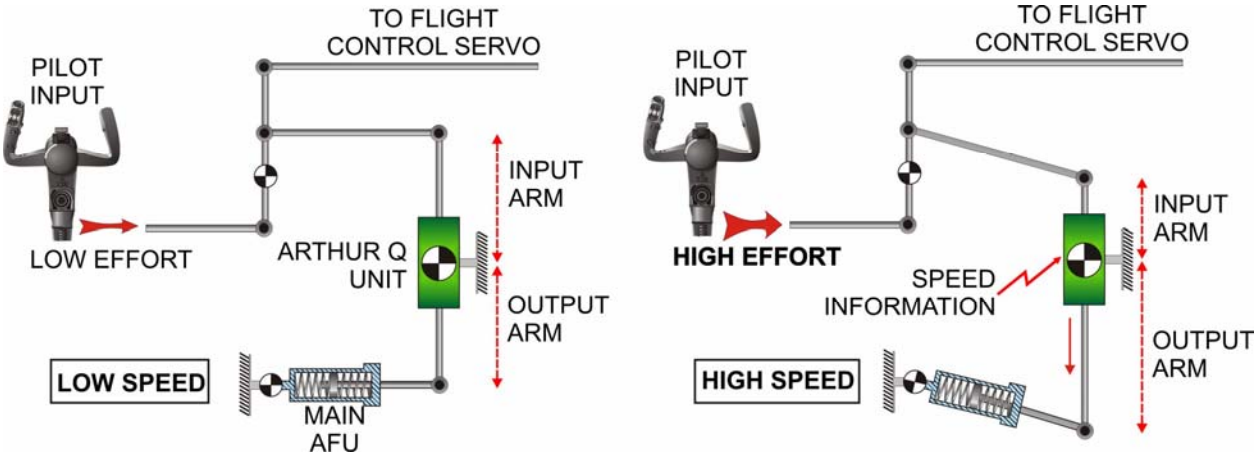
An auxiliary spring-loaded AFU is connected to the airframe and to the auxiliary arm of each servo actuator. In case of control linkage disconnection, the auxiliary AFU forces the slide valves to position the servo actuator into the neutral position.

ARTHUR VARIABLE BELLCRANK

A variable bellcrank, or Arthur, is incorporated within both the aileron and elevator control systems to vary the artificial load feel of the flight controls.

The law governing the position of the Arthur unit is based upon specific parameters (speed or stabilizer deflection). As these parameters change, the pivot-point of the Arthur variable bell crank effectively increases or decreases the AFU input arm length, thus decreasing or increasing the artificial load feel of the control yoke.

The effort applied by the pilot on the yoke to obtain the same control surface deflection is more important when the airplane speed is in the high range rather than when it is in the low range.



ARTHUR OPERATION SCHEMATIC (TYPICAL)

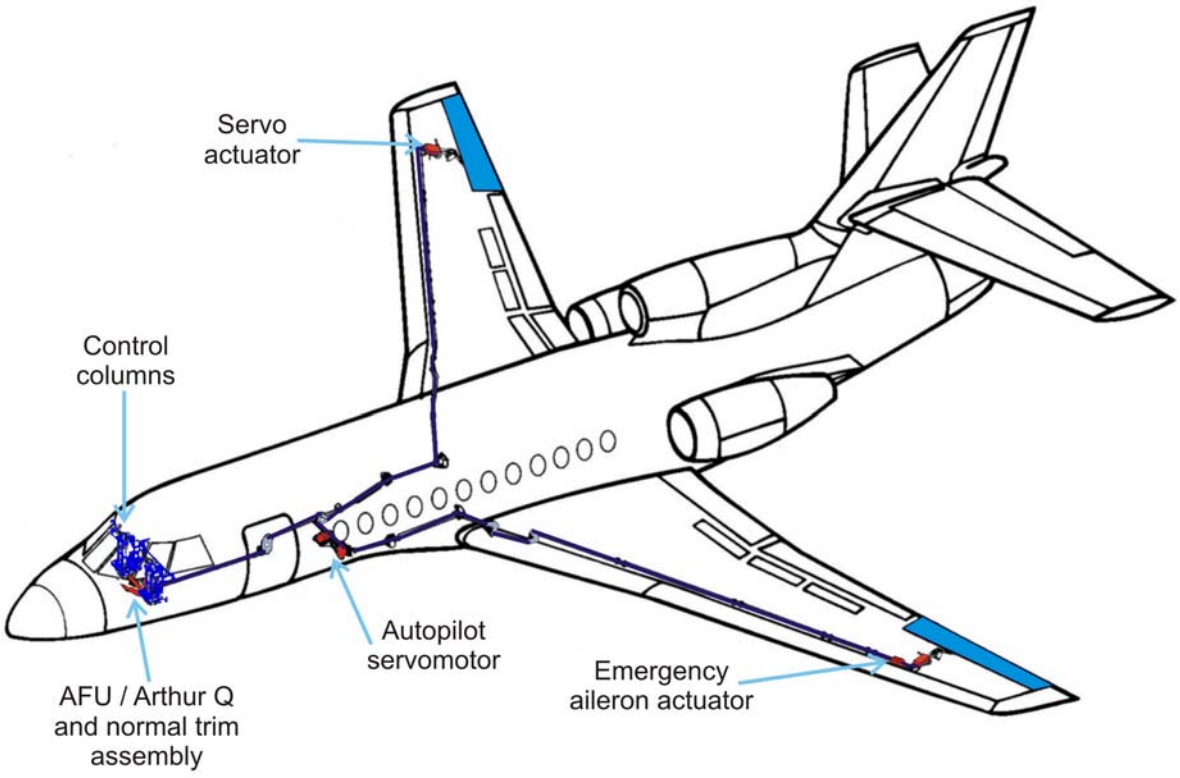
AILERONS

Lateral control of the airplane is provided by the ailerons.

Each aileron is attached to and operated by one servo actuator. This servo actuator is powered by the two independent hydraulic systems and mechanically controlled by rotation of either pilot or copilot control yoke.

The aileron flight control channel includes:

- main and auxiliary spring-loaded AFU,
- an Arthur variable bell crank,
- a trim system (normal and emergency).



AILERON CONTROL SYSTEM

AILERON ARTHUR VARIABLE BELL CRANK

This variable bell crank is incorporated within the aileron control system to adjust the artificial load feel of the flight controls with respect to the airplane airspeed (data issued from No 1 Air Data System).

The position of the Arthur is compared to the theoretical position computed from No 2 ADS airspeed. If the difference exceeds a threshold depending on the airspeed, the **AIL FEEL** CAS message appears.

An Arthur unit failure may cause higher or lower control forces than normal depending on whether the unit has failed in high or low speed position.

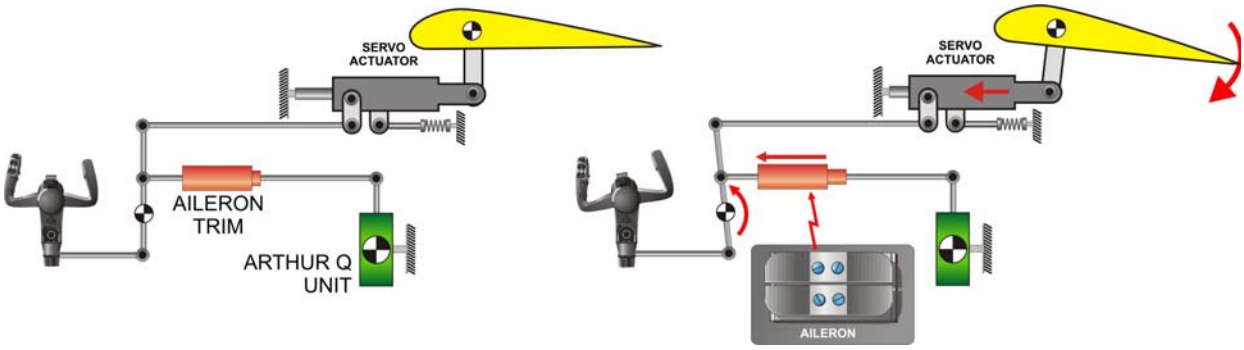
In case of electric supply failure, the Arthur automatically reverts to the low speed mode.

