DOCKET NO. SA-510

EXHIBIT NO. 2I

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

B-737-300/400
PILOT'S HANDBOOK
FLIGHT CONTROLS

INDEX

(cont'd.)

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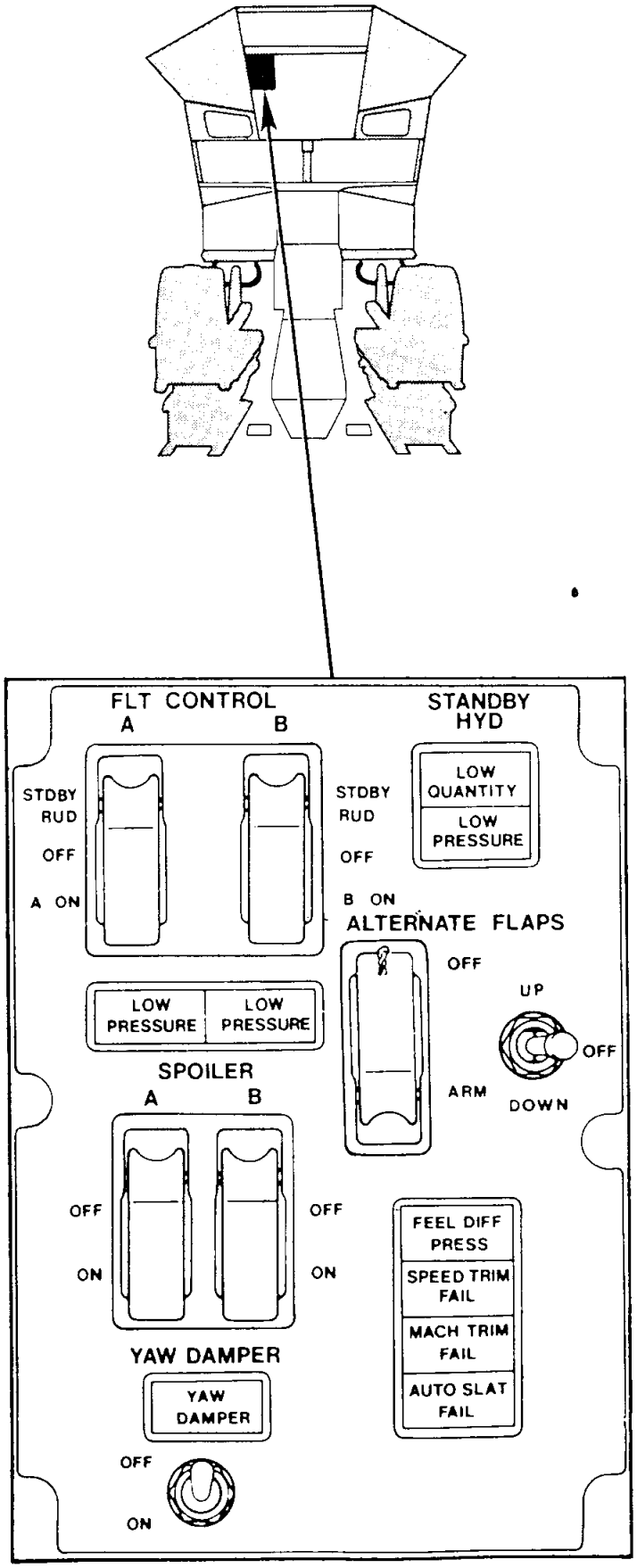
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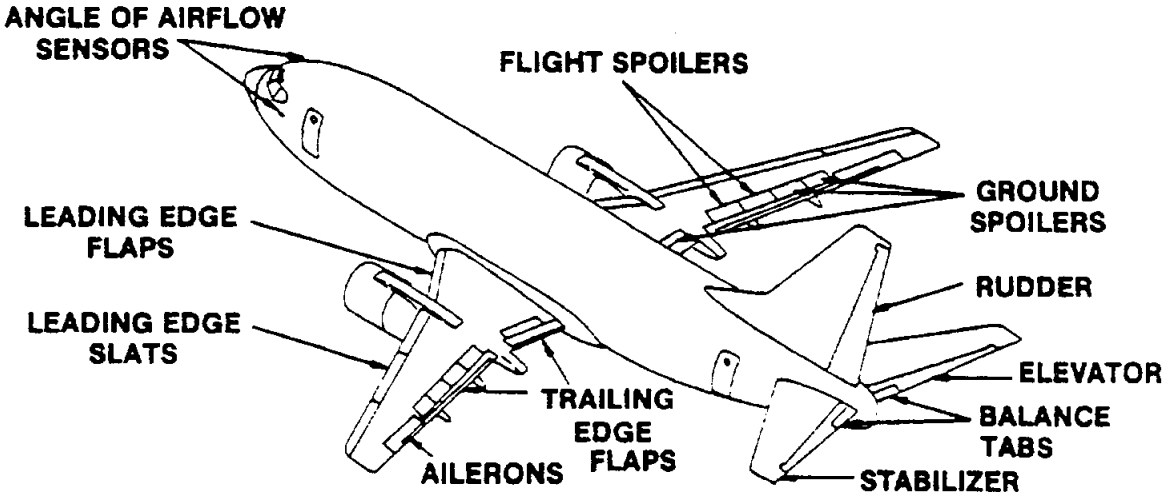
INTRODUCTION



