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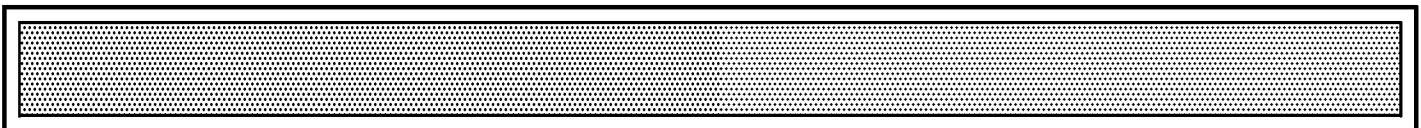
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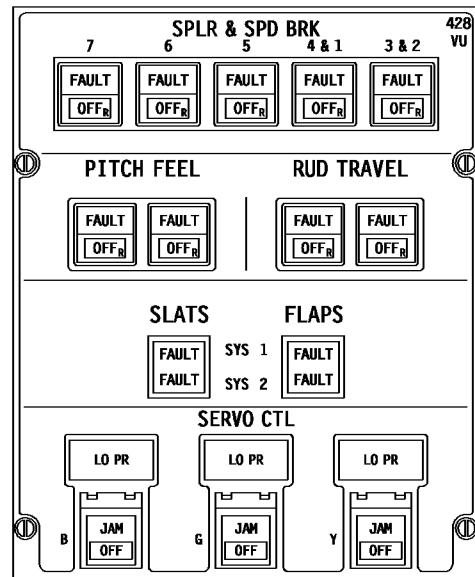
TAKE-OFF CONFIGURATION TEST / TAKE-OFF WARNING

09.50 CONTROLS

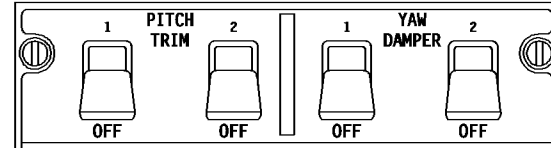
09.51 WARNING LOGICS



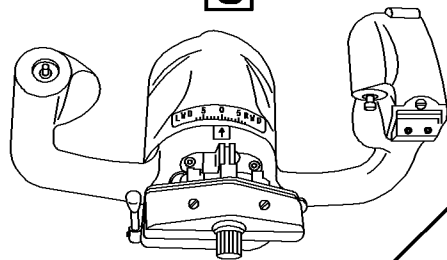
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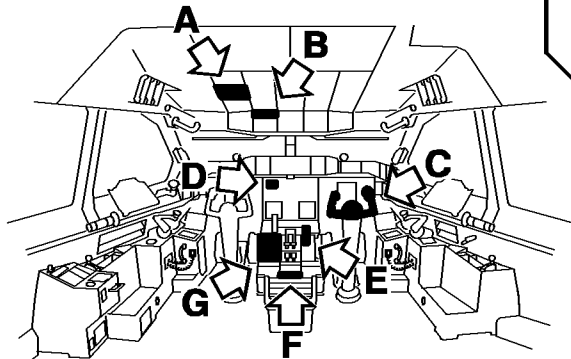
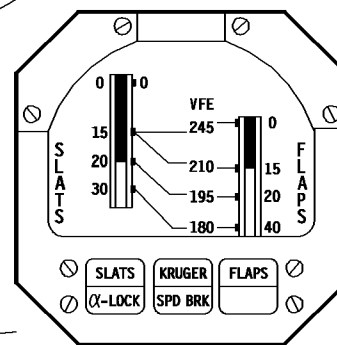
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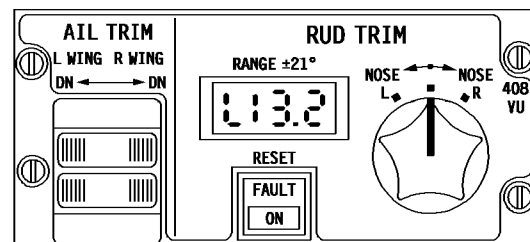
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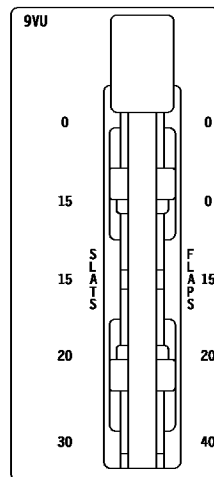
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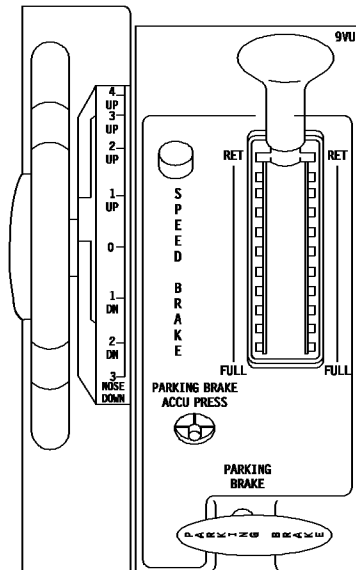
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G



← MAIN SYSTEM CONTROLS AND DISPLAYS

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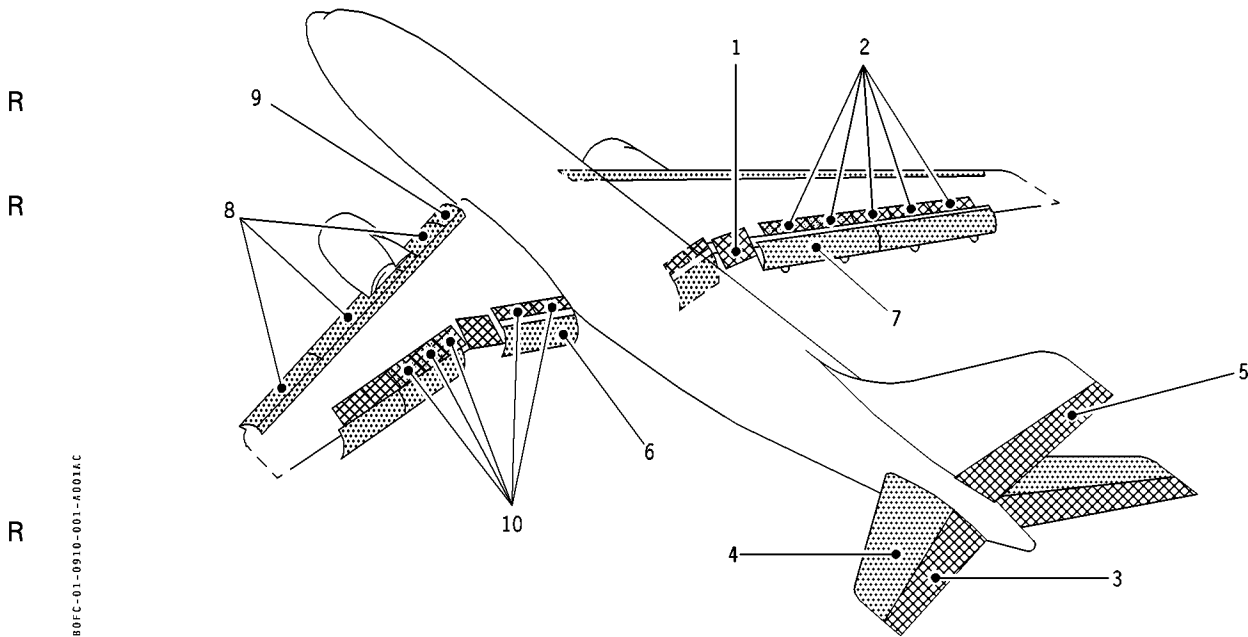
- Control of the aircraft is achieved by:
 - primary flight controls, and
 - secondary flight controls.

PRIMARY CONTROLS

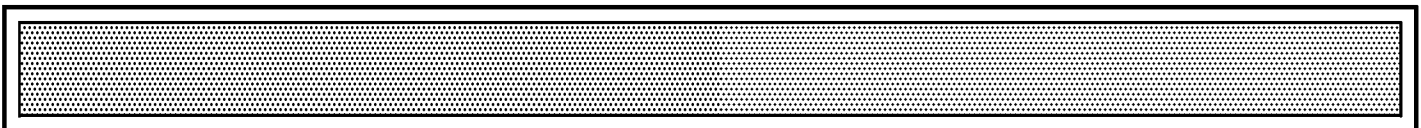
- The primary flight controls are mechanically controlled and hydraulically actuated.
- The primary flight controls ensure **flight path control** and include:
 - **pitch control**, using:
 - the elevators (3), which are hinged to the Trimmable Horizontal Stabilizer, and
 - the Trimmable Horizontal Stabilizer (THS) (4) which provides Pitch Trim.
 - **roll control**, using:
 - 1 aileron (1) per wing, and
 - the 5 outboard spoilers (Nos. 3 to 7) on each upper wing surface, as roll spoilers. (2)
 - **yaw control**, using a single rudder (5).

SECONDARY CONTROLS

- The secondary flight controls are **lift and drag augmenting devices** and includes:
 - **flaps**: there are one double slotted inboard flap (6) and one single slotted outboard flap (7).
 - **slats**: there are three slat sections per wing (inner, center and outer) (8). Associated with the slats a Kruger flap (9) is located on the leading edge of each wing, inboard of the inner slat section.
 - **spoilers**: there are 7 spoilers (Nos. 1 to 7) on each upper wing surface which are used as speed brakes (10), roll spoilers (2) or ground spoilers for lift dumping (all 7 surfaces).



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FLIGHT CONTROLS

DESCRIPTION

GENERAL

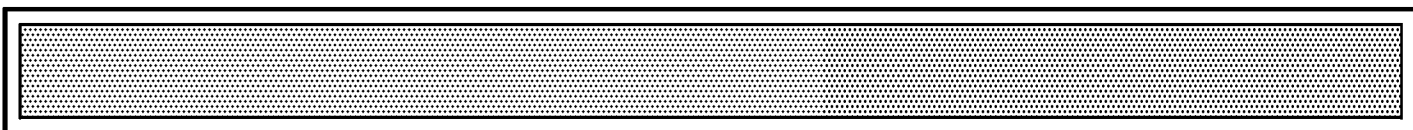
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SERVO CONTROLS

- All flight controls surfaces are operated by hydraulically powered servo-actuators (linear movement) or servo-motors (rotary movement).

Note : For simplicity in the following, "actuator" will be used for "servo-actuator", and "motor" for "servo-motor".

- The THS and Slats/Flaps motors are fitted with pressure-off brakes, which prevent flight controls from moving when the hydraulic pressure to the motor is shut off.
- Each actuator and motor is supplied by one of the three independent hydraulic systems.
- Hydraulic supply to the flight controls is designed with sufficient redundancy so that, with two hydraulic systems depressurized, the remaining hydraulic system can provide safe aircraft control throughout the entire flight envelope.
- Control of the elevator, aileron and rudder actuators (and back-up manual control of the THS motors) is via mechanical linkages from the pilots' controls. (mechanical control-hydraulic actuation)
- Slats/flaps, spoilers, rudder trim and aileron trim actuators are electrically controlled.
- When an AP is engaged, the AP actuators are clutched, and control the rudder, the ailerons and the elevators mechanical linkages (refer AFS chapter 1.03 for AP description and operation).
- In case of jamming of aileron, elevator or rudder actuator, or THS motor, a JAM warning is triggered.

Note : The JAM warning does not mean that the affected flight control is completely jammed, but simply means that one actuator of this flight control surface is not responding to control inputs.

- A servo control (SERVO CTL) shutoff valve can be selected OFF to depressurize the associated servo control manifold, which in turn depressurizes the affected actuator or motor.

- The flight controls supply by respective hydraulic systems is :

BLUE	GREEN	YELLOW
Ailerons	Ailerons	Ailerons
Elevators	Elevators THS Pitch feel 1	Elevators THS Pitch feel 2
Rudder Yaw damper 1	Rudder	Rudder Yaw damper 2
Slats system 1	Slats system 2 Flaps system 2 Kruger Ailerons droop	Flaps system 1
Spoilers 2, 3, 7	Spoiler 5	Spoilers 1, 4, 6,
	AP 1	AP 2

- A priority valve in each hydraulic system closes when the pressure drops below approximately 1900 PSI in order to preserve the continued operation of the primary flight controls.

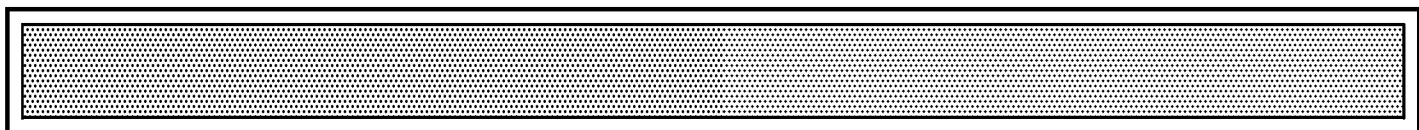
The following flight controls are depressurized by the closing of the associated priority valve :

- Blue : slats system 1.
- Green : flap system 2, slat system 2, Kruger flaps and aileron droop system.
- Yellow : flap system 1 and THS yellow motor.

- **Safety devices :**

To preserve the green hydraulic system from a massive fluid loss in the event of a major structural damage, two hydraulic safety valves (also referred to as hydraulic fuses) are installed :

- up-stream of the kruger flaps actuators (to protect the green hydraulic system in case of an engine rotor burst),
- up-stream of the rudder green system actuator.



FLIGHT CONTROLS

1.09.11

DESCRIPTION

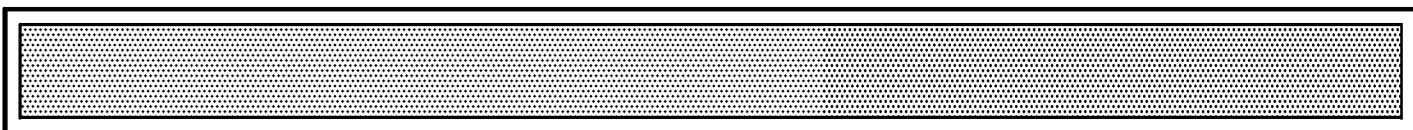
PAGE 2

SERVO CONTROLS

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- Pitch is controlled by the elevators and the Trimmable Horizontal Stabilizer (THS).
- The left and right elevators are connected by a coupling/uncoupling unit.