AILERON TRIM UNIT

The aileron trim system is composed of electrically driven screw jacks and features:

- a normal trim,
- an emergency trim.

The aileron trim aims at adjusting the on-center position of the ailerons in relation with the pilot and/or copilot inputs : acting on the normal trim actuator moves the AFU zero reference in order to obtain a zero reaction force.



AILERON TRIM SCHEMATIC

In case of aileron control linkage jamming, the emergency trim allows to control directly the LH aileron servo actuator.

Normal and emergency trim operation are commanded through switches located in the flight deck center pedestal.

NOTE

Emergency aileron trim is operative even when airplane is not powered. When the emergency aileron trim actuator is out of the neutral position, the **AIL ZERO** CAS message appears.

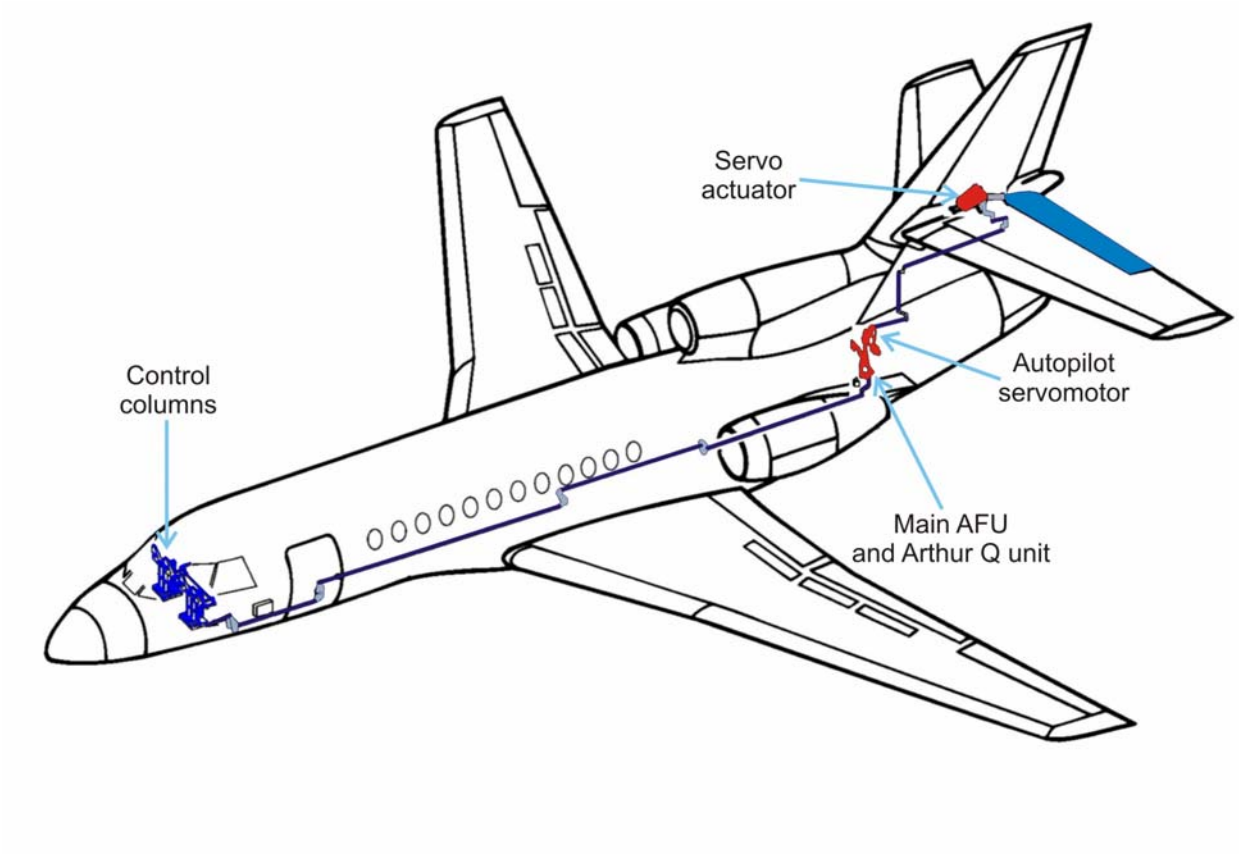
PITCH CONTROL

Longitudinal control of the airplane is provided by the elevators and supplemented by a moveable horizontal stabilizer. Each elevator is attached to and operated by one servo actuator. This servo actuator is powered by the two independent hydraulic system and mechanically controlled by movement of either pilot or copilot control column.

The elevator flight control channel is composed of:

- main and auxiliary spring-loaded AFU,
- an Arthur variable bell crank,
- a horizontal stabilizer trim.

The anti-gust calibrated valve included within the elevator servo-actuator allows to slow down the elevator to the full down position after engine shutdown.



PITCH CONTROL SYSTEM

ELEVATOR ARTHUR VARIABLE BELL CRANK

The elevator Arthur unit is hydraulically actuated by No 1 hydraulic system.

The variable bell crank is included within the pitch control channel to adjust artificial load feel with respect to the position of the horizontal stabilizer. This parameter reflects the balance between the airplane speed and center of gravity.

The elevator Arthur control box continuously monitors the Arthur position. In case of deviation of the Arthur position with respect to the theoretical position computed using the horizontal stabilizer position, the **PITCH FEEL** CAS message appears.

An Arthur unit failure is automatically followed by a low speed Arthur configuration reversion. This may cause lower control forces than normal.

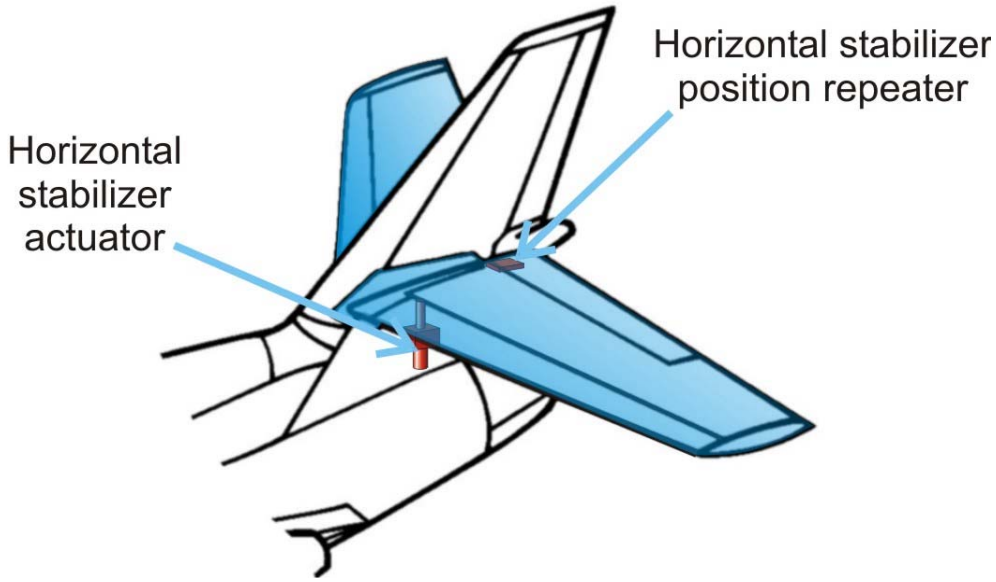
CAUTION

In-flight Arthur unit failure induces speed limitations.