(Flight Controls Surface Locations)

The primary flight controls are the ailerons, elevators and rudder. These hydraulically powered surfaces provide flight control in roll, pitch, and yaw. Hydraulic power is provided from hydraulic systems "A" and "B". Either system can operate all primary flight controls. The ailerons and elevators may also be operated manually, if required. The rudder may be operated by the standby hydraulic system if system "A" and/or "B" pressure is not available.

The ailerons are assisted by flight spoilers for roll control. The spoilers are hydraulically powered from system "A" (inboard) and "B" (outboard) and operate proportionally with aileron movement.

A variable pitch horizontal stabilizer may be positioned by pilot inputs to the electric trim motor, or manually through the trim wheels. During automatic flight, the autopilot electric motor controls the stabilizer position.

A variable incidence horizontal stabilizer is normally positioned by electric motors or controlled manually through a cable system for pitch trim.

High lift for takeoff and landing is provided by trailing edge flaps and leading edge devices. Normally, these surfaces are extended and retracted by hydraulic system "B". Alternatively, the trailing edge flaps may be extended and retracted electrically and the leading edge devices may be extended (but not retracted) by the standby hydraulic system.

INTRODUCTION (cont'd.)

Aerodynamic braking is provided in the air by the flight spoilers operating as speed brakes. On the ground, speed brakes use both flight spoilers and ground spoilers to destroy lift and make braking more effective.

The autoslat system improves handling qualities at high angles of attack during operations with flaps set at 1, 2, or 5. Autoslat deployment is designed to occur prior to stick shaker activation.

The stall warning system is provided to alert the crew of an impending stall condition.

An intermittent takeoff warning horn will sound when either or both throttles are advanced for takeoff if the:

— Stabilizer Trim is not in GREEN band range.
— 300: Trailing edge flaps are not in takeoff range, flaps 1 - 15.
— 400: Trailing edge flaps are not in takeoff range, flaps 5 - 15.
— Speedbrake Lever is not in the DOWN position.
— LE Devices are not in the correct position for takeoff.
— Parking Brake (as installed).

AILERONS

DESCRIPTION

The roll control surfaces consist of hydraulically powered ailerons and flight spoilers which are controlled by rotating either control wheel in the cockpit.

