

	FLIGHT CONTROLS		1.27.50	P 1
	FLAPS AND SLATS		SEQ 001	REV 15

DESCRIPTION

GENERAL

Lift augmentation is achieved on each wing by :

- 2 flaps surfaces
- 7 slats surfaces
- 2 ailerons (aileron droop function)

These surfaces are electrically-signalled and hydraulically-operated.

Slats and flaps are selected by the «FLAPS» lever, located on the center pedestal, which has 5 positions.

MAIN COMPONENTS

Slats and Flaps systems are similar, and consist of :

- Two Slats/Flaps Control Computers (SFCC), each containing one flap and one slat channel.
- A Power Control Unit (PCU), consisting of 2 independent hydraulic motors coupled to a differential gearbox. The motors driven by the related channel, are supplied by blue and green hydraulic power for the slats, and green and yellow for the flaps.

Pressure-Off Brakes (POB) are installed to lock the transmission when the flaps or slats surfaces have reached the selected position, or in case of hydraulic power failure.

- 7 Slats and 2 Flaps surfaces per wing.
- Two Asymmetry Position Pick-Off Units (APPU) measure the asymmetry between the left and right wings.
- A flap disconnect detection system, which detects attachment failure and inhibits flap operation in order to limit further damage. The failure is detected by a sensor measuring excessive differential movement between the inner and outer flaps.
- Wing tip brakes (WTB), activated in case of asymmetry, overspeed, or symmetrical runaway. They cannot be released in flight. They are supplied by blue and green hydraulic power for the slats, and by green and yellow for the flaps.
- The Feedback Position Pick-Off Units (FPPU) provide position feedback to the SFCCs.
- The Instrumentation Position Pick-Off Unit (IPPU) provide position data to the ECAM.

Note : *If the flap wing tip brakes are activated, slat operation is still possible and vice versa.*

If one SFCC is inoperative, both slats and flaps will operate at half speed.

If one hydraulic system is inoperative, the corresponding surfaces (slats or flaps) operate at half speed.

FOR INFO



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CONFIGURATIONS

The FLAPS lever has 5 positions: 0, 1, 2, 3 and FULL.

Two configurations correspond to the FLAPS lever position 1 : CONF 1 or CONF 1+F.

The selection is done as explained in the following paragraphs.

AUTOMATIC RETRACTION SYSTEM (ARS)

When CONF 1+F is selected, the auto retraction of flaps to 0 occurs at 215 knots (before VFE, which is 233 knots).

FLAP LOAD RELIEF SYSTEM (FLRS)

Only available in CONF 2, 3, or FULL. When activated, the system retracts the flaps to the deflection corresponding to the next retracted lever position.

Auto retraction of the flaps only occurs in case of VFE exceedance (VFE + 2.5 knots).

If speed is reduced below VFE (VFE – 2.5 knots), flaps return to their normal (selected) position.

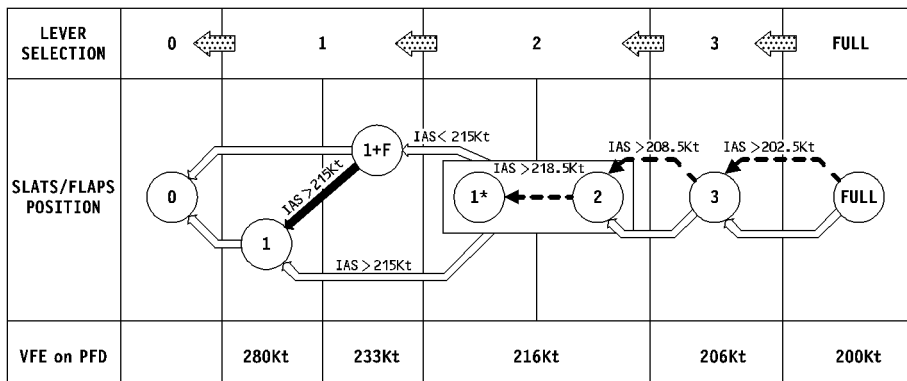
In CONF 2, auto retraction results in CONF 1* (24° slats/17° flaps), which can only be obtained only by FLRS activation.

- Note :** 1. When FLAPS 1 is selected, VFE of CONF 1 or CONF 1 + F is displayed, depending on the actual configuration. In approach, VFE next is 225 knots (VFE of CONF 1*).
2. When FLAPS 2 is selected in approach, VFE of CONF 2 or CONF 1* is displayed, depending on the FLRS activation.

In case of FLRS activation, the ECAM upper display shows a flashing “RELIEF” message.