HORIZONTAL STABILIZER TRIM

The fully movable horizontal stabilizer is actuated by two electrical motors for normal and emergency modes.

The horizontal trim system provides pitch trim by varying the angle of incidence of the horizontal stabilizer from +2° nose-down and -10° nose-up.



ELEVATOR TRIM SYSTEM

For takeoff, the stabilizer must be set between -4.5° and -6.5° (green range).

When on ground and at least one throttle is advanced with the stabilizer out of the takeoff range, the "NO TAKE OFF" aural warning and the NO TAKE OFF CAS message are triggered. The tick mark in the synoptic also turns red.

CAUTION

The pitch trim indication must be located in the green area for take-off.

Paint marks are provided on the fin for takeoff range and extreme positions of the stabilizer for on-ground visual inspection.

PAINT MARKS FOR VISUAL TRIM POSITION INSPECTION

A clacker warns that the stabilizer is moving whatever command comes from (pilot, copilot or autopilot).

The emergency pitch trim allows to actuate the stabilizer after normal stabilizer trim failure.

Horizontal stabilizer operations are commanded:

- by switches located on pilot/ copilot yoke for normal operation,
- by a lever located on the flight deck center pedestal for emergency operations.

NOTE

Acting on the emergency trim lever automatically disengages the normal trim circuit breaker located near the emergency trim lever. This makes the normal operating circuit inoperative.

HORIZONTAL STABILIZER / MACH TRIM OPERATION

To increase natural longitudinal stability at high Mach numbers, the Mach trim system automatically becomes active above Mach .775. The Mach trim control box supplies pitch trim command inputs to the elevator trim to adjust the stabilizer position as the Mach number changes. A clacker sound warns the stabilizer is moving.

With the Mach trim system engaged, the normal trim can be used at any time to adjust stabilizer position. Once the normal pitch trim switch is released, the Mach trim system resumes automatic operation.

CAUTION

In-flight Mach trim failure induces speed limitations when manually flying the airplane.

NOTE

Mach trim is overridden by normal trim and autopilot activation.

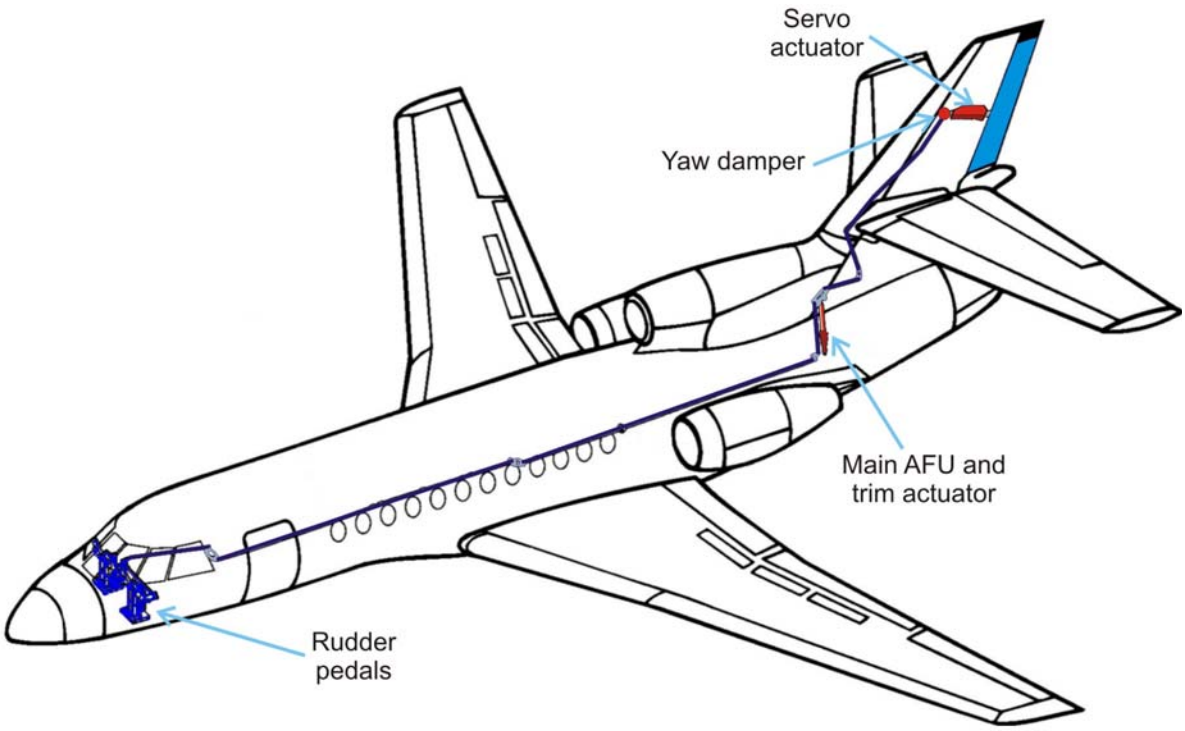
RUDDER

Airplane yaw control is provided by the rudder, assisted by a yaw damper system.

The rudder is attached to and operated by one servo actuator. This servo actuator is powered by the two independent hydraulic systems and mechanically controlled by movement of either pilot or copilot rudder pedals.

The yaw control channel includes:

- main and auxiliary spring-loaded AFU,
- a rudder trim unit,
- a yaw damper system.



RUDDER CONTROL SYSTEM

RUDDER TRIM UNIT

The rudder trim actuator is an electrical screw jack.

The trim unit allows to adjust the on-center position of the rudder: pilot or copilot command on the trim moves the AFU zero reference in order to obtain zero reaction force.

Rudder trim operations are commanded by a switch located on the center pedestal.

YAW DAMPING SYSTEM

An electrically powered actuator (B2 bus) is installed within the rudder control linkages upstream from the main rudder servo-actuator. It compensates the yaw oscillations by inputs to the control linkage.

The yaw damping system reduces oscillations around the airplane yaw axis. It engages automatically on ground at airplane power up or in flight at AutoPilot engagement.