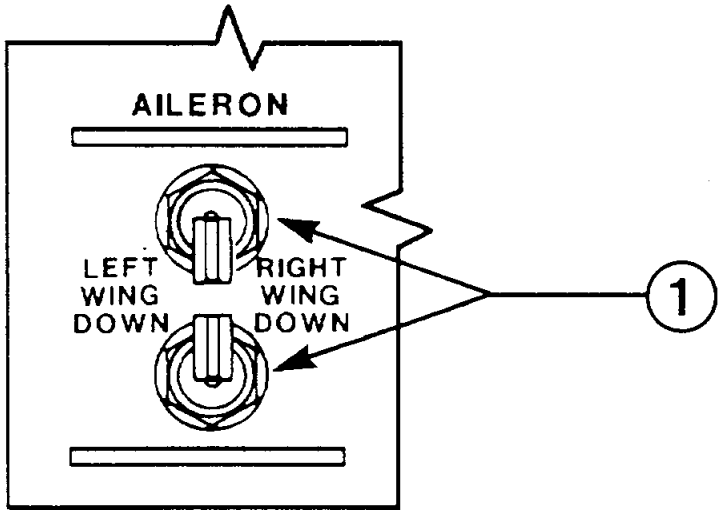
The pilots' control wheels are linked together by cables to supply inputs to two separate hydraulic power control units. Hydraulic systems "A" and "B" provide the pressure to the power control units to operate the ailerons. The two flight control switches control hydraulic pressure shutoff valves for each aileron. These same switches also control hydraulic pressure to the elevator and rudder.

The right and left ailerons are bussed together by the cable-drive system. Either hydraulic system is capable of providing full power control. In the event of total hydraulic power failure, rotation of the pilots' control wheels mechanically positions the ailerons. Manual control forces are aerodynamically reduced by balance tabs and balance panels. If the roll control system jams, a transfer mechanism allows the left control wheel (Captain's) to control roll through the movement of the ailerons. The right control wheel (First Officer's) will control roll through the deflection of the flight spoilers.

Aileron trim is accomplished by simultaneous operation of the trim switches on the control stand. Pushing these switches electrically repositions the mechanical aileron feel system, which, in turn, causes the ailerons to deflect to a new neutral, trimmed position. Hydraulic pressure is required for aileron trim.

AILERONS (cont'd.)

CONTROLS AND INDICATORS



(Aft Electronics Panel)

(1) **AILERON TRIM SWITCHES:**

(Spring-loaded to NEUTRAL position). Movement of both switches repositions the aileron neutral control position.

SPOILERS AND ELEVATORS

SPOILERS

Two flight spoilers are located on the upper surface of each wing. Hydraulic system "A" provides power to the inboard spoilers and hydraulic system "B" provides power to the outboard spoilers. Hydraulic power to the spoilers may be removed through shutoff valves which are controlled by two spoiler switches.

The flight spoilers are hydraulically actuated in response to movement of the aileron control. A spoiler mixer, connected to the aileron cable drive, controls the hydraulic power control units on each spoiler panel to provide spoiler movement proportional to aileron movement.

The flight spoilers rise on the wing with up aileron and remain faired on the wing with down aileron.

ELEVATORS

The elevators provide primary pitch control of the airplane. The elevators are interconnected by a torque tube that is normally powered by system "A" and system "B" power control units. Hydraulic pressure to the units is controlled by "A" and "B" flight control switches on the forward overhead panel. Either hydraulic system is capable of full elevator operation. In the event of failure of both hydraulic system "A" and "B", the elevators are controlled manually from either control column. Elevator tabs operate continuously to reduce the forces required to operate the elevators.

Elevator feel is provided by the elevator feel computer. The computer senses airspeed through the elevator pitot system and the horizontal stabilizer position to simulate aerodynamic forces to the control columns through the elevator feel and centering unit.

Both hydraulic system "A" or "B" operate the feel system. If either system "A" or "B" is unavailable, elevator feel will not be affected, but a difference in pressure to the elevator feel and centering unit will be indicated by the FEEL DIFF PRESS light. This light will illuminate only if the trailing edge flaps are up.

Elevator trim is provided by repositioning the stabilizer.