If the speed is increased by 4 knots above the VFE, corresponding to the actual flap/slat configuration, an overspeed warning appears on the ECAM.

RETRACTION

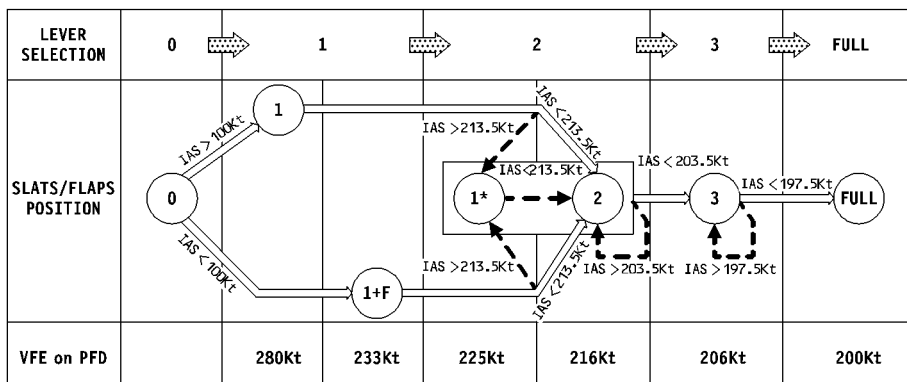


-----> FLAP LOAD RELIEF SYSTEM

————> AUTOMATIC RETRACTION SYSTEM

———> MANUAL SELECTION

EXTENSION



-----> FLAP LOAD RELIEF SYSTEM

————> AUTOMATIC RETRACTION SYSTEM

———> MANUAL SELECTION

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SLATS ALPHA / SPEED LOCK FUNCTION

This function inhibits slats retraction at a high angle-of-attack and/or at low speed.

The SFCCs use a corrected angle-of-attack (alpha), or air speed information from the ADIRUs to inhibit slat retraction.

If alpha exceeds 8.5 degrees, or the speed falls below 148 knots, the retraction from position 1 to 0 is inhibited.

The inhibition is removed when alpha falls below 7.5 degrees, or when the speed exceeds 154 knots. In this case, the slats automatically retract to 0.

The function is not active if:

- Alpha exceeds 8.5 degrees, or the speed falls below 148 knots after the lever has been set to 0.
- Aircraft is on the ground, with the speed below 60 knots.

SIGNALS TO OTHER SYSTEMS

The SFCCs transmit flaps/slats positions to the following systems :

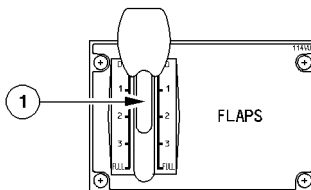
- PRIM and SEC
- FMGC
- ADIRU
- EIU
- CIDS
- GPWS

Note : *The ECAM system receives the position information directly from the IPPU (Instrumentation Position Pick-Off Unit). This information is used for warnings and position indications on the E/WD.*

CONTROLS AND INDICATORS

PEDESTAL

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① FLAPS lever

The FLAPS lever selects simultaneous operation of the slats and flaps.

The five lever positions correspond to the following surface positions :

Lever Position	SLATS	FLAPS	AILERONS	Indication on ECAM	Flight phase	
0	0	0	0			CRUISE
1	20	0	0	1		HOLD
2		17	10	1 + F	TAKEOFF	
	24	17	10	2(a)		
3	24	22	10	2	TAKEOFF	APPR
FULL	24	29	10	3		
	24	34	10	FULL	LDG	

(a) This slats/flaps position corresponds to CONF 1*

Before selecting any position, the lever must be pulled out of detent.

Moreover, balks are provided at Positions 1 and 3 to avoid excessive flap/slat travel demand by a single pilot action.

Note : It is not possible to select an intermediate lever position.

Takeoff in CONF 1 :

CONF 1 + F (21 / 17) is selected. The flaps automatically retract at 215 knots.

Takeoff or go-around in CONF 2 or 3 :

At FLAPS 1 selection : CONF 1 + F (21 / 17) is selected, if speed it less than 215 knots.

Then, the flaps automatically retract at 215 Knots.