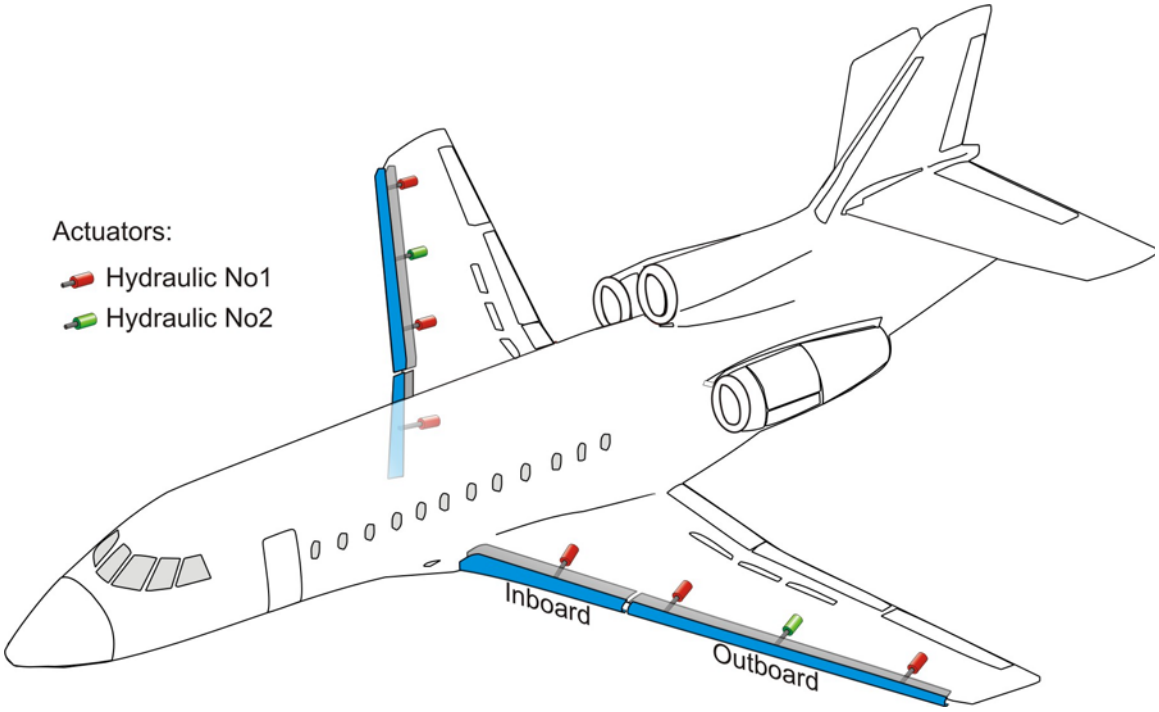
SECONDARY FLIGHT CONTROLS

Secondary flight controls include electrically controlled and hydraulically actuated leading-edge slats, trailing-edge flaps and airbrakes.

LEADING-EDGE SLATS

The slat assembly aims at increasing the lift at low speeds. It includes inboard and outboard slats, not operating the same way.

The slats are controlled by the slats / flaps control handle located in the flight deck center pedestal for normal operations. They can also be operated by a switch located at the right side of the control handle allowing extension only of outboard slats for emergency operation.



LEADING-EDGE SLATS SYSTEM

- **Outboard slats:**

  Three hydraulic actuators power each outboard slats. Two double-acting units provide both retraction and extension during normal slats operation and are powered by No 1 hydraulic system. The third actuator provides only emergency extension with hydraulic power supplied by No 2 system.

  In case of bus failure, the outboard slats remains operative thanks to the battery bus.

- **Inboard slats:**

  One differential actuator powers extension and retraction of the inboard slats with No1 hydraulic system power. The inboard slats cannot be extended in the emergency mode.

  The slat actuators are designed to maintain the slats in the retracted position in case of No 1 hydraulic system failure.

- **Slat operation**

  Slats operation is electrically sequenced. The extension occurs in two phases : the outboard slats are fully extracted first. Then the inboard slats are extended at the same time as the flaps. During retraction, inboard slats and flaps are first fully retracted before allowing the outboard slats retraction. The monitoring of slat extension and retraction is performed through micro-switches.

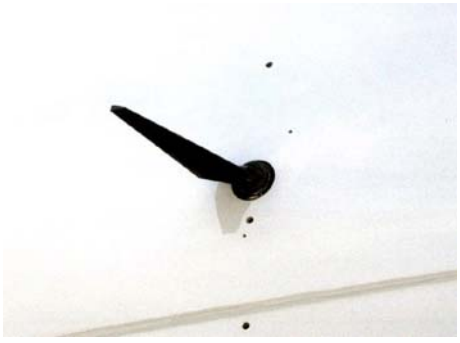
  The slats are operated in three modes, normal, emergency and automatic:

  - the normal operation mode consists in deploying and retracting the slats and flaps using the slats / flaps control handle,
  - the emergency slats extension is manually activated in flight by a guarded switch located on the center pedestal. It allows to extend the outboard slats for approach in the event of a No1 hydraulic system failure.

NOTE

When the EMERG SLATS switch has been used, the slats retraction is not possible.

  - the automatic operation mode is active in flight and is controlled according to Angle of Attack (AOA). Slats are automatically extended or retracted when the airplane angle of attack (AOA) exceeds different thresholds depending on the airplane configuration. If airplane AOA is too high,
    - in the clean configuration, outboard slats are extended (AOA > 11°),
    - in the slat / flap extended configuration, inboard slats are retracted (AOA > 23°, inboard slats are re-extended when airplane AOA recovers an acceptable value).



ANGLE OF ATTACK PROBE

It can be noted that engine ignition is activated in conjunction with slat automatic extension and retraction and that the "STALL" aural warning is triggered.

The automatic mode is active in flight only (Weight On Wheel signal) and is inhibited when airspeed is above 265 kt.

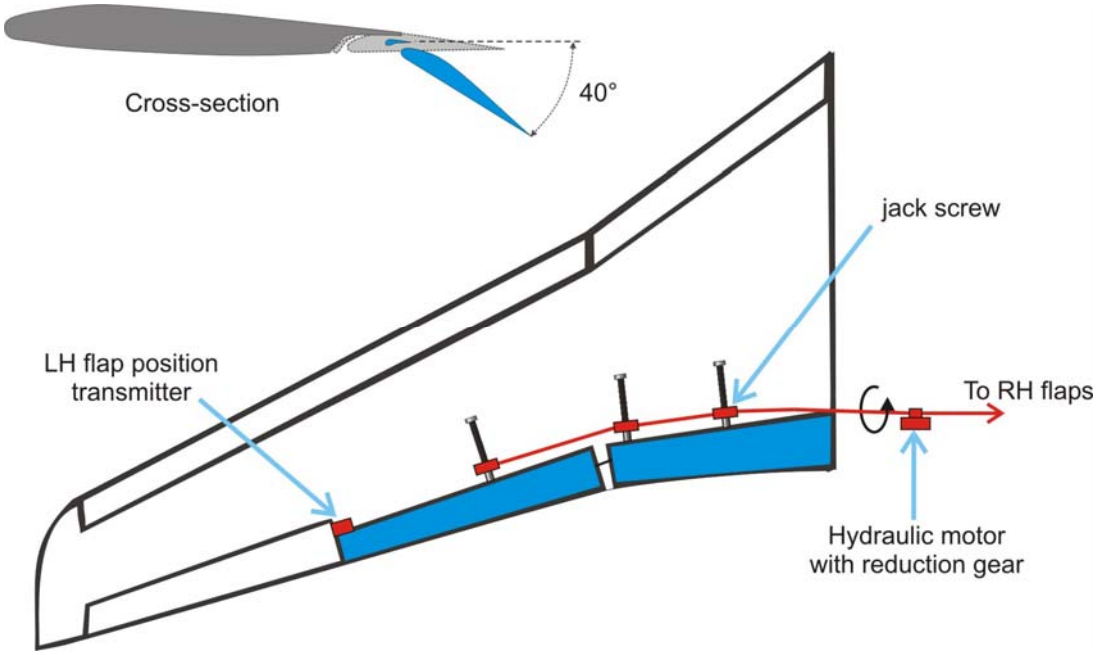
When the airplane is on the ground, if slats are not extended and at least one throttle is advanced, an audio <no take-off> warning in addition to the **NO TAKE-OFF** CAS message occurs.