ELEVATORS

- Each elevator is controlled by the 3 hydraulic systems via 3 actuators, commanded by cable control runs from the Captain and First Officer control columns.
- If an elevator control run jams in flight (except for takeoff) the THS is used for pitch control.
- Fortakeoff, the elevator uncoupling/coupling sequence is as follows :
 - the elevator uncoupling unit (controlled by the Electrical Flight Control Unit, EFCU) uncouples the 2 elevators from 30 kt to 195 kt.
 - 2 bellcranks and detents connecting the front and rear ends of the 2 control runs (see diagram) allow the 2 control runs to be uncoupled so that, in case of elevator control jamming, the pilots can control the other elevator (overriding the detent requires a force of approximately 50 kg / 110 lbs).
 - above 195 kt, the unit recouples the elevators to prevent inflight asymmetric deflection of elevators.
- 2 independent artificial Pitch Feel systems, controlled by the Feel and Limitation Computers (FLC), provide increasing pitch control feel above 125 kt (high speed mode). The force increases progressively according to speed, Mach and THS position. Below 125 kt (low speed mode), the artificial pitch feel is a constant spring force.

One system is active, the other is in stand-by.

Each system uses its own hydraulic actuator (SYS 1 Green/SYS 2 Yellow).

If both systems fail, the mechanism automatically returns to the low speed position, assisted by a spring (light elevator forces).

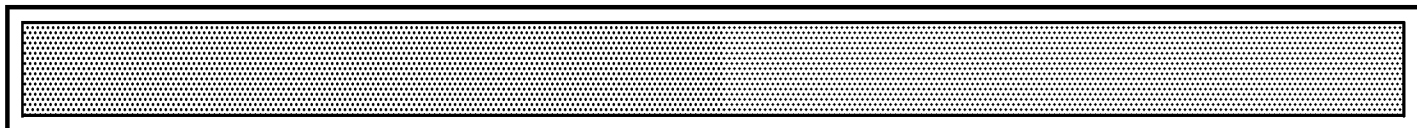
If the system does not return to low speed mode, a warning of high speed mode operation is triggered when flaps reach 20°.

- The autopilot pitch actuator is connected to the linkage next to the left elevator. When one or both AP are engaged, the AP actuator drives the elevators.
- Stall warning is provided by electrical stick shakers fitted on the control columns (FWC activated).

PITCH TRIM

- Pitch trim is provided by the Trimmable Horizontal Stabilizer (THS). Mechanical stops are set at 3° nose down and 14° nose up.
- The THS is operated by two independent hydraulic motors (green and yellow hydraulic systems).
- The THS can be commanded:
 - by the electric trim using either trim switches (rocking levers) located on the control wheels,
 - or
 - manually, by turning either trim wheel on the center pedestal,
 - or
 - automatically, by the autopilot (Autotrim function),
 - or
 - automatically, by the Flight Augmentation Computer (FAC) :
- **Speed trim** (active above 200 kt) and Mach trim (active above MN 0.7) :
 - * **Nose up** order to optimize the longitudinal stability and handling qualities.
 - * The speed trim is available with the AP OFF, in CWS or in CMD
- **Alpha trim** (active at high angle of attack, and high Mach number) :
 - * **Nose down** order to increase the pull-up stick force and prevent reaching an excessive angle-of-attack.
 - * The Alpha trim is available in clean configuration with the AP OFF, or AP in CWS and speedbrake lever in the retracted position.
- **Stall trim** (active at high angle of attack and low speed).
 - * **Nose down** order to assist the stall recovery
 - * The stall trim is available in slats/flaps :
 - . in slats/flaps 20/20 and 30/40
 - . with AP OFF or AP in CMD or in CWS.
- **Theta trim** (active at high pitch rate and low speed)
 - * **Nose down** order to ease the control of the pitch rate and attitude and prevent pitch from exceeding 30° (specially during go around)
 - * The theta trim is available with AP OFF, pitch above 10° and speed below 180 kts/M.37

Code : 0084



- The electric pitch trim inputs on rocking levers are inhibited when the AP is engaged in CMD (in case of an out-of-trim condition being experienced with the AP engaged in CMD, the AP must be first disconnected - using the AP instinctive disconnect pushbutton on the control wheel - before re-trimming the aircraft manually using the electric trim rocking levers.
 - The Autotrim orders are inhibited :
 - at take-off, if the landing gear is still extended 60 seconds after rotation,
 - when landing gear is down locked during approach,
 - during 5 seconds following the engagement of the GO AROUND mode, in order to take account of the nose up pitching effect of the increasing engine thrust.
 - Electric pitch trim commands (rocking lever inputs) and Autotrim commands (AP pitch trim orders) are processed by two pitch trim systems, provided the PITCH TRIM 1 and PITCH TRIM 2 levers are engaged.
 The THS position is indicated on the pitch trim wheel scale.
 - In normal operation PITCH TRIM 1 is operating, and PITCH TRIM 2 is in standby.
- R • The manual pitch trim (wheel and THS) runs approximately 5 time faster at low aircraft speed than at high speed.
- R The Autotrim speed depends on the flaps configuration (pitch trim runs faster when flaps are extended).
- R
- R

Pitch trim safety devices

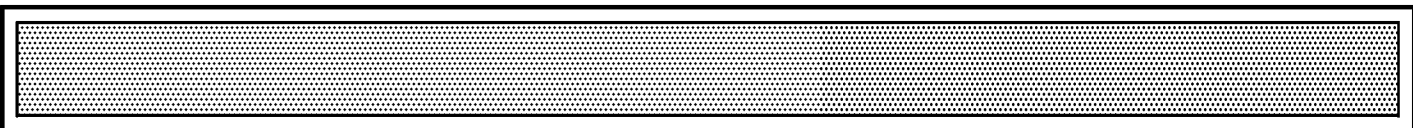
- Electric and automatic pitch trim commands can be overridden manually using the pitch trim control wheel.
 Overriding the electric trim and Autotrim by using the pitch trim control wheel results in the automatic disengagement of both pitch trim systems (both PITCH TRIM levers trip to OFF).
- When the pitch trim is controlled by the electric trim (i.e either rocking lever), the THS automatically stops before reaching the mechanical stops (3° nose down and 14° nose up).
- When using the electric trim switches, if the THS runs for more than 1 second, an audio "Whooler" sounds to alert the pilots.
- If CM1 and CM2's electric trim switches (rocking levers) are held in opposite directions, trimming action stops.
- Each electric trim rocking lever actuates two switches. If switches provide contradictory orders both pitch trim systems disengage.

Pitch trim engagement conditions

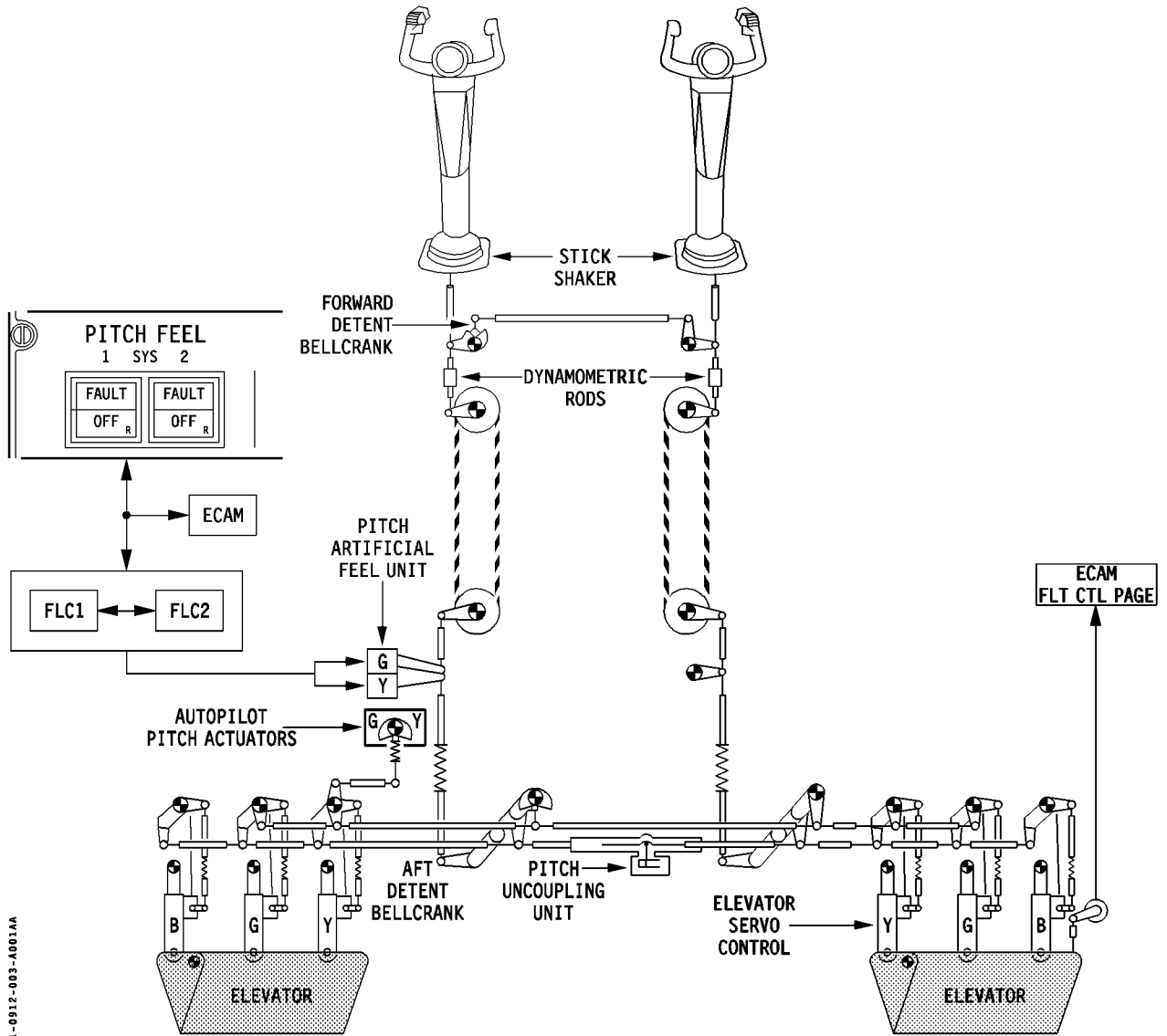
- Pitch Trim lever can be engaged if:
 - power supply is available,
 - associated Flight Augmentation Computer (FAC) is operative,
 - associated Air Data Computer (ADC) is operative, if flaps are retracted,
 - associated THS motor is operative.
- For in-flight re-engagement, in addition to the above conditions and if slats are retracted, at least two Angle-of-Attack sensors must be operative.

Pitch trim disengagement conditions

- If any pitch trim engagement condition is lost, the corresponding PITCH TRIM lever trips to OFF.
 ECAM warning is activated.
 The remaining pitch trim system continues to operate normally.

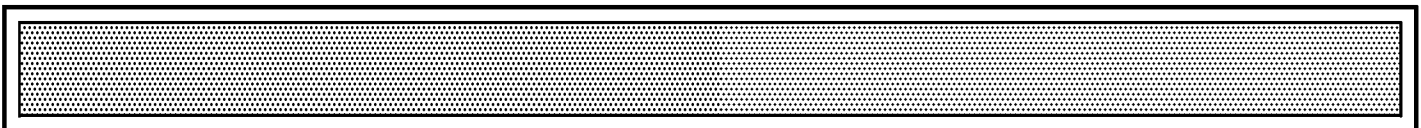


PITCH CONTROL



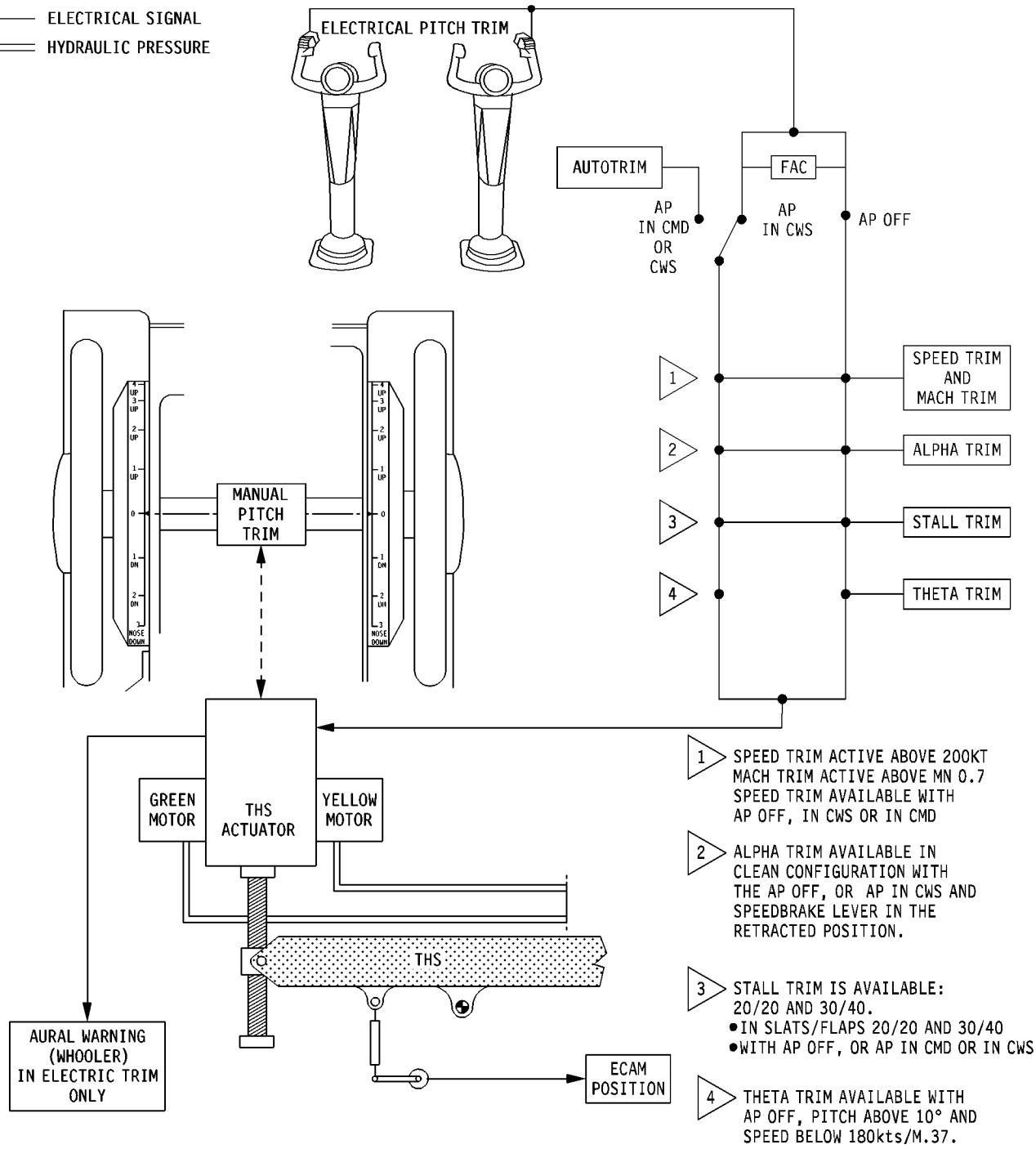
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R *Note* : The elevator trailing edge might appear to be low when observed from the ground. This is expected
 R behavior when the hydraulics are switched off and the servo actuators can no longer hold the weight
 R of the elevator surface.