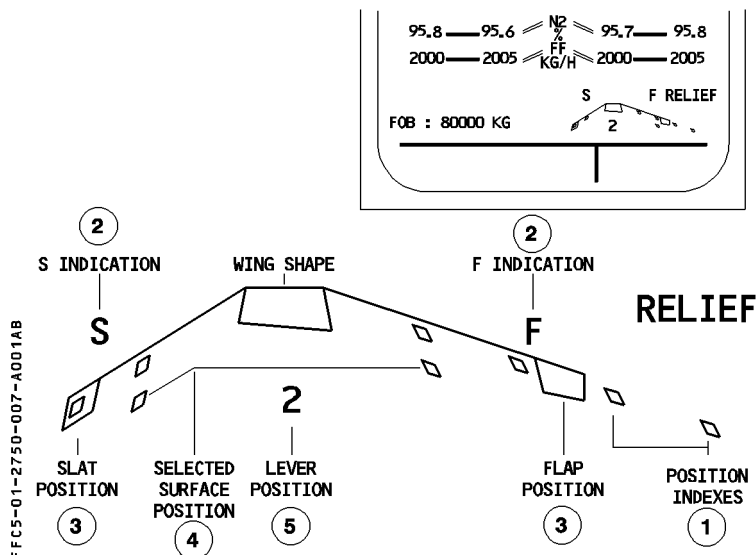
0 to 1 above 100 Knots :

CONF 1 (21 / 0) is selected.

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Note : After flaps retraction, CONF 1+F is no longer available until the speed is 100 kt or less, except if CONF 2 or more has been previously selected.

ECAM UPPER DISPLAY



① Position indexes:

A fixed grey center part, and two plus four white dots, show all the flaps and slats positions. The white dots are not displayed in clean configuration.

② F and S

Normally white. Not displayed in clean configuration.

The F symbol is :

- replaced by the amber “F LOCKED” message, when wing tip brake is applied to flaps.
- replaced by the green pulsing “F RELIEF” message when the flap load relief system is activated.
- displayed in amber at flap system failure or at yellow and green hydraulic system low pressure.

The S symbol is :

- replaced by the amber “S LOCKED” message when wing tip brake is applied to slats.
- replaced by the green pulsing “A LOCK” message when the alpha/speed lock function is activated.
- displayed in amber at slat system failure or at blue and green hydraulic system low pressure.

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③ Flaps/Slats actual position

The green boxes move independently, when flaps/slats are retracted or extended. When fully retracted, boxes are side by side with wing fixed part. The signal is acquired by separate sensors, not used by the SFCC.

Symbols become amber when S (F) LOCKED. The slat box pulses in green, when the alpha/speed lock function is active. The flap box pulses in green, when the flap load relief system is active.

④ Selected position

It is in blue when the surfaces are in transit.

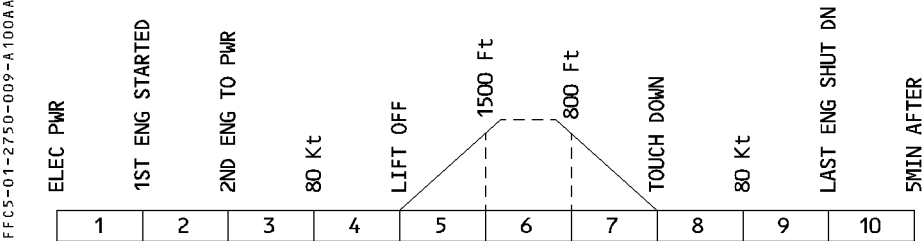
It disappears, when the selected position has been reached.

It is provided by the SFCC.

⑤ Lever position

Numbers and letters indicate the flap/slat position. It is in green when the actual position agrees with the selected position. It is in blue, when the surfaces are in transit. It is not displayed in clean configuration. It is provided by the SFCC.

WARNINGS AND CAUTIONS



E / WD: FAILURE TITLE conditions	AURAL WARNING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
CONFIG SLATS (FLAPS) NOT IN TO CONFIG slats or flaps are not in takeoff configuration when thrust levers are set at TO or FLEX TO or when depressing TO CONFIG pb.	CRC	MASTER WARN	NIL	NIL	5, 6, 7, 8
FLAP LVR NOT ZERO Slat/flap lever is not in zero position and altitude is above 22 000 ft.	CRC				1 to 5 7 to 10
SLATS (FLAPS) FAULT failure of both slat or flap channels	SINGLE CHIME	MASTER CAUT			4, 5, 8
SLATS (FLAPS) LOCKED slats or flaps wing tip brakes applied					1, 2, 4, 5, 6, 7, 8, 9, 10
FLAP/MCDU DISAGREE discrepancy between real TO flaps position and value entered into MCDUPERF TO page					NIL
LVR OUT OF DETENT The flap/slat lever is between two detents.					
SLATS SYS 1 (2) FAULT failure of slat channel in one SFCC					NIL
FLAP SYS 1 (2) FAULT failure of flap channel in one SFCC					
SLAT (FLAP) TIP BRK FAULT failure of one wing tip brake on slats or flaps					