TRAILING-EDGE FLAPS

As well as slats, the flap assembly aims at increasing the lift at low speeds.

The trailing-edge flaps consist of an inboard and outboard double slotted flaps on each wing. The same control handle as the slats, located in the flight deck center pedestal allows to operate the flaps together with the slats.

Flaps are actuated by a geared hydraulic motor powered by the No 2 hydraulic system. A spring-loaded brake within the motor holds the flaps in their selected position. Flap position is monitored by micro-switches.



FLAPS SYSTEM

Flaps selections are:

- SF1 (slats + flaps 7°),
- SF2 (slats + flaps 20°),
- SF3 (slats + flaps 40°).

The selection of the SF1 position sequences the outboard slats extension prior to flaps and inboard slats deployment.

The difference between right and left flaps position is continually monitored to detect a possible asymmetry. In case of asymmetry detection, the **FLAPS ASYM** CAS message appears and the related flap control circuit breaker trips, stopping the flaps movement.

CAUTION

Selection of SF2 or SF3 notch directly from the CLEAN notch is forbidden.

On the ground, in take-off configuration, the <NO TAKE-OFF> aural warning, the **NO TAKE-OFF** CAS message appears and the flap symbol, on HSI window, turns to red if:

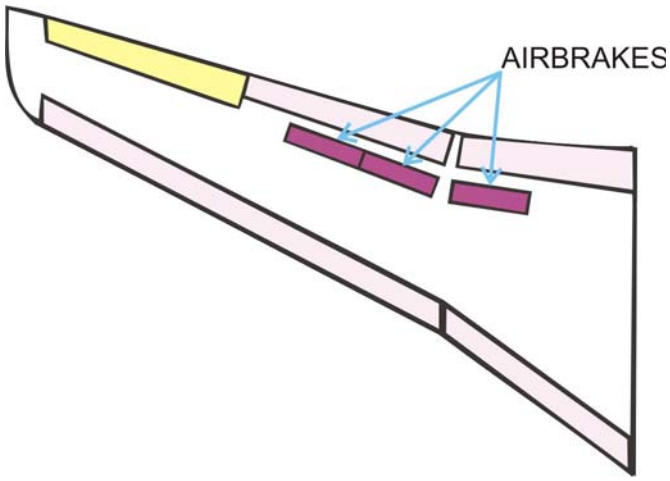
- the flaps are not deployed or are set to SF3, and
- at least one throttle is advanced beyond the 84° power lever angle.

AIRBRAKES

The airbrake assembly is designed to increase airplane drag in order to slow down the airplane. They can be operated either on ground or in flight.

Three airbrake panels are provided for each wing upper surface. The airbrakes are hydraulically actuated and electrically controlled.

The airbrakes handle is located in the flight deck center pedestal. The normal operation mode allows selection of three notches of the handle. Setting airbrake handle to notch 0 induces all airbrake retraction. Setting the handle to the notch 1 causes the extension of the center airbrake panels. Selecting notch 2 causes the extension of all six airbrake panels.



AIRBRAKES PANELS LOCATION

NOTE

The airbrakes must not be actuated (extended or retracted) during flight within 300 feet AGL.

Each panel is either fully deployed or fully retracted. Depending on the panel location (inboard, center or outboard), the deflection angle of the panel when fully extended varies. Switches allow the system to monitor airbrakes panel position.

An automatic mode allows automatic airbrakes extension at landing and during Rejected Take-off (RTO). The airbrakes are automatically retracted when speed decreases below 20 kt. This automatic function enhances global braking action during landing or rejected take-off and reduces bounces after a touchdown.

This mode of operation of the airbrakes depends on throttle angles and on Braking System Computer Unit (BSCU) logic.

The AUTO EXT pushbutton (amber DISARM status light) located on the overhead panel allows the crew to disarm this function.

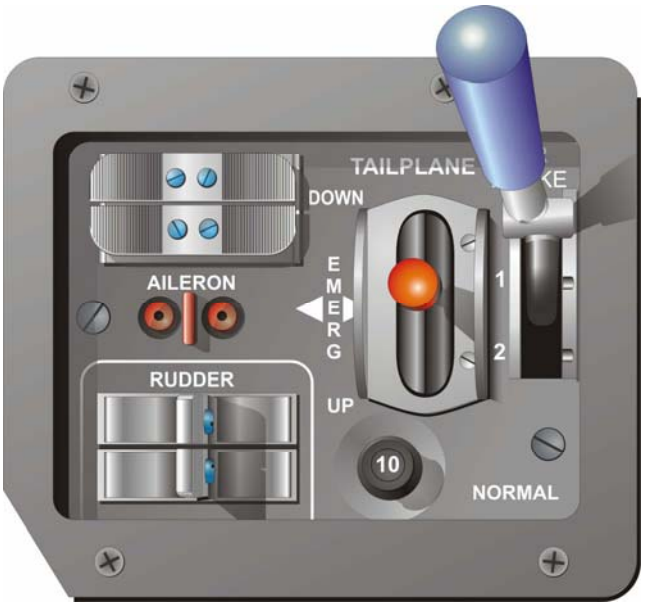
A stall protection feature also commands automatic retraction of the airbrakes when high Angle Of Attack (AOA) is detected by the AOA probes. The AOA threshold for automatic retraction depends on the slats / flaps control handle notch.

When automatically retracted, the airbrakes can not be extended again until the handle is returned to the notch 0, recycling the system.

On ground, in take-off configuration, if at least one airbrake panel is not retracted there is a <NO TAKE-OFF> aural warning and the **NO TAKE-OFF** CAS message appears. The airbrake symbol on HSI window and AB1 or AB2 label on speed scale turn to red.

CONTROL

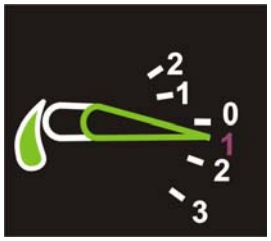
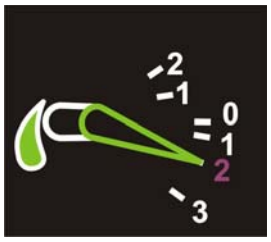
SLAT AND FLAP CONTROL HANDLE



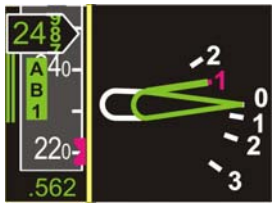
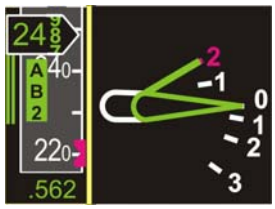
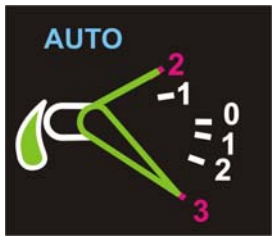
NORMAL AND EMERGENCY TRIM CONTROLS