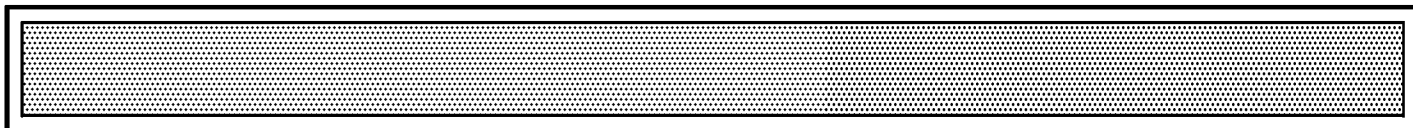
PITCH TRIM CONTROL

--- MECHANICAL LINKAGE
 — ELECTRICAL SIGNAL
 == HYDRAULIC PRESSURE



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Code : 0084



ROLL CONTROLS

- The roll control on each wing is achieved by :
 - one aileron, powered by 3 actuators, and
 - 5 roll spoilers (Nos. 3 to 7), each one powered by 1 actuator.

- Pilot inputs on the control wheel are sent to the aileron actuators via dual parallel mechanical control systems (control runs) providing fail- safe operation.

- Roll spoilers are used for roll control only if the control wheel is moved beyond a given threshold.

- An artificial feel load which is proportional to the control wheel deflection is provided by a spring rod.

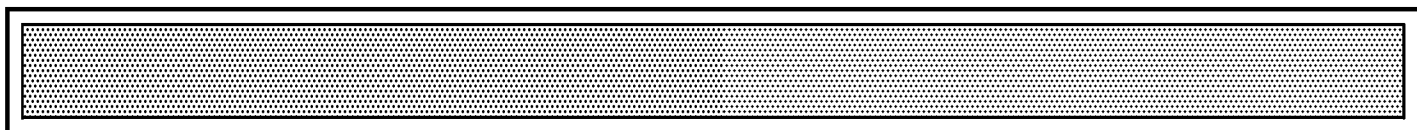
- If one control run jams, the associated control wheel is jammed. The other control run can be operated provided a given force (in the order of 16 kg/35 lbs) is applied on the associated control wheel. This action compresses the spring strut connecting the two control wheels (see diagram).
 The aileron on the unjammed side still operates.
 Roll spoiler control is degraded, so that:
 - if Crew Member (CM) 1 control run jams, CM2 controls roll spoilers 4 and 5.
 - if CM2 control run jams, CM1 controls roll spoilers 3, 6 and 7.

- To improve the aerodynamic characteristics with slats extended, the ailerons droop downwards by approximately 7° (aileron authority is unchanged).

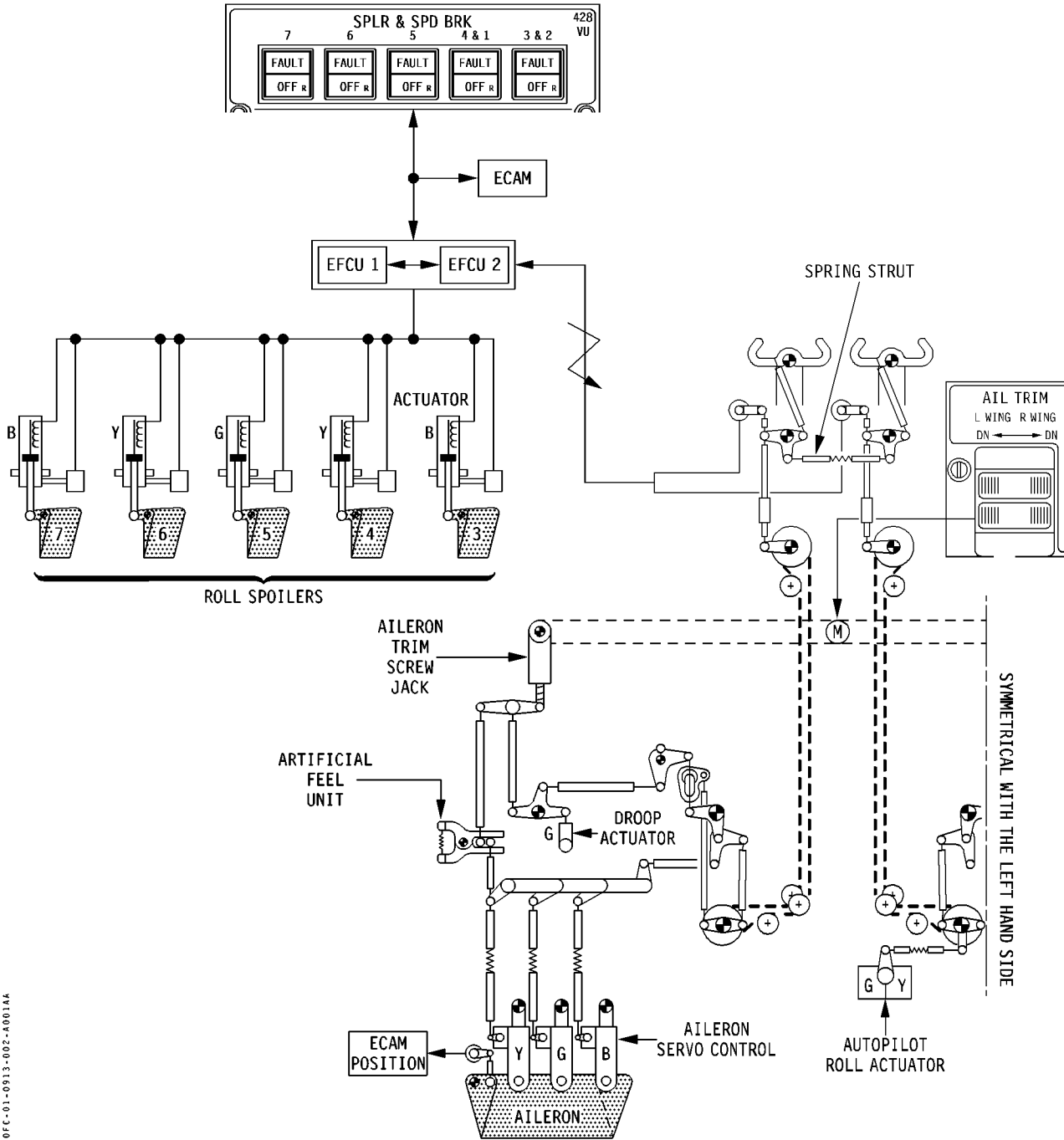
- An aileron trim enables to trim the aircraft in wing-level condition using the aileron trim switches (rocking levers).
 Aileron trim is indicated on a scale on top of each control wheel.

- Roll spoilers are electrically controlled by the EFCU.

Mod : 5330



ROLL CONTROL



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R *Note :* The aileron trailing edge might appear to be low (or asymmetrical compared to the other side) when
R observed from the ground. This is expected behavior when the hydraulics are switched off and the
R servo actuators can no longer hold the weight of the aileron surface.

RUDDER CONTROL

- The rudder is controlled by 3 actuators, which are commanded by a single cable run from the rudder pedals.
Rudder artificial feel is provided by a spring-loaded rod.

- Additional inputs to the rudder come from:
 - the rudder trim, and
 - the 2 yaw dampers.
- Rudder trim is operated by an electric motor.
 - Rudder trim inputs are inhibited when the AP yaw channel is active (i.e. when the AP is engaged in CMD and slats are extended).

- During cruise, it is recommended to trim the aircraft to achieve a Zero Control Wheel deflection.
The resulting rudder trim deflection should not exceed 1.5 unit NOSE L or NOSE R.

- 2 independent Rudder Travel Limiting Systems (RUD TRAVEL), controlled by the Feel and Limitation Computers (FLC), progressively decrease the maximum rudder travel as a function of speed :
 - at or below 165 kt, maximum rudder travel is $\pm 30^\circ$ (low speed range),
 - at VMO, maximum rudder travel is about $\pm 4^\circ$ (high speed range).

R
R
R
R
R

If both systems fail, whatever the aircraft speed, the mechanism automatically returns to the low speed position ($\pm 30^\circ$ rudder travel available).

If the system does not return to the low speed position, an ECAM warning (indicating that the rudder travel limiting system is jammed in the high speed range) is activated when flaps are at 20° or more.

In normal operation, RUD TRAVEL SYS 1 is active and SYS 2 is in standby.

- On the ground, the rudder pedals are linked to the nose wheel steering.

YAW DAMPER

- The yaw damper ensures the following functions:
 - dutch roll damping,

Mod : 5408 + 11442

- turn coordination which becomes active if sufficient control wheel deflection is applied except if :
 - AP is engaged in CMD, or
 - flaps are extended to 40° , or
 - a stall warning is detected.
- yaw compensation in case of engine failure, provided the AP is engaged in CMD with SRS (takeoff) or GO AROUND mode annunciated on FMA.

- Yaw damper command is transmitted to the rudder but there is no deflection feedback sent to the rudder pedals.
- There are two yaw damper systems. In normal operation, yaw damper 1 is operative and yaw damper 2 is in standby.
- Each system is engaged by its respective yaw damper lever on the overhead panel.
- If both EFCU fail, both yaw dampers remain engaged but turn coordination is inhibited.

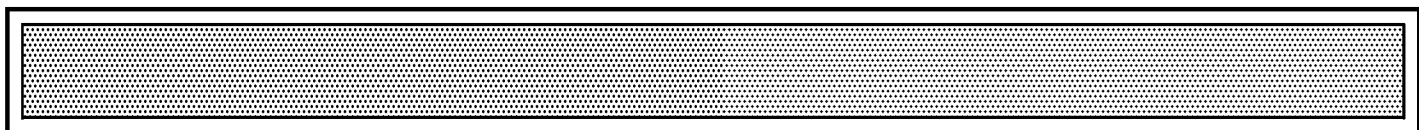
Yaw damper engagement :

- YAW DAMPER lever can be engaged if :
 - power supply is available,
 - associated FAC is operative,
 - associated ADC is operative (condition required only if flaps are retracted),
 - IRS 1 and (2 or 3) is operative for YD 1,
 - IRS 2 and (1 or 3) is operative for YD 2,
 - blue hydraulic system is pressurized, for YD 1,
 - yellow hydraulic system is pressurized, for YD 2.

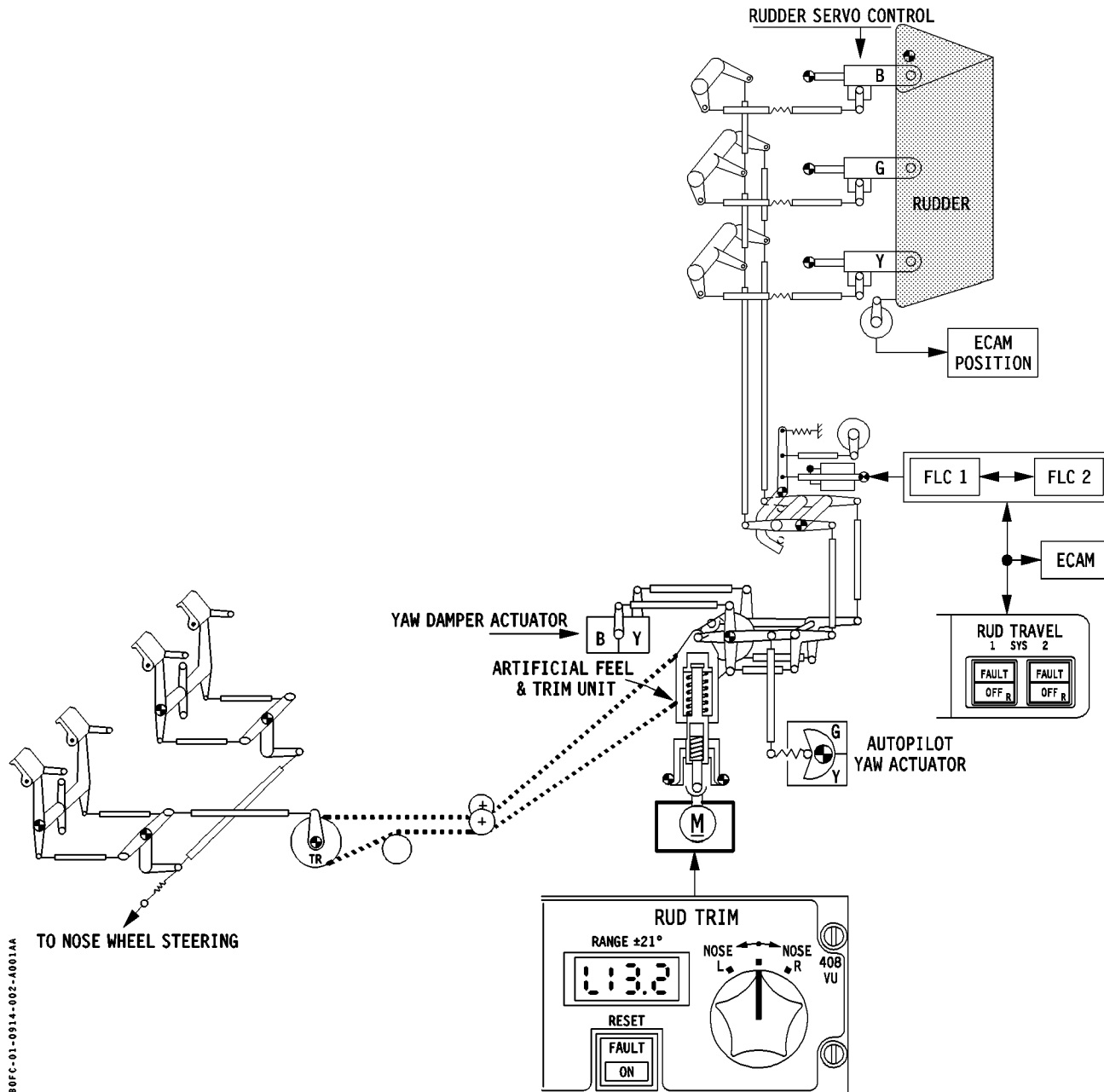
Note : on ground, hydraulic power is not necessary for yaw damper engagement.

Yaw damper disengagement :

- If any of the engagement conditions are lost, the respective YAW DAMPER engagement lever trips to OFF accompanied by ECAM activation.



YAW CONTROL



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GENERAL

- The 5-position SLATS/FLAPS control lever, located on the right side of the center pedestal, electrically controls the slat and flap operation.