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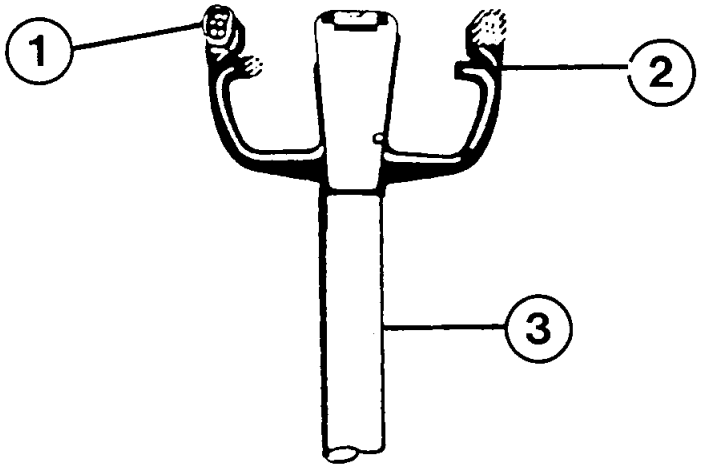
MACH TRIM SYSTEM

DESCRIPTION

The airplane has a tendency to tuck as mach number exceeds about 0.615. The mach trim system provides a signal to the elevator feel and centering unit to compensate for this instability. Mach information received from the air data computer is used by the mach trim system. Dual channel failure would result in a failure or unreliable mach trim indicated by illumination of the MACH TRIM FAIL light. A single channel failure causes the MACH TRIM FAIL light to illuminate when the recall feature of the Master Caution system is used.

CONTROLS AND INDICATORS



(1) STABILIZER TRIM SWITCHES (Outboard Arms):

Press to operate main electric stabilizer trim motor in desired direction. The autopilot disconnects.

(2) CONTROL WHEELS:

Rotate to raise or lower respective ailerons and flight spoilers.

(3) CONTROL COLUMNS:

Movement positions elevators. If moved in opposite direction to stabilizer trim, will automatically apply stabilizer brake to stop stabilizer movement.

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STABILIZER TRIM AND SPEED TRIM SYSTEMS

STABILIZER TRIM

The horizontal stabilizer may be operated by either the main electric trim motor, the autopilot trim motor, or manually, using the trim wheels in the cockpit.

Control wheel mounted stabilizer trim switches actuate the main electric trim motor and, if the autopilot is engaged, trip the autopilot engage switches. The main electric trim has two speed modes, high speed with flaps extended and low speed with flaps retracted.

The stabilizer trim motors (main electric and autopilot) move the stabilizer through a jackscrew mechanism. Manual control of the stabilizer is through cables connected to the same mechanism, allowing the pilot to manually position the stabilizer using the trim wheels.

The trim wheels follow automatically when electric stabilizer trim is actuated and the stabilizer trim indicator shows the trim unit setting.

Trim Authority	Main Electric Trim
Flaps Retracted	2.5 — 12.5 units (-300)
	2.8 — 12.5 units (-400)
Flaps Extended	0.25 — 12.5 units
Autopilot Trim	0.25 — 14.0 units
Manual Trim	0 — 17.0 units

The green band range of the stabilizer trim indicator shows permissible takeoff trim range (1.0 to 6.3 units for 737-300, 1.0 to 5.8 for 737-400). An intermittent horn sounds if takeoff is attempted with the stabilizer trim ***not*** in the green band range.

Main electric and autopilot trim motors may be disengaged by individual cutout switches located on the control stand.

A control column operated stabilizer trim cutout switch stops operation of the main electric and autopilot trim when the control column movement opposes trim direction. An override switch (located on the control stand) bypasses the control column operated cutout switch. When the guard is raised and the override switch is positioned to OVERRIDE, electric trim can be used regardless of control column position.