SYNTHETIC TABLES

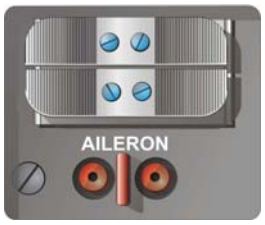
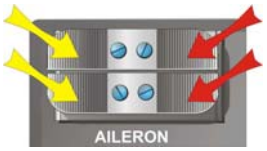
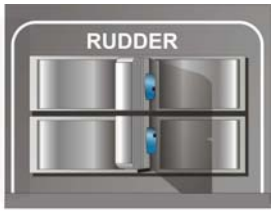
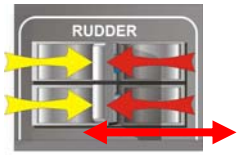
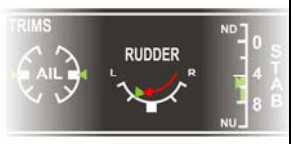
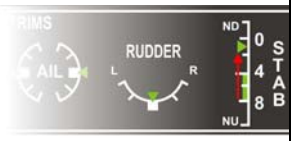
Slats and flaps

CONTROL	FUNCTION	TO ACTIVATE TO DEACTIVATE	SYNOPTIC
	Sets slats / flaps to CLEAN notch: (Slats + Flaps retracted)		
	Sets slats / flaps to first notch: SF1 (Slats + Flaps 7°) The SF1 position is only displayed after external slats extension.		
	Sets slats / flaps to the second notch: SF2 (Slats + Flaps 20°) (Flaps 22° during retraction from SF3)		
	Sets slats / flaps to the third notch: SF3 (Slats + Flaps 40°)		
	Extends the outboard slats in emergency mode.		

Airbrakes

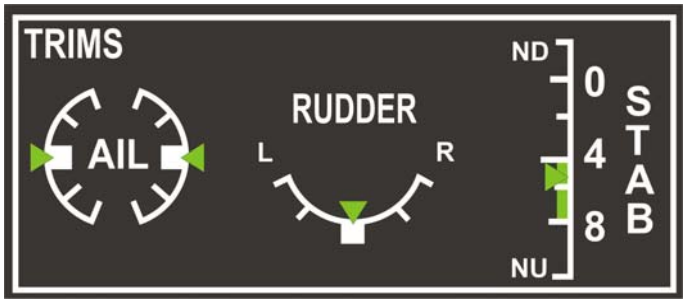
<table>
<tr><th>CONTROL</th><th>FUNCTION</th><th>TO ACTIVATE
TO DEACTIVATE</th><th>SYNOPTIC</th></tr>
<tr><td rowspan="3">  </td><td>Sets airbrakes to CLEAN notch:
(airbrake panels retracted)</td><td>  </td><td>  </td></tr>
<tr><td>Sets airbrakes to first notch:
1 (center airbrake panels deployed)</td><td>  </td><td>  </td></tr>
<tr><td>Sets airbrakes to second notch:
2 (inboard, center and outboard airbrake panels deployed)</td><td>  </td><td>  </td></tr>
<tr><td> 
Pushbutton</td><td>Arms / disarms automatic airbrake extension.</td><td> 
AUTO EXT mode operative</td><td>  </td></tr>
<tr><td></td><td> 
AUTO EXT mode disarmed</td><td>  </td></tr>
</table>

Normal and emergency trim

CONTROL	FUNCTION	ACTIVATION	ENG/TRM/BRK WINDOW
	Activates aileron left or right trim (trims roll axis). (Push both halves of the switch.)		
	Activates emergency aileron left or right trim (trims roll axis).		No synoptic
	Activates rudder left or right trim (trims yaw axis). (Push both halves of the switch.)		
	Activates horizontal stabilizer to move up or down (trims pitch axis). (Push both halves of the switch.)		
	Activates emergency horizontal stabilizer up or down (trims pitch axis) and deactivates primary trim.		

INDICATION

Aileron, rudder and horizontal stabilizer trim positions are displayed in the ENG-TRM-BRK windows on pilots request or as soon as one trim surface movement is detected (including untimely or non-commanded movement). A green mark-up moves along a graduated scale to indicate trim surface position. A green range also defines the authorized settings for take-off on the horizontal stabilizer graduated scale.



ENG/TRM/BRK WINDOW, TRIM POSITIONS

NOTE

In cruise, after trimming the airplane, it is usual to have aileron and rudder trim indicators not centered (due to differential dilatation of aileron linkage rods).

Horizontal stabilizer position is also permanently displayed in the top left hand corner of the HSI window. Any movement of the horizontal stabilizer generates a clacker sound in the aural warning system.

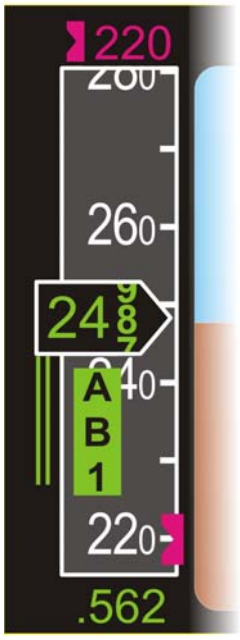
HSI WINDOW DISPLAY

Slap, flap and airbrake positions are displayed in the top left hand corner of the HSI window. Several symbols and labels can be displayed in this dedicated area according to the following rules:

- slat / flap / airbrake symbols are displayed as long as:
  - there is one slat, one flap or one airbrake panel extended (including untimely or non-commanded surface movement), or
  - there is a flight control CAS message displayed, or
  - a flight control label is triggered (AUTO, EMERG, AUTO RET, DISARM).
- the slat / flap / airbrake symbols are replaced by a white CLEAN label if:
  - the airplane is in the CLEAN configuration,
  - no flight control CAS message appears, and
  - no flight control label is triggered.
- the CLEAN white label is erased (nothing appears) if:
  - the airplane altitude is above 18,000ft, and
  - the CLEAN label has been displayed for 15 s.

Flap handle and airbrake handle positions are shown in the indicator as a magenta tick mark (1, 2 or 3 for flaps indication, 1 or 2 for airbrakes indication).

The airbrake indication label (AB1 or AB2) is also displayed in airspeed tape as a reminder.



AIRSPEED TAPE WITH AIRBRAKES POSITION 1

SLATS, FLAPS AND AIRBRAKES SYMBOLS

Airplane is in CLEAN configuration, no flight control CAS message appears and no flight control label is triggered.

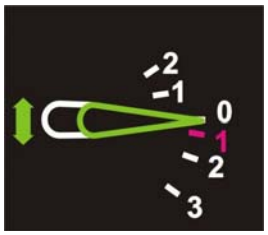
CLEAN label has been displayed for 15 s (see conditions associated to the CLEAN white label) and airplane altitude is above 18,000ft.

Slat / flap / airbrake indications are not valid.

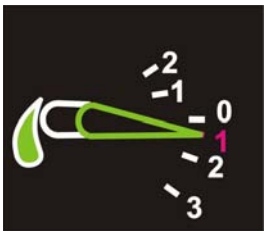
SLAT SYMBOL

Slats extension sequence

Control handle in CLEAN notch.
Inboard and outboard slats are retracted and slat symbol is not displayed.

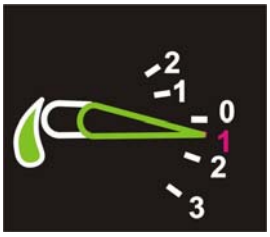


Control handle moved to SF1 notch.
Selecting the SF1 notch causes arrow symbol flashing (green filled to blank).
1 position tick mark is displayed in magenta.

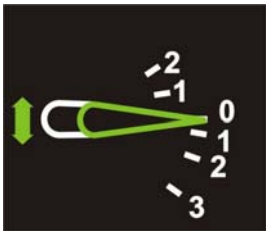


When slats and flaps are extended, slats symbol comes green filled and steady.