Four slat positions can be selected (0° , 15° , 20° and 30°).

Four flap positions can be selected (0°, 15°, 20° and 40°).

- There are 5 selectable SLATS/FLAPS positions: 0/0, 15/0, 15/15, 20/20, 30/40.
- The slats and flaps are electrically controlled by two identical Slats Flaps Control Computers (SFCC). Each SFCC includes one slats and one flaps control channel (SYS 1 and SYS 2).
- The SLATS/FLAPS SYS 1 and SYS 2 are electrically and hydraulically supplied as follows :

	Hydraulic	Electric
SLATS SYS1	B	AC EMER BUS
SYS2	G	AC BUS 2
FLAPS SYS1	Y	AC ESS BUS (*ACEMERBUS)
SYS2	G	AC BUS 2

Note 1 : with only one hydraulic system pressurized, slats or flaps move at half speed.

Note 2 : (), with LAND RECOVERY selected ON.*

SLATS

- There are three retractable slat sections per wing, driven by screwjack mechanisms.
- The screwjack mechanisms are equipped with torque limiters to stop the system in case of excessive torque, in order to prevent system damage (slats jamming).

In case of torque limiter engagement, slats operation may be recovered by cycling the slats/flaps lever. The jamming may also clear by itself, without crew action.

The screwjacks are driven through a torque shaft by two independent hydraulic motors. These motors have pressure-off brakes which stop the slat motion when hydraulic pressure drops.

- A wing tip brake is fitted at the end of the torque shafts to stop the slat motion in case of detected slat asymmetry (slats stuck).
- To improve lift, a Kruger flap is fitted on each wing, between the inner slat and the fuselage.
- An aileron droop system is installed to improve aerodynamic characteristics with the slats extended.

When slats are extended to 15°, the Kruger flaps extend and the ailerons droop by approximately 7°.

Alpha-lock protection

- If slats are selected to the 0/0 position while the angle-of-attack is higher than 9°, the slat retraction is limited to 15° , and the Kruger flaps and aileron droop remain extended (Alpha-lock protection is inhibited below 60 kt).

If the slats/flaps lever is in the 0/0 position, once the AoA is below 9° , the slats, Kruger flaps and aileron droop retract automatically.

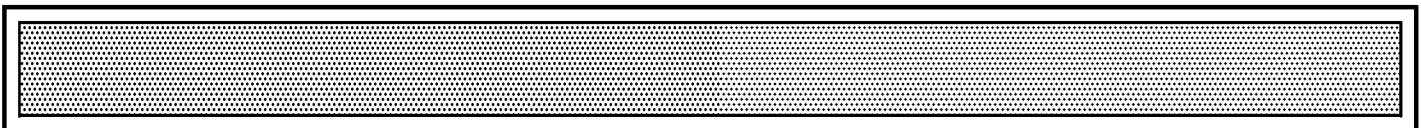
The activation of the Alpha-lock protection is indicated on the Slat/Flap Position Indicator (SFPI) by the illumination of the blue α-LOCK light.

FLAPS

- There are two retractable flap sections per wing driven by screwjack mechanisms.

The flaps mechanism is identical to the slats one.

Mod : 5330



FLIGHT CONTROLS

DESCRIPTION

SLATS AND FLAPS

1.09.15

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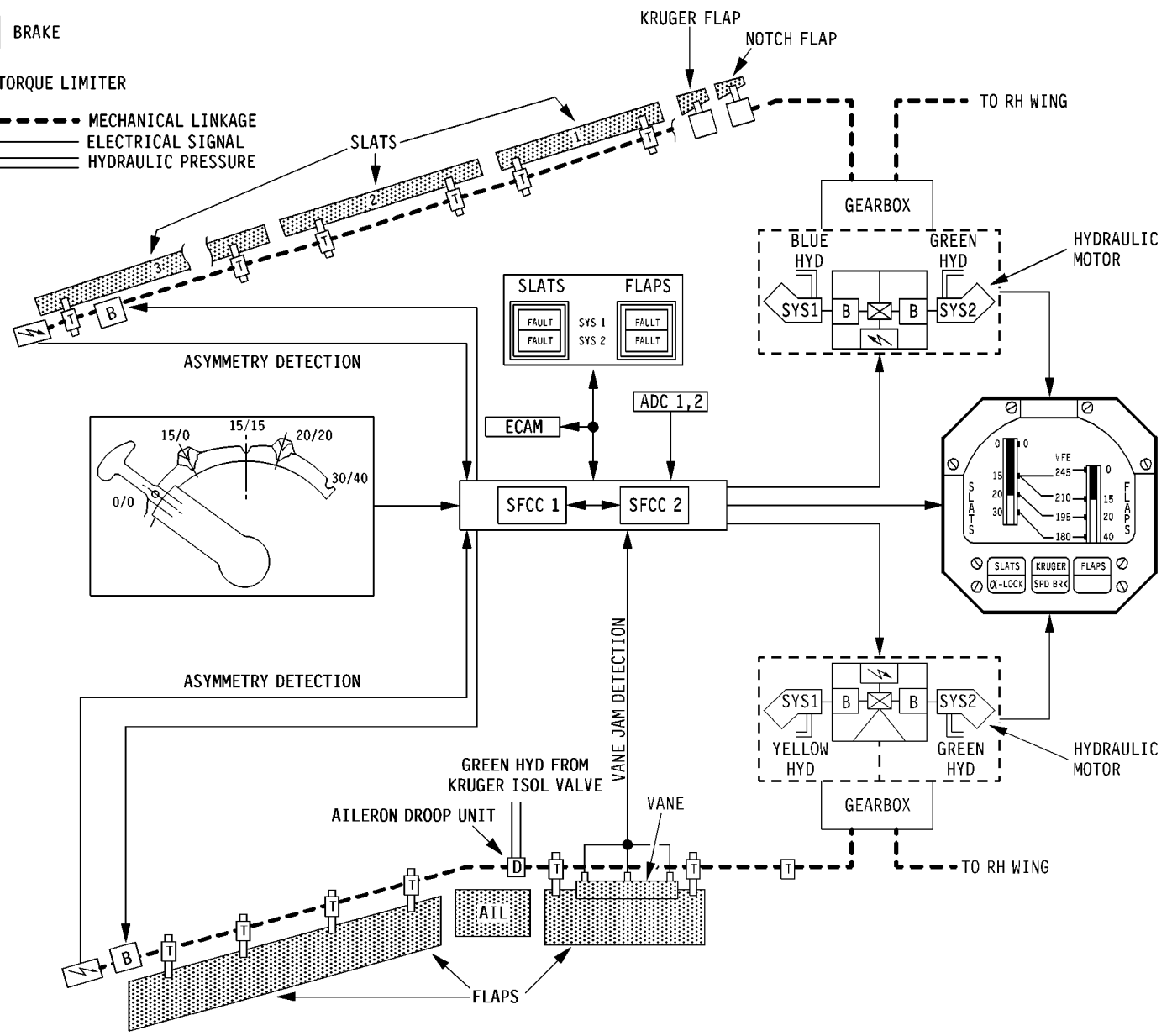
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B BRAKE

T TORQUE LIMITER

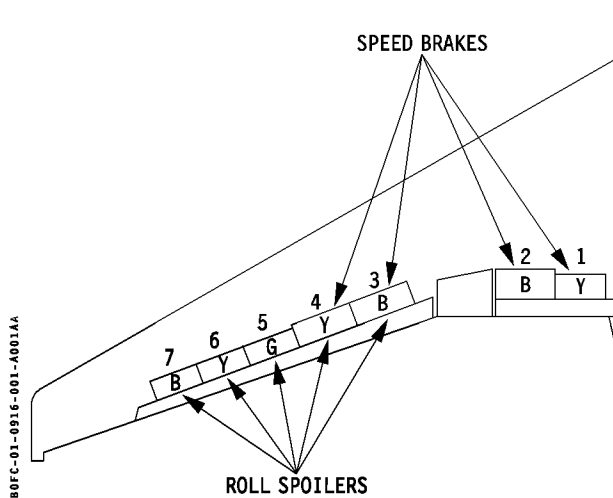
--- MECHANICAL LINKAGE
 ——— ELECTRICAL SIGNAL
 === HYDRAULIC PRESSURE



For training only IPM AI / V-F 1000

GENERAL

- There are 7 spoilers per wing which are electrically controlled and hydraulically actuated. In flight, some act as speed brakes, some act as roll spoilers. On the ground, all spoilers are used as ground spoilers.
- Each spoiler is powered by one actuator supplied by the Blue, Green or Yellow hydraulic system.



SPEED BRAKES

- The 4 inner spoilers (No 1 to 4) of each wing are used as speed brakes. Speedbrakes are operated by the SPEED BRAKE lever located on the left side of the center pedestal. Eleven positions can be selected from RET (retracted) to FULL (full extension).
- When extended, a "SPEED BRAKES EXTENDED" message is displayed on the ECAM MEMO page and the SPD BRK light illuminates blue on the SFPI.

ROLL SPOILERS

- The 5 outer spoilers (No 3 to 7) are used as roll spoilers.
- The roll spoilers automatically extend, in accordance with the control wheel deflection.

GROUND SPOILERS

- On the ground, all 7 spoilers can be automatically extended as ground spoilers.
- Ground spoilers are armed for take-off or landing by pulling the SPEED BRAKE lever.
- The ground spoilers automatically extend when the following conditions are met :
 - ground spoilers are armed (SPEED BRAKE lever in RET position and pulled upward into the arming detent) and main landing gear compressed,
 - or
 - at least on thrust reverser selected,
 - and
 - both throttle levers are at idle,
 - and
 - wheel speed of main landing gear aft wheels is greater than 85 kt.

Note : In case of aborted take off below 85 kt, ground spoilers do not deploy.

- If conditions for the automatic extension of the ground spoilers are not met (e.g. in case of jamming of one throttle lever out of the idle position), the speed brakes can be manually extended (spoilers 1 to 4 only with normal speed brake in-flight deflection).
- The ground spoilers deflection is higher than the maximum speed brake deflection.
- Ground spoilers can be retracted after landing:
 - if armed, by pushing the speedbrake handle down out of the arming detent, or
 - if not armed, by advancing at least one throttle above idle.

Note : In case of aircraft bouncing, the ground spoilers will remain extended provided both throttle levers are maintained at idle, and the other arming conditions are still met.

FLIGHT CONTROLS

DESCRIPTION

SPOILERS

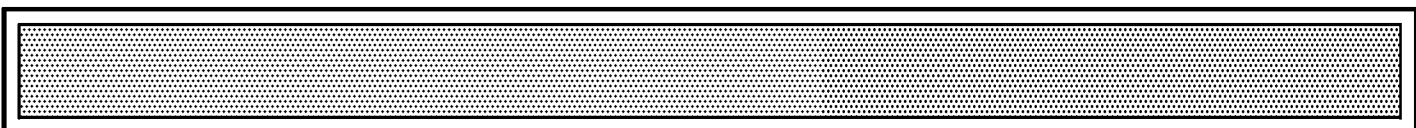
1.09.16

PAGE 2

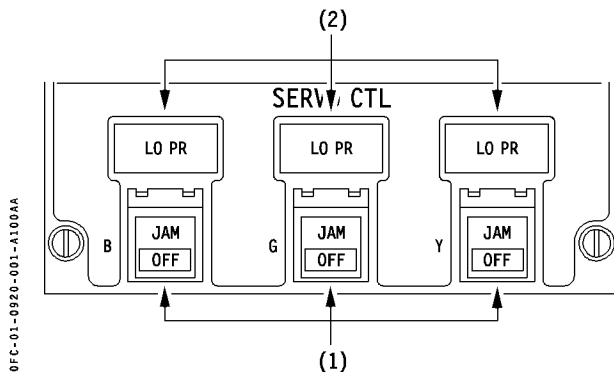
REV 31

SEQ 001

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SERVO CONTROL PANEL



(1) SERVO CTL shutoff valves pushbutton switches

These guarded pushbutton switches control the servo control shutoff valves for the Blue (B), Green (G) and Yellow (Y) servo control manifolds.

- **Normal** (pushbutton switch pressed-in):
 - The corresponding (B, G or Y) servo control shutoff valve is open, and hydraulic pressure is supplied to the servo control manifold users when the associated hydraulic system is pressurized.
- **JAM** (amber):
 - The JAM light illuminates in case of jamming of the hydraulic control valve of any rudder, elevator or aileron actuator or in case of jamming of one of the pilot valves of the THS actuator.
 - Jamming detection is inhibited if the associated hydraulic system is depressurized.
- **OFF** (white: pushbutton switch released-out):
 - The associated servo shutoff valve closes, shutting off hydraulic pressure supply to the corresponding users.
 - The associated JAM warning is inhibited.
 - The amber LO PR light for the associated servo control manifold confirms that the valve has closed.

• **Safety device :**

To prevent the inadvertent closing of all three servo control shutoff valves, only two valves can be closed simultaneously.

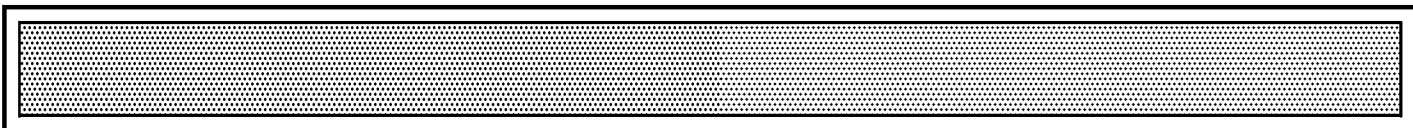
If all three servo control shutoff valve pushbuttons are mistakenly selected OFF, when the third pushbutton is selected OFF, all three servo control shutoff valves automatically re-open.

Note : the servo control shutoff valve position is shown on the ECAM HYD page.

(2) SERVO CTL manifolds LO PR lights

The amber LO PR lights illuminate if the hydraulic pressure in the associated servo control manifold drops below 1450 PSI.