SPEED TRIM

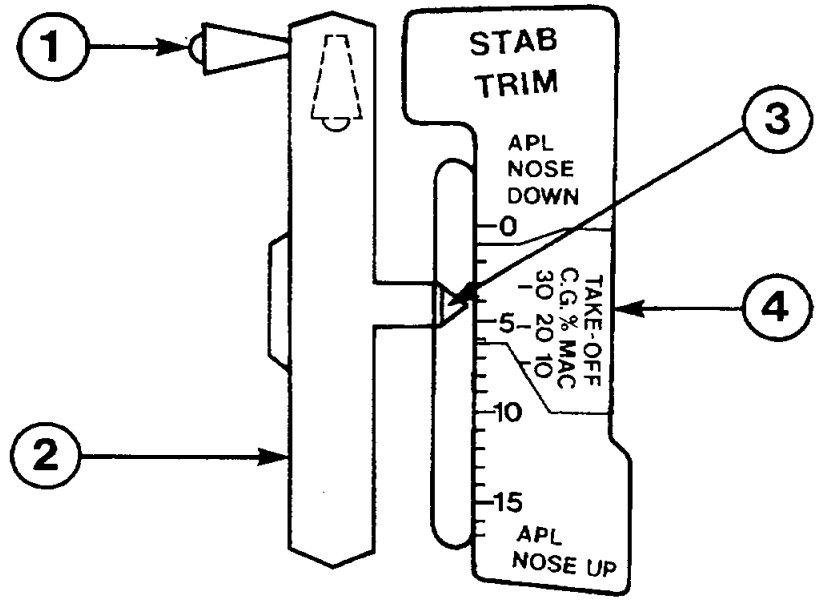
The speed trim system provides trim inputs to the stabilizer to improve flight characteristics during low speed operations with a low gross weight, aft center of gravity, high thrust, and flaps extended. Utilizing inputs of stabilizer position, thrust lever position, airspeed, and vertical speed, the system trims the aircraft using autopilot trim. It will most frequently be observed in operation during takeoffs and go-arounds. Conditions for speed trim operation are listed below:

— Flaps not UP (–300)
— Flaps UP or DOWN (–400)
— Airspeed 90—250 KIAS (–300)
— Airspeed 90 KIAS/Mach .6 (–400)
— 10 seconds after liftoff
— 5 seconds following release of trim switches
— N_1 above 60%
— Autopilot NOT ENGAGED
— Sensing of trim requirement

A dual channel failure would result in a failure or unreliable speed trim, indicated by illumination of the SPEED TRIM FAIL light. A single channel failure causes the SPEED TRIM FAIL light to illuminate when the Master Caution annunciator recall is activated.

STABILIZER TRIM AND SPEED TRIM SYSTEMS (cont'd.)

CONTROLS AND INDICATORS



(1) STAB TRIM HANDLES:

Provide for manual operation of stabilizer. Override any other stabilizer trim inputs. Handles may be folded inside STAB TRIM wheel.

(2) STAB TRIM WHEELS

(3) STAB TRIM INDICATORS:

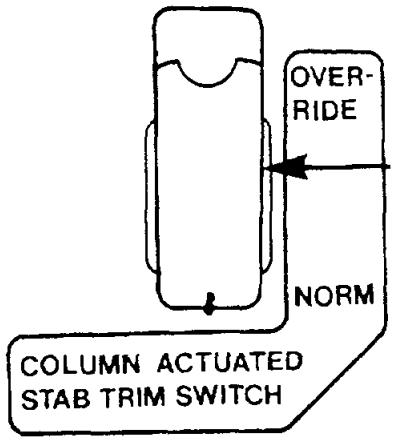
Indicate units of airplane trim on the adjacent scales.

(4) STAB TRIM GREEN BAND RANGE:

Corresponds to allowable range of trim settings for takeoff.

STABILIZER TRIM AND SPEED TRIM SYSTEMS (cont'd.)

CONTROLS AND INDICATORS (cont'd.)



(Aft Electronic Panel)