Slats retraction sequence



Control handle in SF1 notch. Inboard and outboard slats are extended and slat symbol is green filled.
1 tick mark is displayed in magenta. Flap position, outline green, is in the 7° status.



Control handle returned to CLEAN notch.
Selecting the control handle back to CLEAN causes arrow symbol to flash (green filled to blank).
1 tick mark is displayed in white.

When both slats are retracted, slat symbol is not displayed. Flap position, outline green, is in 0° status.

Slat malfunction, automatic an emergency operations

No take-off: slat symbol is flashing red.
The configuration is not allowed for take-off.

Discrepancy between slat control and slat position.

Automatic slat movement.

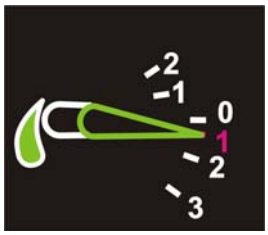
Slats automatically extended.

Emergency slat movement

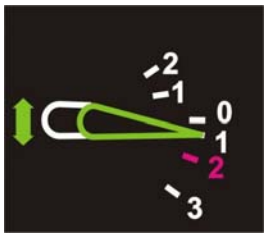
Slats extended by emergency system (no retraction).

FLAPS SYMBOL

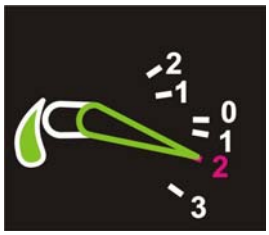
Flaps extension from SF1 to SF2 (from CLEAN to SF1: identical to slat extension)



Control handle in SF1 notch : flaps are extended to a deflection angle of 7°, tick marks and labels 0, 2, 3 are displayed in white, label 1 is displayed in magenta and flap symbol, outline green, is in status 1. Slats are extended (green filled).

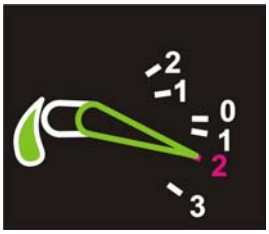


Control handle moved to SF2 notch. Selecting the control handle to the SF2 notch causes tick mark and label 2 to be displayed in magenta.

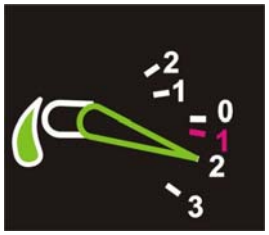


When flaps reach the notch of 20°, tick mark and label 2 are displayed in magenta. Flap symbol, outline green, is in status 2.

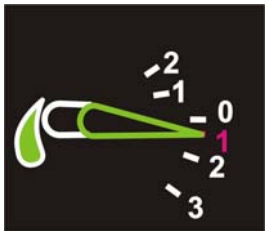
Flap retraction from SF1 to SF2 (from SF1 to CLEAN: identical to slat extension)



Control handle in SF2 notch : flaps are extended to a deflection angle of 20°, tick marks and labels 0, 1, 3 are displayed in white. Label 2 is displayed in magenta and flap symbol, outline green, is in status2. Slats are extended (green filled).



Control handle moved to SF1 notch: tick marks and labels 0, 2 and 3 are displayed in white, tick mark and label 1 are displayed in magenta. Flap symbol, outline green, is in status 2.



When flaps reach the position of 7°, tick mark and label 1 are displayed in magenta, flap symbol, outline green, is in status1.

No take-off: flap symbol is flashing red. The configuration is not allowed for take-off.

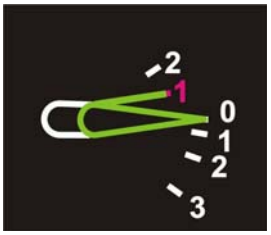
Flap failure.

AIRBRAKES SYMBOL

Airbrakes extension (from AB0 to AB1)

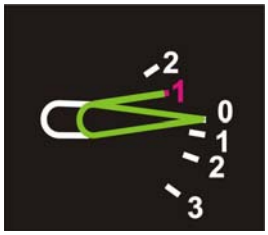
Control handle in notch 0. Airbrakes are retracted and airbrake symbol is not displayed.

Control handle moved to notch 1. Selecting the control handle to notch 1 causes tick mark and label 1 to be displayed in white.



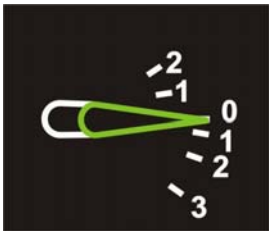
When airbrakes are deployed, airbrake symbol is displayed in position1. Tick mark and label 1 are displayed in magenta.

Airbrake retraction (from AB1 to AB0)

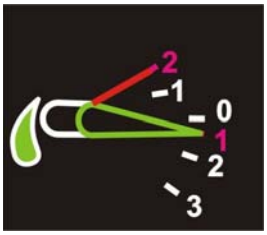


Control handle in notch 1 Airbrakes are deployed, airbrake symbol is displayed in position 1. Tick mark and label 1 are displayed in magenta.

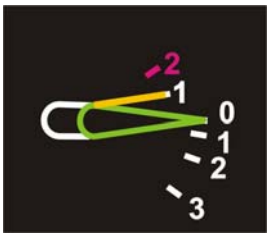
Control handle moved to notch 0. Selecting the control handle to position 0 causes tick mark and label 1 to be displayed in white.



When airbrakes are retracted, airbrake symbol is no more displayed.

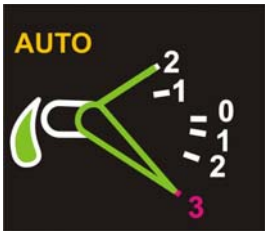


No take-off: airbrake symbol is flashing red. The configuration is not allowed for take-off.



Airbrake failure.

Automatic retraction (stall protection).