Mod : 5904



FLIGHT CONTROLS

CONTROLS

SERVO CONTROLS

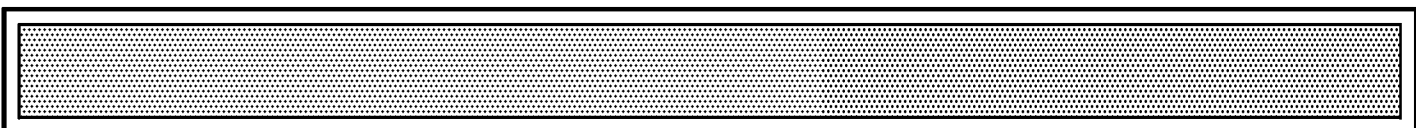
1.09.20

PAGE 2

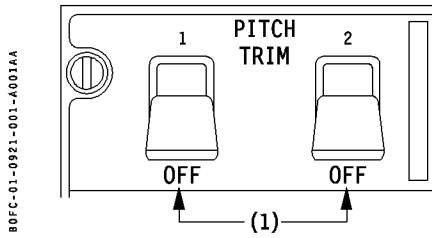
REV 31

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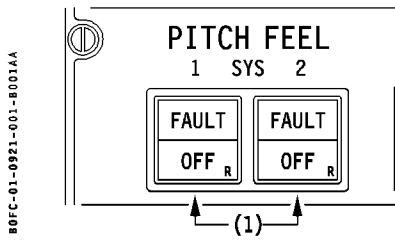
PITCH TRIM LEVERS



(1) PITCH TRIM engagement levers

- **Up** : pitch trim 1 (or 2) is engaged and operative.
- **OFF** : pitch trim 1 (or 2) is not engaged.

PITCH FEEL CONTROL PANEL



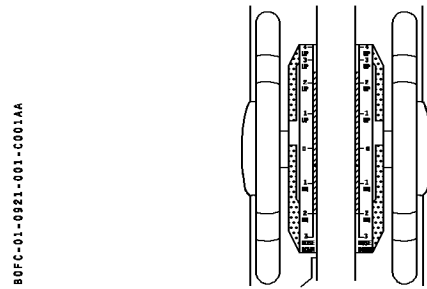
(1) PITCH FEEL pushbutton switches

The pushbutton switches control the two Pitch Artificial Feel systems.

- **Normal** (pushbutton switch pressed-in):
The associated system is engaged.
- **FAULT** (amber):
Illuminates if a failure is detected with the pushbutton switch in normal position.
ECAM warning is activated.
- **OFF/R** (white: pushbutton switch released-out):
The system is disengaged. The monitoring circuits are reset.

If both pitch feel systems have been selected OFF, but both FAULT lights illuminate again when flaps reach 20° or more, the Pitch Feel system is in high speed mode. High elevator forces may be expected for approach and landing.

PITCH TRIM WHEELS



- The pitch trim wheel provides mechanical feedback of THS movement and position. The THS position (in degrees) is indicated on the trim wheel scale.

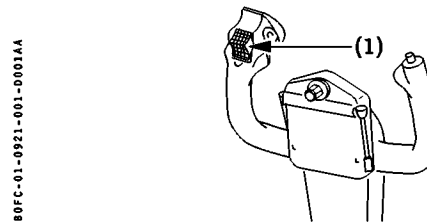
The green band indicates the normal THS position for takeoff (the takeoff trim range provides a THS setting to have the aircraft trimmed for the second segment climb at approximately 1.3 Vs with two engines operative).

The white band provides additional indications regarding the THS position (typically illustrated on the sketch) :

- the small white band indicates the normal trim setting corresponding to a mean CG in cruise.
- the large white band indicates the possible trim setting within the whole CG range during climb, cruise and descent.

- If manually operated by the pilot, the wheel mechanically controls the THS. When the manual trim wheel is used to override an electrical trim order, both PITCH TRIM levers drop.

ELECTRICAL TRIM SWITCH (ROCKING LEVER)



- Pushing the electrical trim switch (1) (rocking lever) forward trims the aircraft nose down, while backward movement of the switch trims the aircraft nose up. When the switch is released, it is spring-loaded to neutral.

FLIGHT CONTROLS

CONTROLS

PITCH

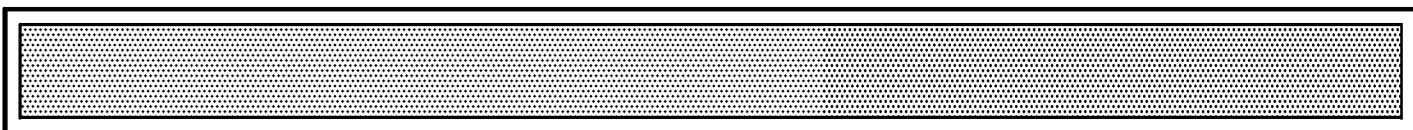
1.09.21

PAGE 2

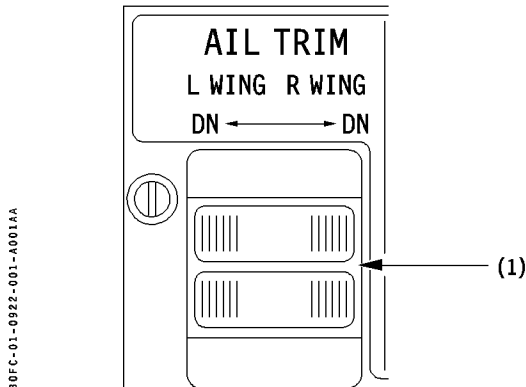
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AILERON TRIM PANEL

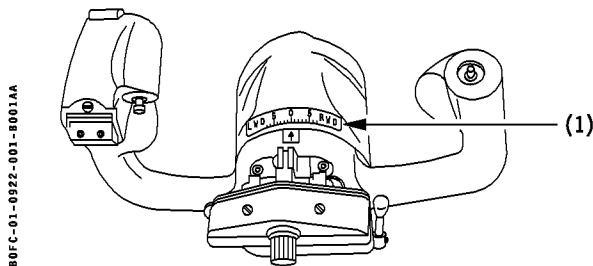


(1) AIL TRIM switches

- Aileron trim control is electrically powered via this split-switch.

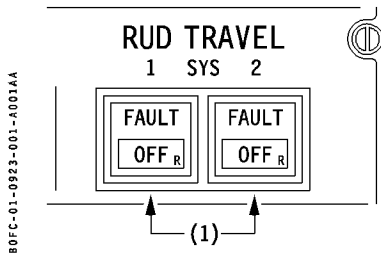
To operate the aileron trim, both switches must be simultaneously held in the same direction (L WING DN or R WING DN).

AILERON TRIM SCALE



- The amount of aileron trim applied can be read on a scale (1) on top of each control column.
- The scale is marked in 1° increments from 7° LWD (Left Wing Down) to 7° RWD (Right Wing Down).

RUD TRAVEL CONTROL PANEL



(1) RUDDER TRAVEL pushbutton switches

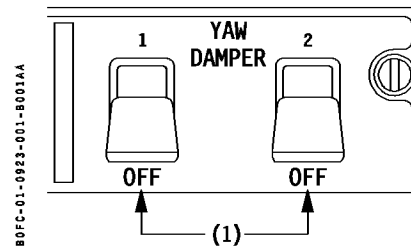
The pushbutton switches control the two Rudder Travel Limiting systems.

- **Normal** (pushbutton switch pressed-in):
 - The associated system is engaged.
- **FAULT** (amber):
 - Illuminates if a failure is detected with the pushbutton switch in normal position.
 - ECAM warning is activated.
- **OFF/R** (white: pushbutton switch released-out):
 - The associated system is disengaged. The monitoring circuits are reset.

If both RUD TRAVEL systems have been selected OFF, but both FAULT lights illuminate again when flaps reach 20° or more, the RUD TRAVEL system is in the high speed configuration.

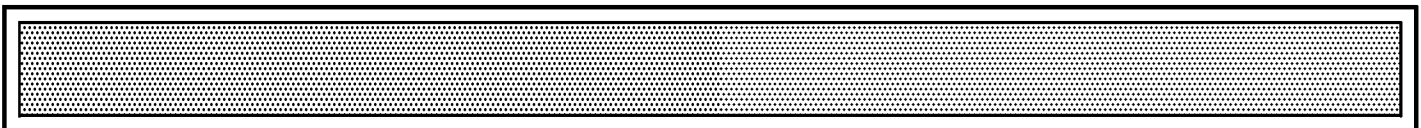
The maximum cross-wind capability is reduced, a reduced maximum cross-wind limitation for landing is applicable (as directed by the ECAM procedure).

YAW DAMPER LEVERS

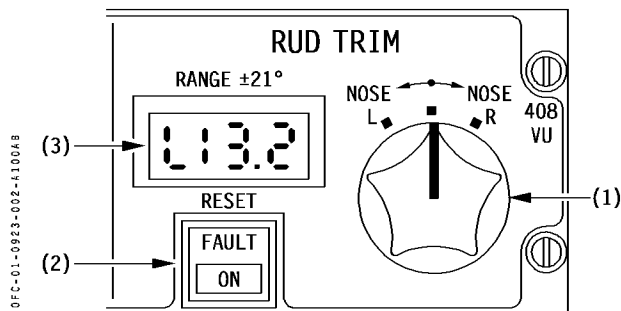


(1) YAW DAMPER engagement levers

- **Up** : yaw damper 1 (or 2) is engaged and operative.
- **OFF** : yaw damper 1 (or 2) is not engaged.



RUD TRIM PANEL



(1) RUDDER TRIM selector knob

■ **NOSE L or NOSE R :**

- Rudder trim is applied in the same direction as the selector knob.
- Rudder trim travel range is $\pm 21^\circ$ (or as limited by the rudder travel limiting system).

Note : Rudder trim inputs are inhibited when the AP yaw channel is active (i.e. when the AP is engaged in CMD and slats are extended).

■ **Neutral :**

- the selector knob is springloaded to the neutral (center) position.

(2) RESET pushbutton switch

Pressing this pushbutton switch automatically resets the rudder trim to zero.

■ **ON (white: pushbutton switch pressed-in) :**

- Rudder trim is being reset to neutral.
- The pushbutton switch is latched while the rudder trim is being reset to zero, and is released out automatically when reset is complete.
- The reset to zero can be stopped by pressing again the pushbutton switch. The pushbutton switch unlatches, and the ON light extinguishes.

■ **FAULT (amber) :**

- Automatic reset function has failed.
- Manual reset using the selector knob must be performed.

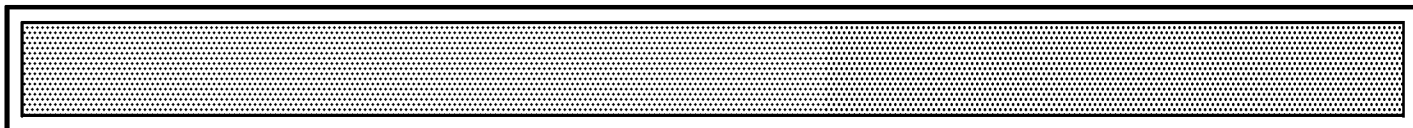
■ **Normal (pushbutton switch released-out) :**

- The reset action has stopped automatically or manually. The ON light extinguishes.

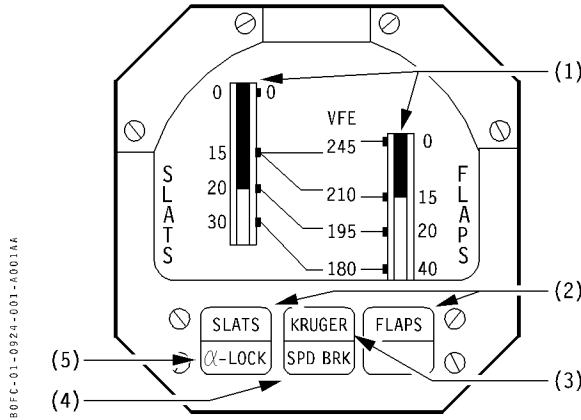
(3) RUD TRIM position indicator

Displays digital indication of the rudder trim direction (L or R) and deflection (0° to 21°).

Mod : 11442



SLATS / FLAPS POSITION INDICATOR



(1) SLATS / FLAPS position indicator strips

Slats and flaps position is shown by white strips moving up and down the SLAT and FLAPS scales.

The corresponding VFE (speed limit) is displayed opposite each selectable position.

Note : In case of loss slats/flaps position indication, slats/flaps position can be checked through the cabin windows identified by a black triangle sticker (▲).

(2) SLATS / FLAPS lights

Illuminate amber when the associated system is locked out. In case of detected slats or flaps asymmetry, system recovery is not possible in flight.

(3) KRUGER light

Illuminates amber if the Kruger flap has not retracted within 10s of selecting slats retraction, or has not extended within 10s after extending slats.

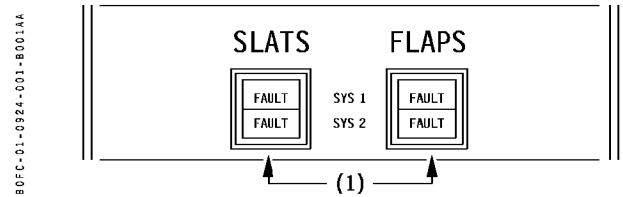
(4) SPD BRK light

The SPD BRK (speedbrake) light illuminates blue anytime the speedbrake lever is out of the retract (RET) position.

(5) alpha-LOCK light

Flashes blue to indicate that the Alpha-lock protection is active.

SLATS / FLAPS CONTROL PANEL



(1) SLATS (or FLAPS) FAULT lights

• One FAULT light illuminates to indicate a fault on slats or flaps SYS 1 or SYS 2. Then, normal operation is achieved through remaining system. R
R

• In case of insufficient hydraulic supply conditions (too low flow available) when the slats and/or flaps are extending or retracting, the associated FAULT light(s) on the overhead panel may flash until the selected configuration is reached, and then extinguishes. R
R
R
R
R

• Both SLATS or both FLAPS FAULT lights, illuminate together if slats (or flaps) movement stops due to a system jamming (torque limiter engagement).

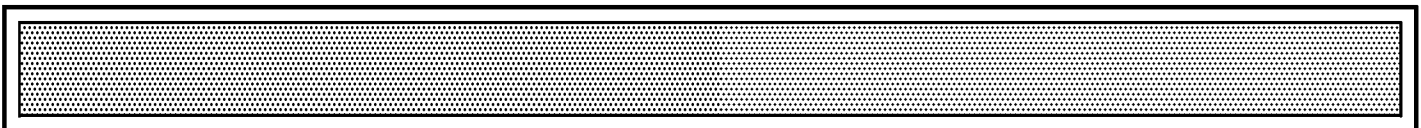
Note : The SFPI SLATS or FLAPS light does not illuminate in this case.

If the jamming is cleared, the slats or flaps will move to the position commanded by the lever.

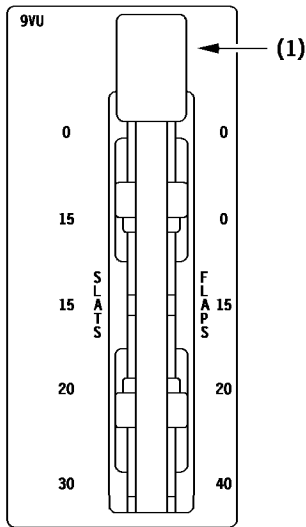
• Illumination of both SLATS, or both FLAPS FAULT lights, together with the SFPI SLATS or FLAPS light indicates that an asymmetry has been detected in the associated system.