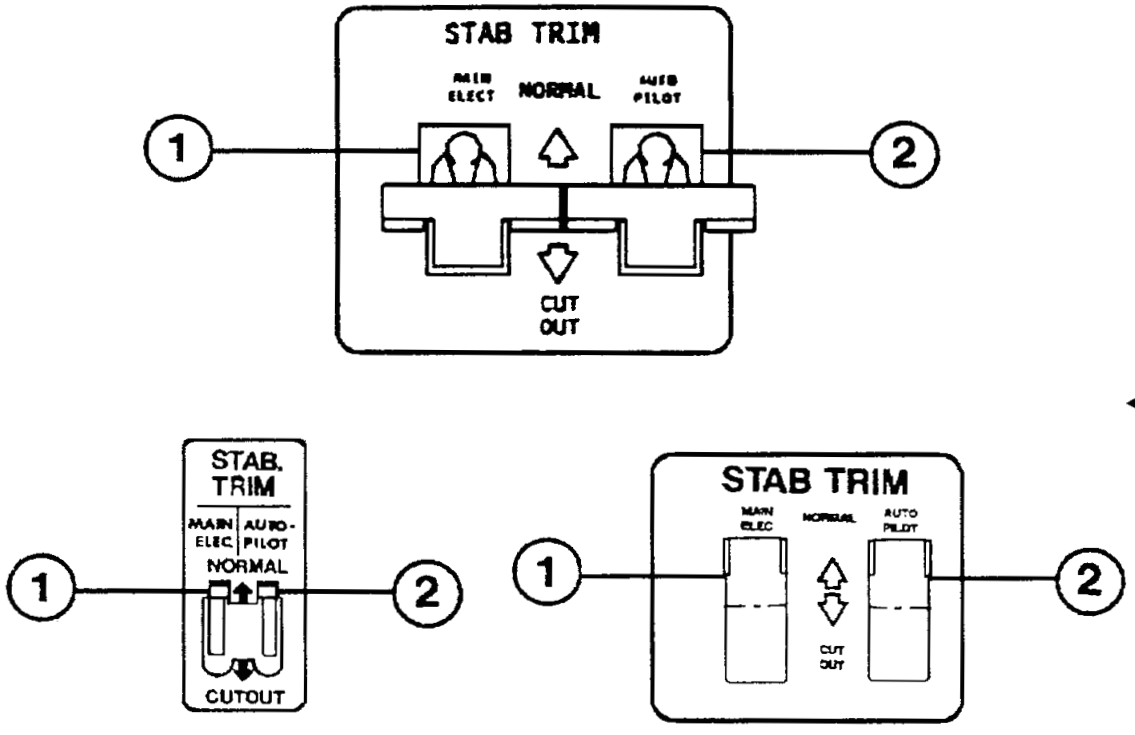
① **STABILIZER TRIM OVERRIDE:**

OVERRIDE — Bypasses the control column actuated stabilizer trim cutout switches to restore power to the electric trim.

←

STABILIZER TRIM AND SPEED TRIM SYSTEMS (cont'd.)

CONTROLS AND INDICATORS (cont'd.)



(As Installed)

(1) STAB TRIM MAIN ELEC CUTOUT SWITCH:

CUTOUT — Removes power from stabilizer main electric trim motor.

(2) STAB TRIM AUTOPILOT CUTOUT SWITCH:

CUTOUT — Removes autopilot servo power to stabilizer drive. Disconnects the autopilot.

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RUDDER

DESCRIPTION

Yaw control is provided by the rudder. Either set of rudder pedals will position the rudder through the rudder power control unit. Both hydraulic systems "A" and "B" supply the main rudder power control unit. Either hydraulic system will operate the rudder, if required.

Rudder feel is provided by a feel and centering unit using the mechanical action of springs, cams, and rollers.

The rudder trim knob electrically repositions the trim unit, which displaces the rudder pedals. When the pedals are offset, the rudder is positioned through the main rudder power control unit. Hydraulic pressure is required for rudder trim.

The standby pump furnishes hydraulic pressure to operate the rudder through a separate power control unit in the event of a loss of system "A" or system "B" pressure.

NOTE: The rudder pedals are displaced proportionately according to the following schedule:

INDICATED RUDDER TRIM (UNITS)	*RUDDER DISPLACEMENT*	*PEDAL SPLIT*	*NOSE WHEEL ANGLE*
5	*4.69°*	*1.24"*	*1.10°*
10	*9.37°*	*2.49"*	*2.20°*
15	*14.06°*	*3.74"*	*3.31°*