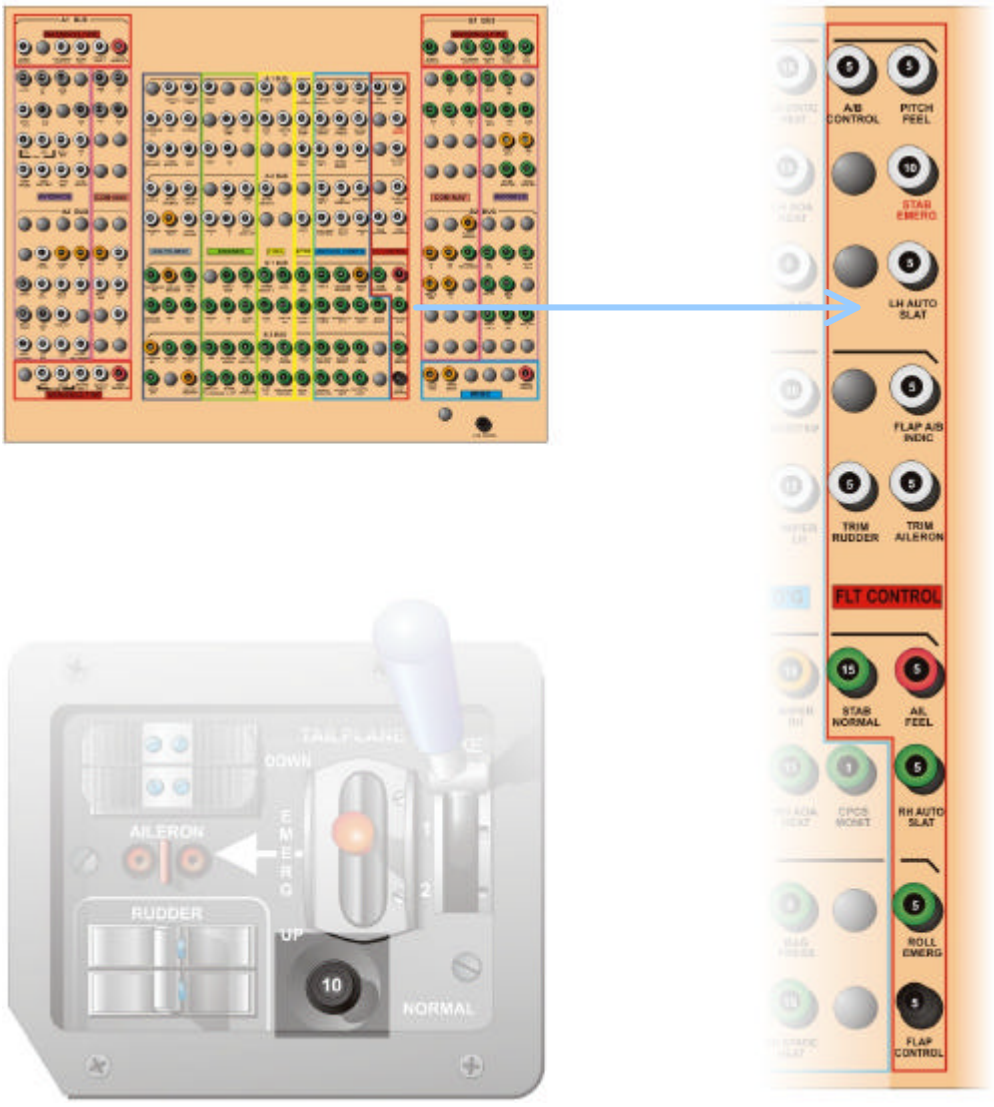
Automatic extension.

Airbrakes in DISARM mode: no automatic extension.

INTRODUCTION TO SYSTEM PROTECTION

The circuit protection is provided by conventional trip-free circuit breakers located above the overhead panel and on the center pedestal.

CIRCUIT BREAKERS



OVERHEAD AND PYLON CIRCUIT BREAKERS

PLACARD MARKINGS

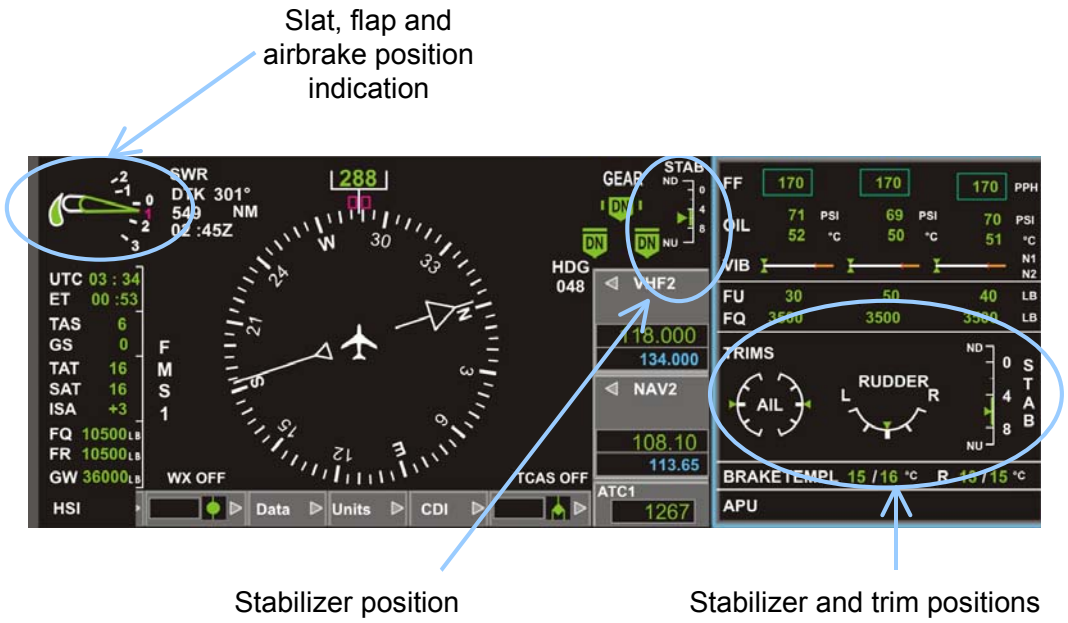
SPEED LIMITATIONS PLACARD MARKINGS

The above placard are located on the left side of the pilot PFD and on the right side of the copilot PFD.

INTRODUCTION

In the following, typical on ground and in-flight situations have been selected to help the crew to understand the symbols provided in the various panels and displays.

ON GROUND



PDU DISPLAY ON GROUND WITH FLAPS SET FOR TAKE-OFF

IN-FLIGHT

PDU DISPLAY IN FLIGHT BELOW 18,000FT

INTRODUCTION

In the following, abnormal operations have been selected to help the crew to understand the CAS message philosophy for flight controls.

SLAT ABNORMAL OPERATION

CONTEXT	RESULT
Inboard slats do not extend	- **INBD SLATS FAIL** CAS message - Slat symbol is amber.
Outboard slats do not extend	- **OUTBD SLATS FAIL** CAS message - Slat symbol is amber - Use EMERG SLATS
Unwanted outboard slats movement	- **UNWANTED OUTBD SLATS** CAS message - Slat symbol is amber
Failure of automatic slat extension system	- **AUTOSLATS** CAS message

No 1 HYDRAULIC SYSTEM FAILURE

The slats are only powered by the emergency actuators. Outboard slats only can be extended and not retracted (for landing only).

The aileron, rudder and elevator control surfaces are still hydraulically powered.

Flaps and airbrakes are operating normally.

No 2 HYDRAULIC SYSTEM FAILURE

Flaps and airbrakes are inoperative.

The aileron, rudder and elevator control surfaces are still hydraulically powered.

Slats are operating normally.

No 1 AND 2 HYDRAULIC SYSTEM FAILURE

Slats, flaps and airbrakes are inoperative.

The aileron, rudder and elevator control surfaces are only mechanically actuated.

JAMMING

In the event of jamming of the aileron linkage, roll control is obtained through the electric emergency actuator of the left hand aileron.

In case of jamming of the elevator linkage, the horizontal stabilizer trim allows pitch control.

CAS MESSAGES

CAS MESSAGE	DEFINITION
NO TAKE-OFF	Airplane is not properly configured for take-off
AIL FEEL	Failure of aileron Arthur unit
AIL ZERO	Aileron Emergency trim not in neutral position
AIRBRAKES AUTO EXTENSION	Airbrakes automatic extension malfunction
AIRBRAKES DO NOT EXTEND	One airbrake failed to extend when commanded
AIRBRAKES DO NOT RETRACT	Airbrakes not retracted despite of retraction command
AUTO SLATS	Automatic slats extension system failure
FLAP ASYM	Flaps asymmetry detected
INBD SLATS FAIL	Inboard slats failed to retract or extend when commanded
OUTBD SLATS FAIL	Outboard slats failed to retract or extend when commanded
PITCH FEEL	Wrong position of pitch Arthur actuator
UNWANTED OUTBD SLATS	Abnormal outboard slats operation
STAB EMERGENCY	Stabilizer emergency trim has been used Normal control circuit breaker is tripped