In this case, the affected slats or flaps system is locked out by the wing tip brakes and cannot be recovered in flight.

• The four SLATS and FLAPS FAULT lights illuminate if the control lever remains between two notches for more than 10s.



SLATS / FLAPS CONTROLS



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- When selecting the slats/flaps, the lever must be placed in one of the 5 selectable notches. **It is not possible to select intermediate slats or flaps positions.**

If the lever is placed between 2 notches, the slats/flaps move to the setting corresponding to the previous notch position.

(1) SLATS / FLAPS control lever

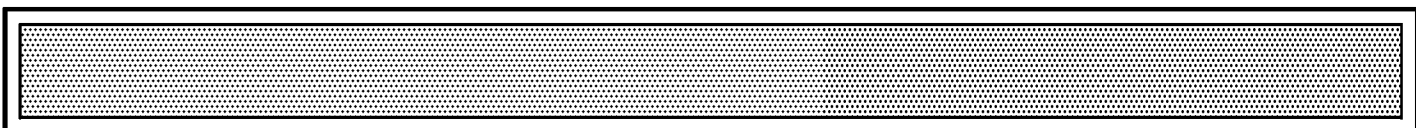
- The lever controls the operation of the slats/flaps. The Kruger and notch flaps are automatically extended when the slats are extended.
- The 5 gated positions select the following configurations :

Slats/Flaps lever position	Kruger flaps
0/0	Retracted
15/0	Extended
15/15	Extended
20/20	Extended
30/40	Extended

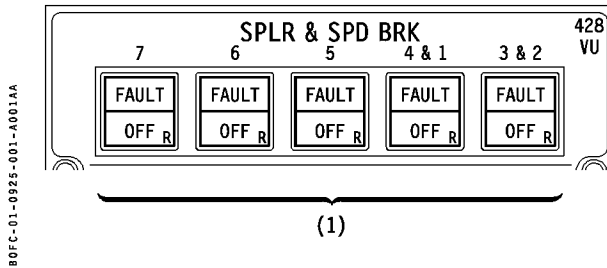
- To move the slats/flaps lever, the lever must be lifted out of its detent.

- R
- A blocking bulk is installed at notch 15/0 and 20/20 to prevent moving the lever straight through these positions.

Mod : 5224



SPLR AND SPD BRK CONTROL PANEL

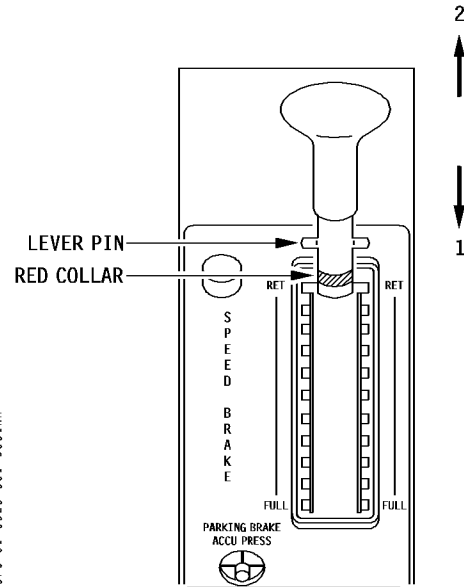


(1) SPLR & SPD BRK pushbutton switches

Each pushbutton switch controls one or two spoilers.

- **On** (pushbutton switch pressed-in):
 - The corresponding spoiler control system is activated.
- **FAULT** (amber):
 - When a spoiler pushbutton switch is On, the FAULT light illuminates if a failure is detected. The associated spoiler(s) is deactivated. ECAM warning is activated.
- **OFF/R** (white: pushbutton switch released-out):
 - the corresponding spoiler(s) is deactivated and the monitoring system is reset.
 - if hydraulic pressure is available, the actuators are pressurized in retracted position.

SPEED BRAKE / GROUND SPOILERS LEVER



- When pushed down (1) and manually moved the SPEED BRAKE lever controls speed brake extension to any of the eleven positions from fully retracted (RET) to fully extended (FULL).
- When pulled up from the fully retracted position (2), the lever arms the ground spoilers for automatic deployment.
- The SPEED BRAKE lever does not move in case of automatic extension of the roll spoilers or ground spoilers.
- When the ground spoilers are armed, observing or feeling the lever pin position and/or observing the red collar located on the handle shaft allows to visually identify the lever position.

Note : The lever cannot be pulled aft to deploy speed brakes when the ground spoilers are armed.

FLIGHT CONTROLS

CONTROLS

SPOILERS

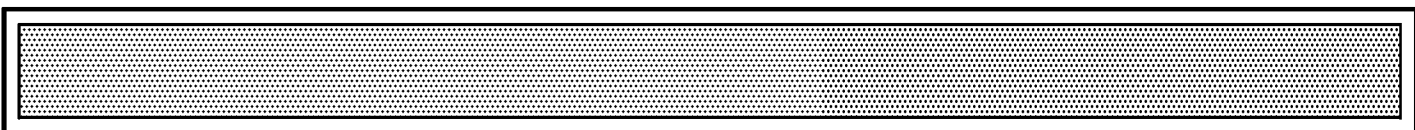
1.09.25

PAGE 2

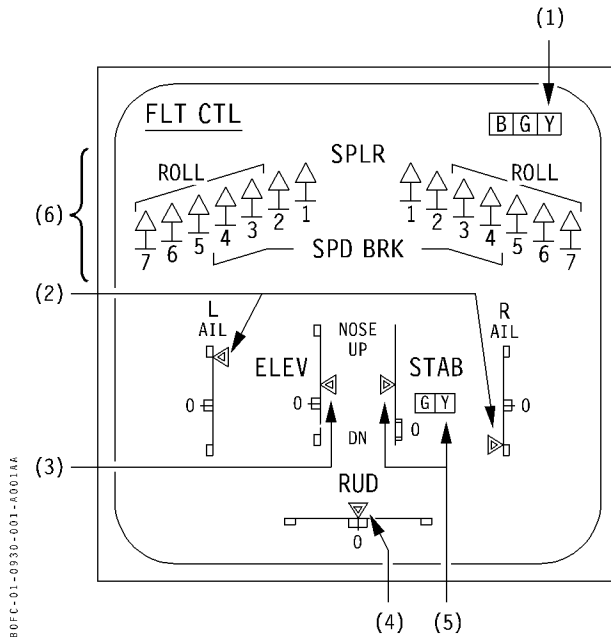
REV 31

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ECAM FLT CTL PAGE



(1) B, G, Y, symbols

- Each available system on the flight controls and trimmable horizontal stabilizer is indicated by a green symbol.
- In case of servo control low pressure detection, the corresponding symbols become amber.

(2) AIL, (3) ELEV and (4) RUD position indication

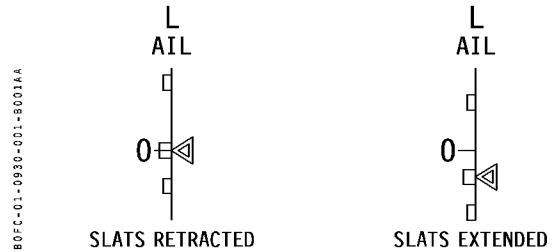
- A white scale covering the full travel range is provided for each flight control surface.
- An index indicating the actual position of the surface moves along the scale.
- Boxes, located at each end of the travel range and in the neutral position, represent the indication tolerance for the respective positions.

R

- Full travel or neutral position is shown when the index is in the box or on the line of the box.

R
R

- The aileron zero position and endboxes are shifted downwards when slats are extended (to indicate the aileron droop position).



(5) STAB position indication and hydraulic power

- THS (STAB) position is indicated by white scale and index covering the full travel range.
- The 2 hydraulic systems (G and Y) powering the THS are indicated by green symbols that become amber when low pressure is detected.

R
R

(6) ROLL SPLR, SPD BRK and GND SPLR position indication

—	Green	Surface is retracted
—	Amber	Surface is retracted but a failure exists
△ I	Green	Surface is deflected by more than 2°
△ I 3	Amber	Surface is extended but a failure is detected by the EFCU
△ I	Pulsing Green	Surfaces is extended, on ground and speed is greater than 70 kt

Note : The spoilers position indication is also provided on the ECAM WHEEL page.

FLIGHT CONTROLS

ECAM DESCRIPTION

FLT CTL PAGE

1.09.30

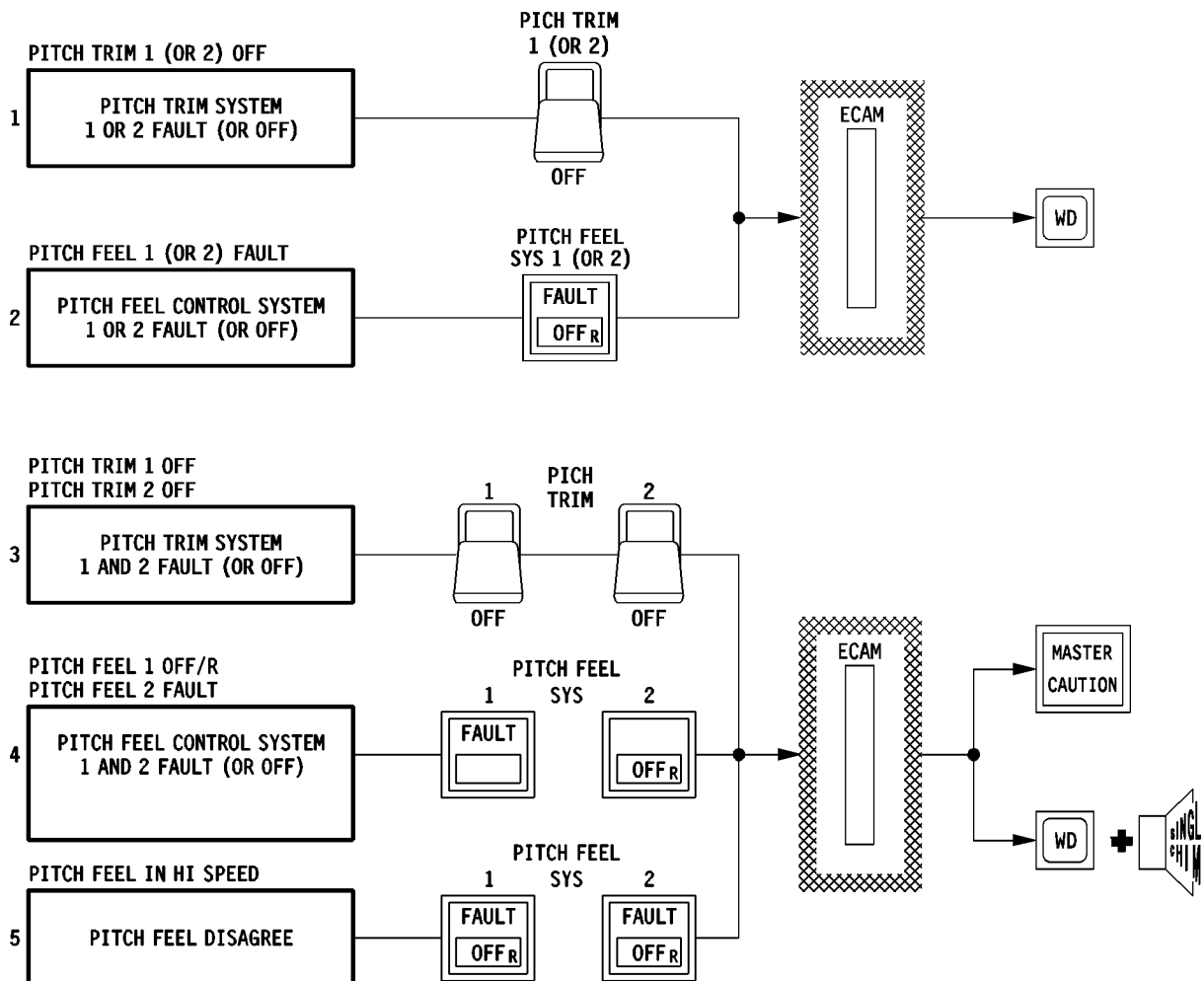
PAGE 2

REV 30

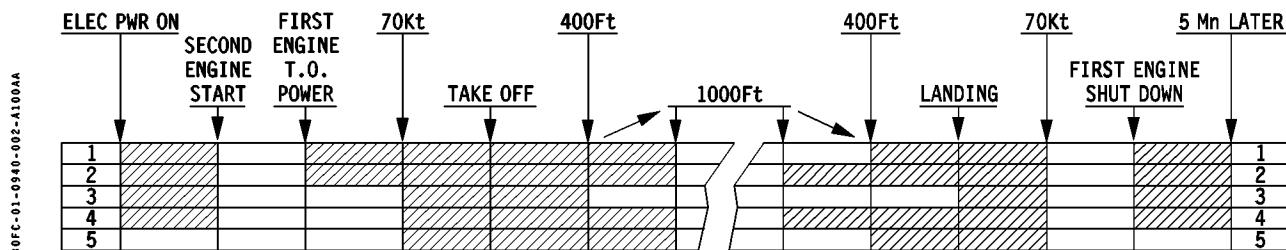
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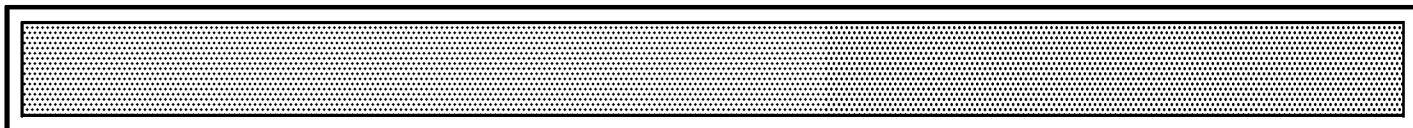
WARNING LOGIC