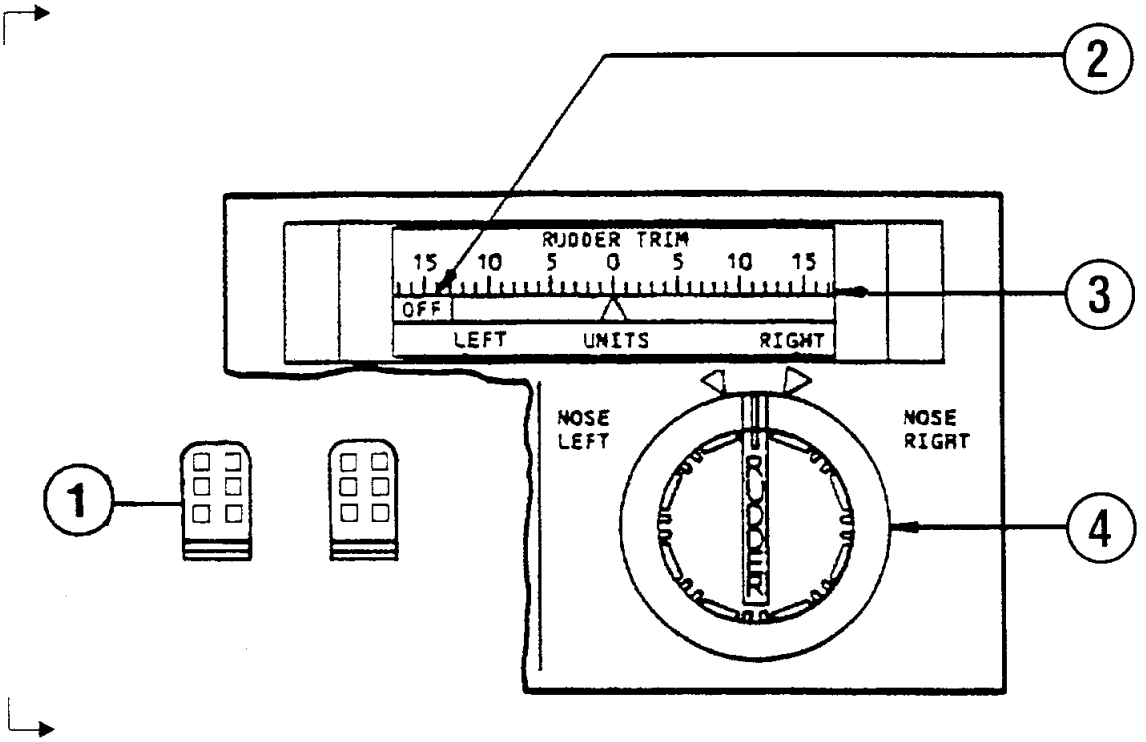
The system is powered from the #1 AC transfer bus (115 V, 28V) and has two circuit breakers on the P6-2 panel labeled "Rudder Trim Indicator" and "Trim Control Rudder".

Although 15° of rudder trim gives us nearly 4 inches of pedal split, it results in only a 3° nose wheel angle. Steering from the rudder pedals is limited (7°), and the steering wheel takes priority. Therefore, a 2° or 3° nose wheel angle may not be readily apparent when taxiing with the steering wheel.

THE RUDDER PEDALS ARE ALWAYS A DIRECT INDICATION OF RUDDER POSITION; *i.e., centering the rudder pedals centers the rudder.*

RUDDER (cont'd.)

CONTROLS AND INDICATORS



(Aft Electronics Panel)

(1) RUDDER PEDALS:

Control rudder position and, on the ground, permit limited nose gear steering.

(2) RUDDER TRIM OFF FLAG (Amber):

IN VIEW — Rudder trim indicator is inoperative.

(3) RUDDER TRIM INDICATOR:

Indicates units of rudder trim.

(4) RUDDER TRIM CONTROL:

(Spring-loaded to NEUTRAL position).

ROTATE — Electrically trims the rudder in the desired direction.

YAW DAMPER SYSTEM

DESCRIPTION

The yaw damper system consists of a yaw damper coupler, rate gyro, and a yaw damper actuator in the rudder power control unit (PCU).