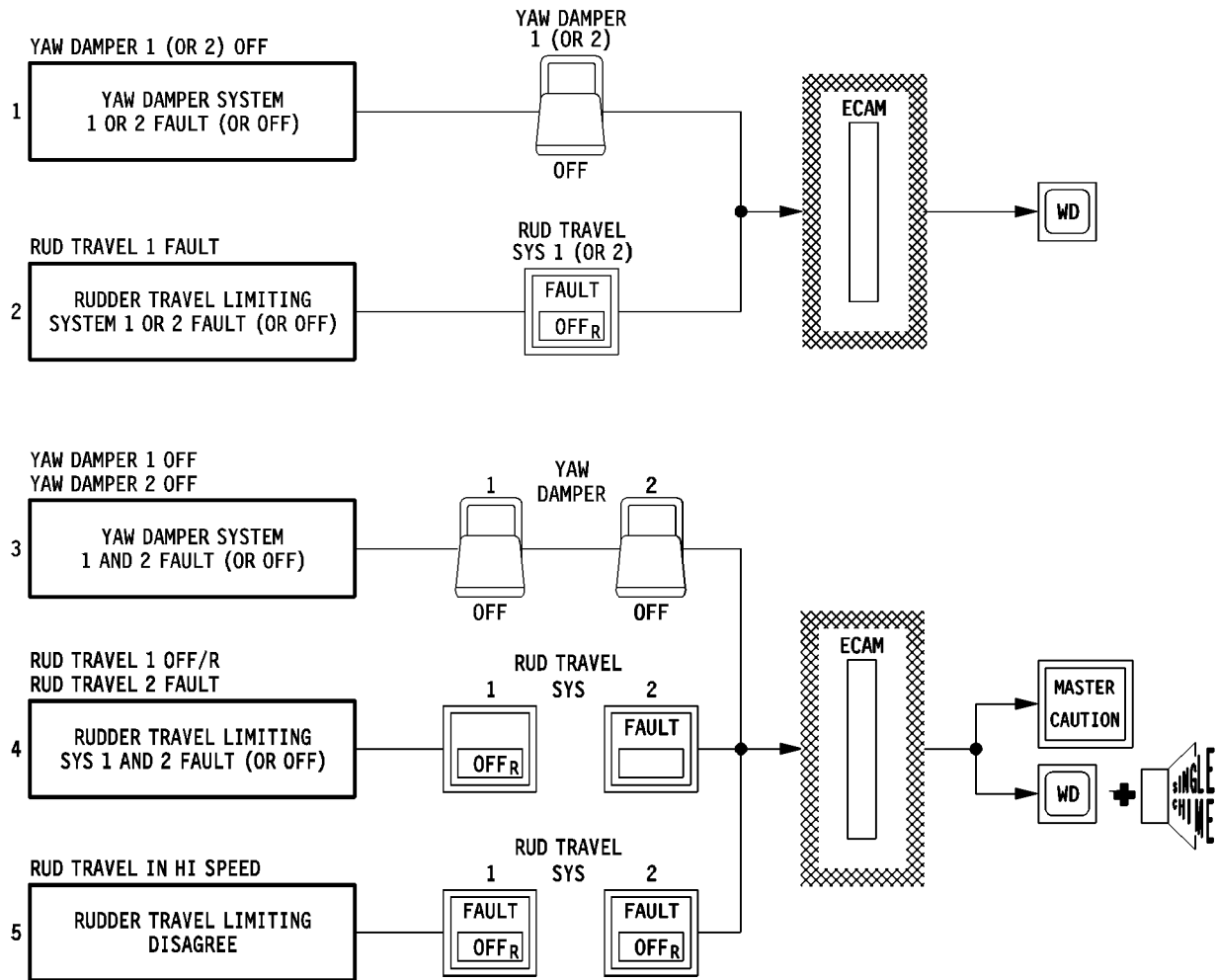
ECAM AUTOMATIC FLIGHT PHASE INHIBITION




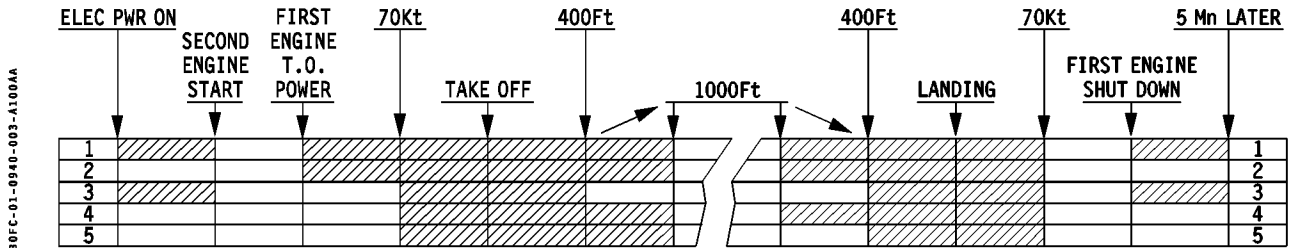
Mod : 5051



WARNING LOGIC

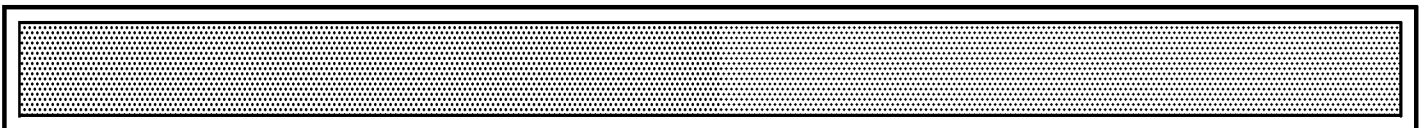


ECAM  AUTOMATIC FLIGHT PHASE INHIBITION

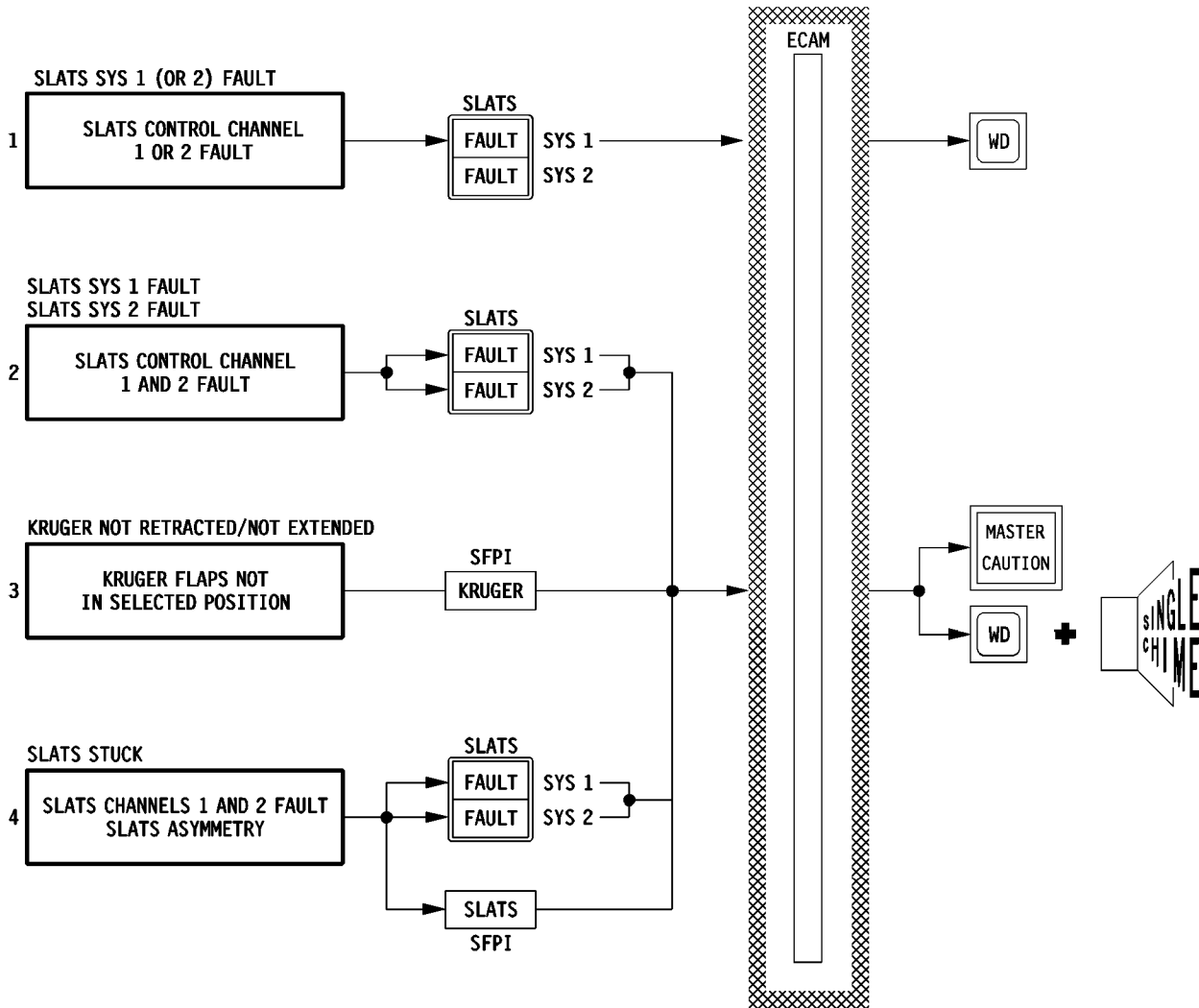


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Mod : 5051

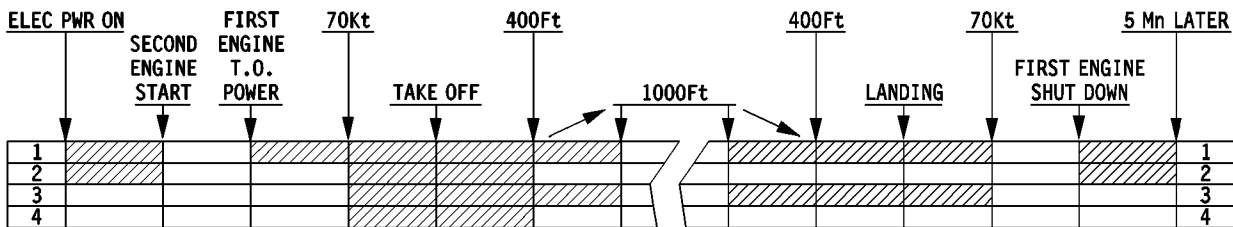


WARNING LOGIC

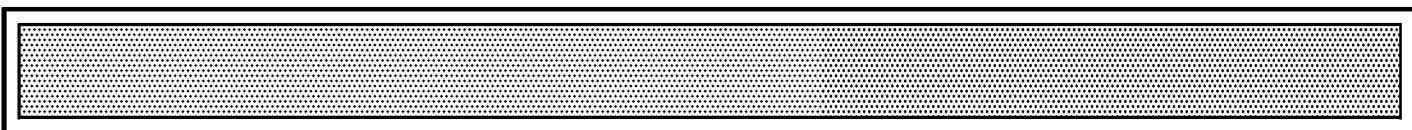


ECAM AUTOMATIC FLIGHT PHASE INHIBITION

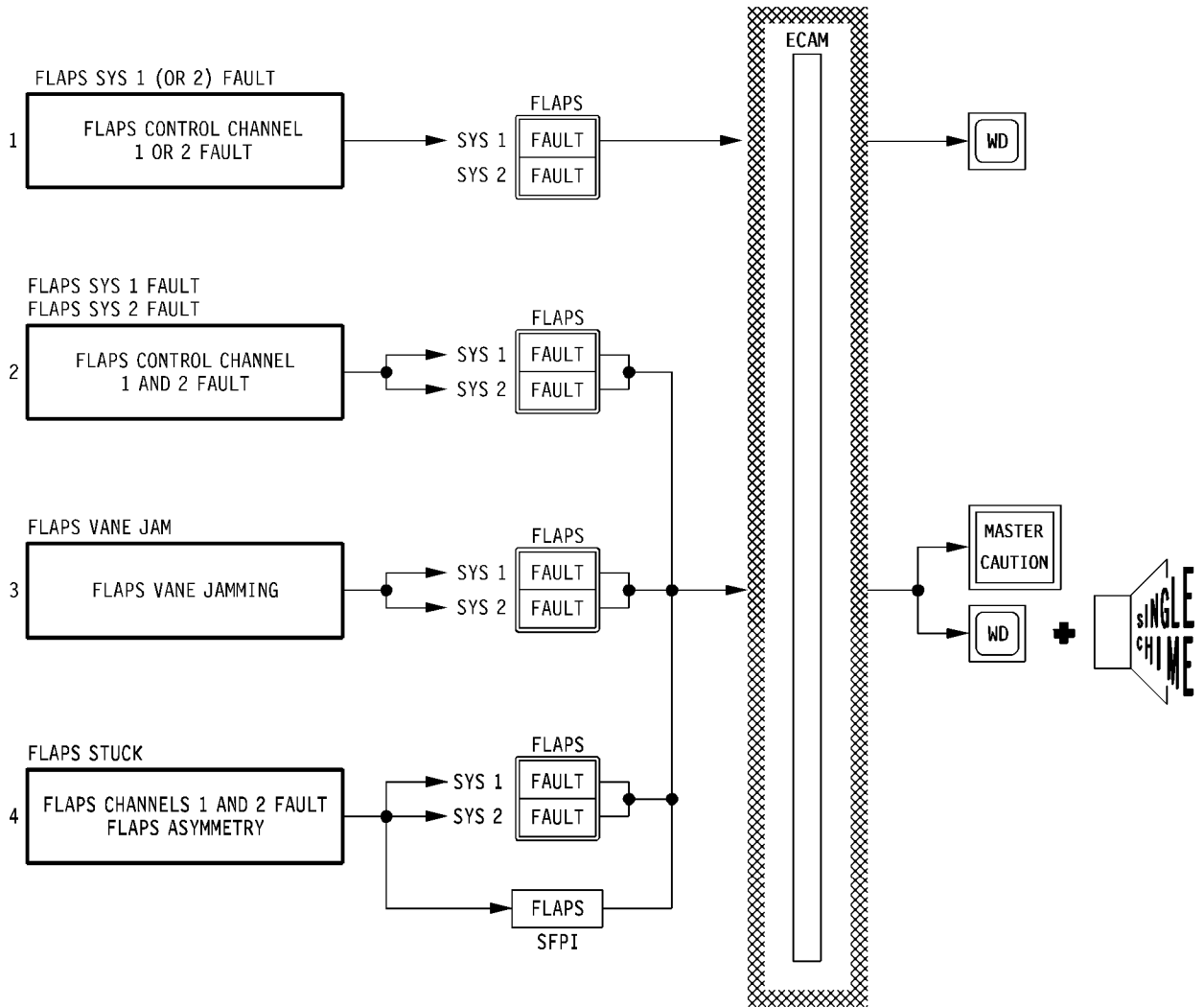
80FC-01-0940-004-A100AA



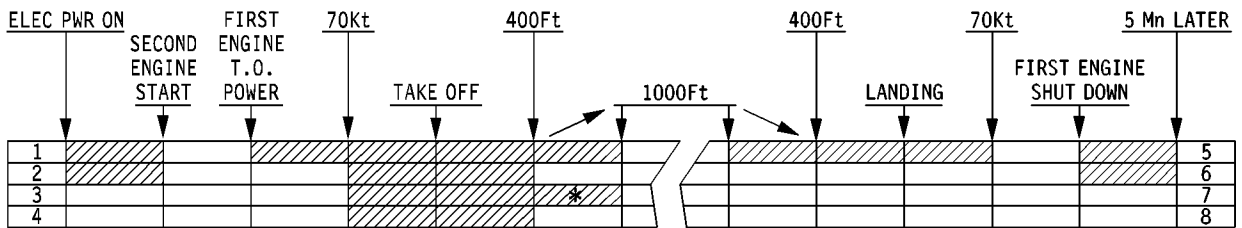
Mod : 5051



WARNING LOGIC



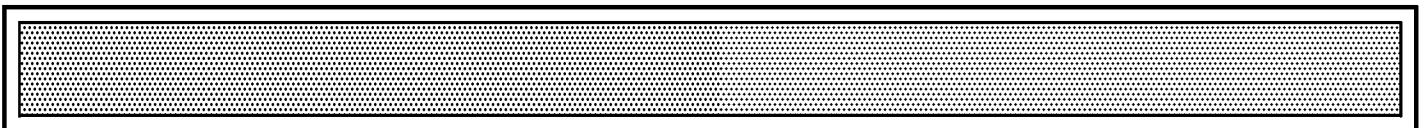
ECAM AUTOMATIC FLIGHT PHASE INHIBITION



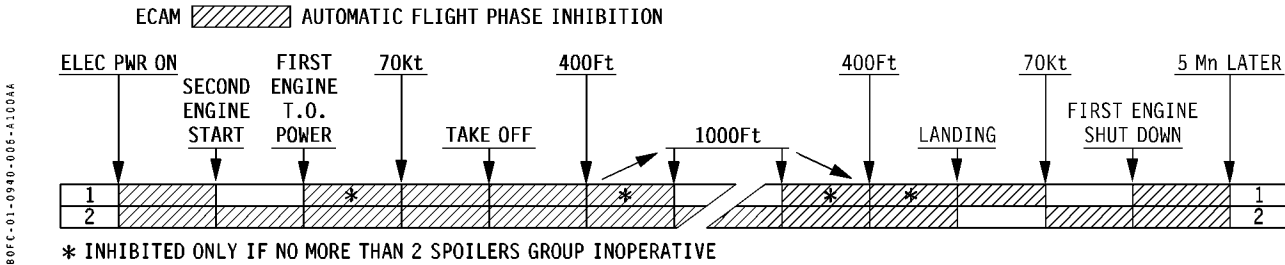
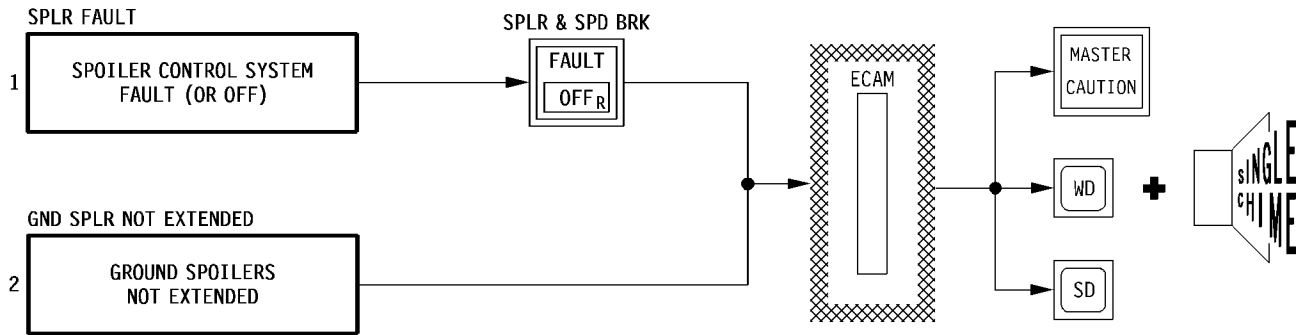
* INHIBITED ONLY DURING EXTENSION

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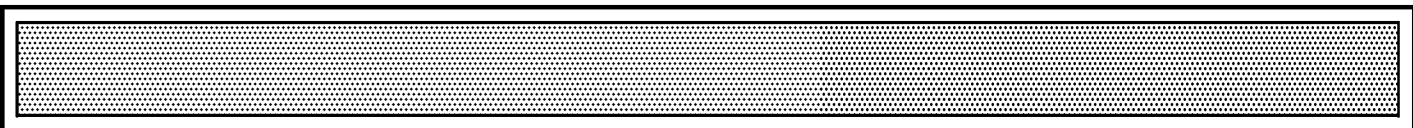
Mod : 5051



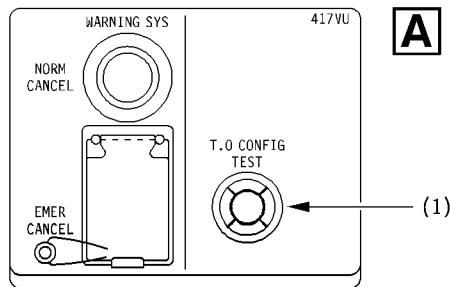
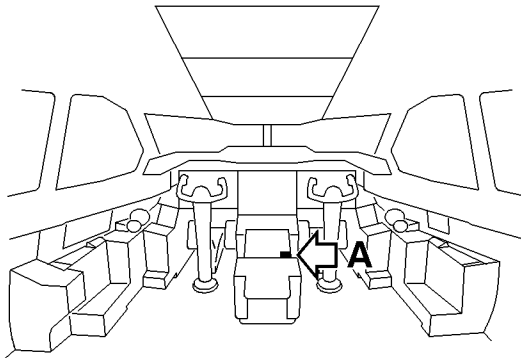
WARNING LOGIC



Mod : 5051



T.O CONFIG TEST



B0FC-01-0950-001-R220A4

(1) T.O CONFIG TEST pushbutton

- Pressing and holding the T.O CONFIG TEST pushbutton activate the takeoff configuration test.
- The T.O CONFIG TEST is active from the electrical power up until takeoff thrust is reached by at least one engine.
- The test result is indicated as follows :
 - If the aircraft is in a normal configuration for takeoff, the message NORM FOR T.O is displayed on the ECAM MEMO page.
 - If the aircraft is not in a normal configuration for take-off, the warnings described in the section 1.09.51 are activated, as applicable.
- The warnings are cancelled when the T.O CONFIG TEST pushbutton is released.

- The T.O CONFIG TEST monitors the correct configuration of the following flight controls and systems :

– **horizontal stabilizer (STAB TRIM) :**

- If the STAB TRIM setting is not in the takeoff range (2.3° DN to 3.5° NU), the MASTER WARNING lights illuminate, accompanied by the Continuous Repetitive Chime (CRC) and ECAM activation.

– **slats and flaps :**

- If slats or flaps are not in an approved takeoff configuration, the MASTER WARNING lights illuminate, accompanied by the CRC and ECAM activation.
- The position of the kruger flaps is not monitored by the T.O CONFIG TEST.

– **speed brakes and ground spoilers :**

- If the speedbrakes or ground spoilers are extended, the blue SPD BRK light illuminates on the SFPI, accompanied by the illumination of the MASTER WARNING lights and by the CRC and ECAM activation

– **doors :**

- If any door (as monitored by the ECAM DOOR page) is not locked, the associated warning is recalled (i.e. the MASTER CAUTION lights illuminate accompanied by the Single Chime (SC) and ECAM activation).

– **brakes temperature :**

- If the temperature of any brake exceed the BRK HOT warning level, the associated warning is recalled (i.e. the MASTER CAUTION lights illuminate accompanied by the Single Chime (SC) and ECAM activation).

– **probe heating :**

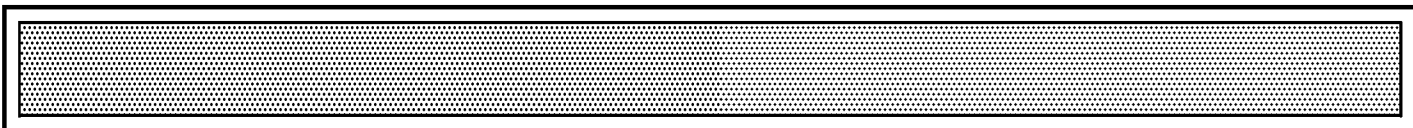
- If the CAPT (or F/O or STBY) PROBE HEAT pushbutton switch is in the OFF position, the ANTI ICE lights illuminate amber on the WLDP accompanied by the Single Chime (SC) and ECAM activation.

– **engine oil temperature :**

- If the engine OIL TEMP is below 50°C, the MASTER CAUTION lights illuminate accompanied by the Single Chime (SC) and ECAM activation.

Mod : 4801 + 5051

PW Eng. : 4000



TAKE-OFF WARNING

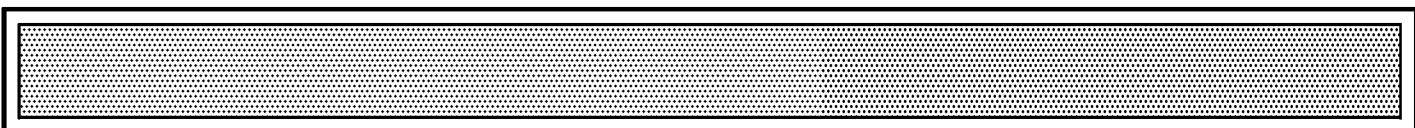
- The take-off warning monitors the correct configuration of the flight controls and systems, when a least one engine has reached take-off power, in order to ensure that flight controls and systems have been correctly selected (as required) following the T.O CONFIG TEST.

If a flight control surface or system is not in the correct configuration for take-off, the associated local warning (as applicable) illuminates accompanied by the Continuous Repetitive Chime (CRC) and ECAM activation.

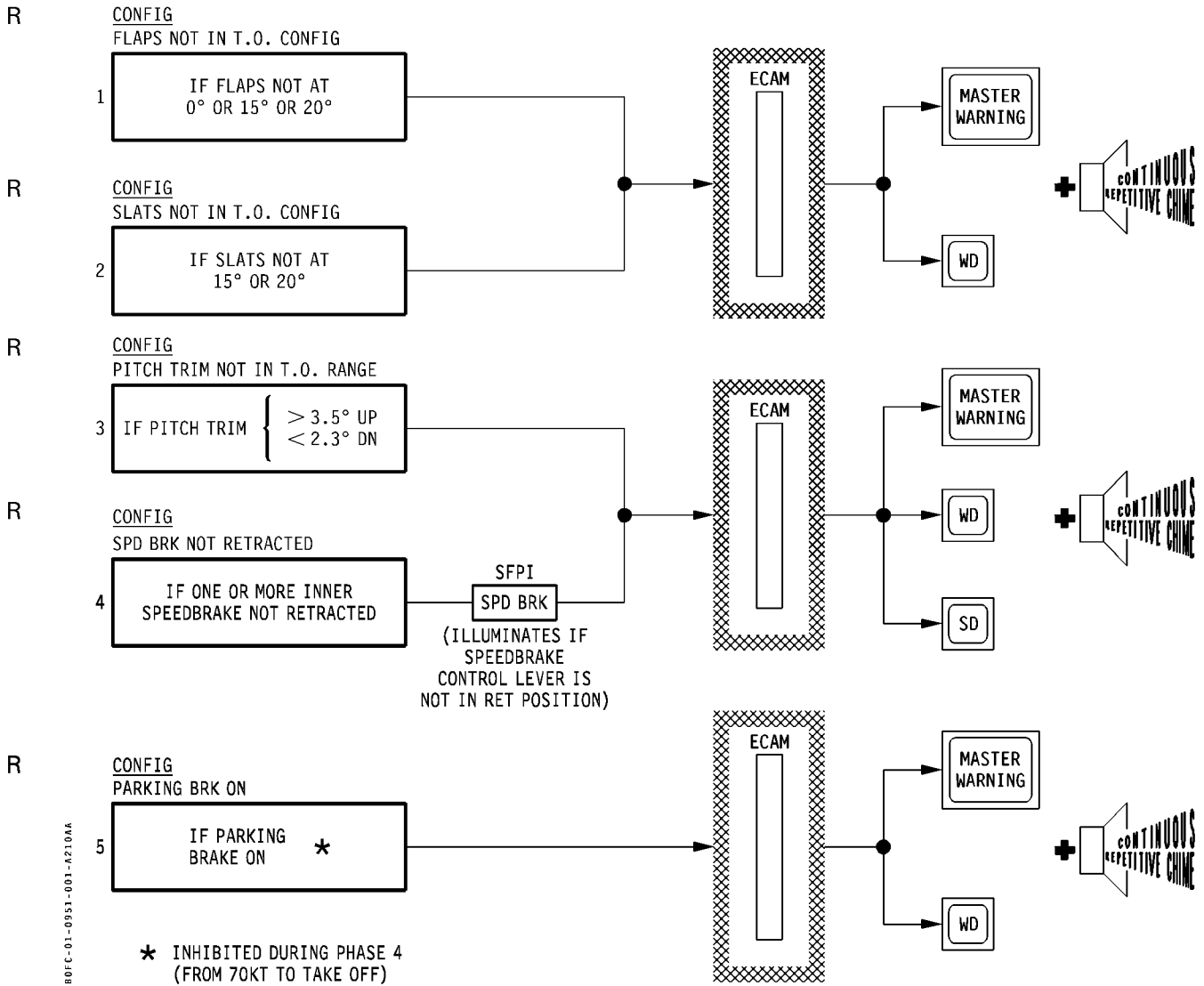
- In addition, the position of the PARKING BRAKE handle is also monitored.

If the handle is not in the released position, the MASTER WARNING lights illuminate accompanied by the Continuous Repetitive Chime (CRC) and ECAM activation.

Mod : 5051

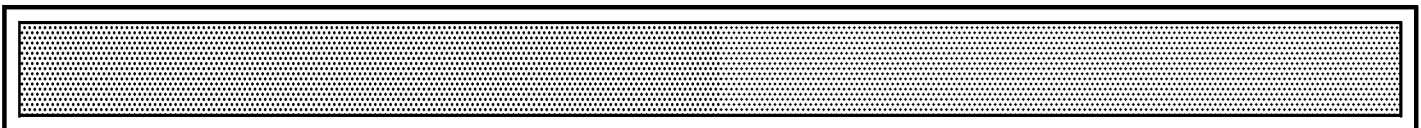


WARNING LOGIC



Note : The following warnings are recalled by pressing the T.O. CONFIG TEST :
 - PROBES HEAT OFF
 - BRK TEMP HI
 - DOOR NOT CLOSED
 - ENG OIL TEMP LO

Note : . The conditions 1 thru 4 are monitored by the T.O CONFIG TEST.
 . The conditions 1 thru 5 are monitored by the T.O WARNING.



FLIGHT CONTROLS

1.09.51

TAKE OFF CONFIGURATION TEST / TAKEOFF WARNING

PAGE 2

ECAM

REV 31

SEQ 001

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