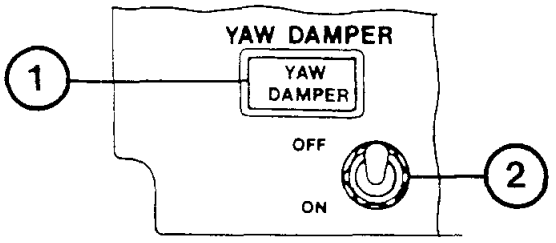
The rate gyro sends yaw change signals to the yaw damper coupler. The coupler responds only to those yaw rate signals which could be associated with dutch roll. Command signals are then sent to the rudder power control unit to deflect the rudder. The yaw damper also assists in providing turn coordination. No rudder pedal movement results from yaw damper operation.

Airspeed signals from the air data computer decrease the amount of yaw damper rudder deflection at higher airspeeds.

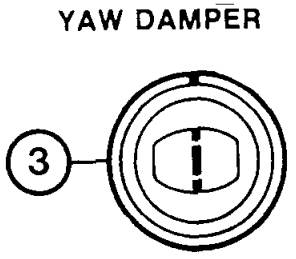
The yaw damper uses hydraulic system "B" only. Moving the "B" FLT CONTROL switch to the OFF or STDBY RUD position will disengage the yaw damper. Loss of hydraulic system "B" pressure will not illuminate the amber YAW DAMPER light.

YAW DAMPER SYSTEM (cont'd.)

CONTROLS AND INDICATORS



(Overhead Panel)



(Center Instrument Panel)

(1) **YAW DAMPER LIGHT (Amber):**

ILLUMINATED — Yaw damper is disengaged.

(2) **YAW DAMPER SWITCH:**

ON — Engages yaw damper to rudder power control unit.

(3) **YAW DAMPER OPERATION:**

Indicates movement of rudder due to yaw damper input on the ground and in the air and during testing. Pilot rudder pedal inputs are not indicated.

SPEED BRAKES

DESCRIPTION

The flight spoilers are used as speed brakes in the air, and both flight spoilers and ground spoilers are raised to reduce lift and for aerodynamic braking on the ground. The speed brake lever controls a spoiler mixer which positions the flight spoiler power control units and a ground spoiler control valve. The surfaces are actuated by hydraulic power supplied to the power control units or actuators on each surface. Operation of the ground spoilers in the air is prevented by the ground spoiler shutoff valve remaining closed until the main gear strut is compressed on landing.

INFLIGHT OPERATION

By actuating the speed brake lever, all flight spoiler panels will rise symmetrically in incremental amounts to act as speed brakes. Caution should be exercised when using flight spoilers during a turn, as they greatly increase roll rate. Movement of the speed brake lever past the FLIGHT DETENT causes buffeting and is therefore not permitted.

GROUND OPERATION

All flight and ground spoiler panels will automatically rise to full extend, if the speed brake lever is in the ARMED position, both thrust levers are in IDLE, and the correct combination of wheel spin-up or wheel spin-up and ground/air sensing signals are present.

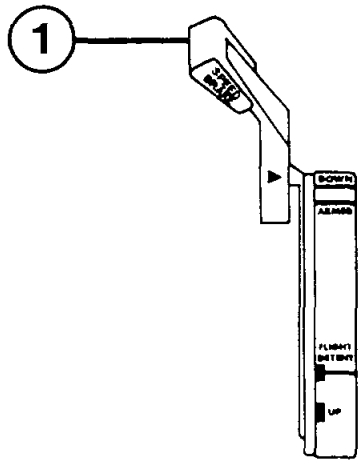
All spoiler panels retract automatically after touchdown, if either thrust lever is advanced. The speed brake lever will move to its DOWN position and the spoiler panels will retract if they were extended automatically.

All spoiler panels will extend automatically if the takeoff is rejected and the reverse thrust levers are positioned for reverse thrust. Wheel spin up must have occurred on at least two (any two) main wheels in order for the automatic extension to take place.

A failure in the automatic functions of the speed brakes is indicated by the illumination of the amber SPEED BRAKE DO NOT ARM light. In the event the automatic system is inoperative, the speed brake lever must be moved manually to the UP position after landing.

SPEED BRAKES (cont'd.)

CONTROLS AND INDICATORS



(Control Stand)

(1) SPEED BRAKE LEVER:

DOWN (Detent) — All flight and ground spoiler panels in faired position.

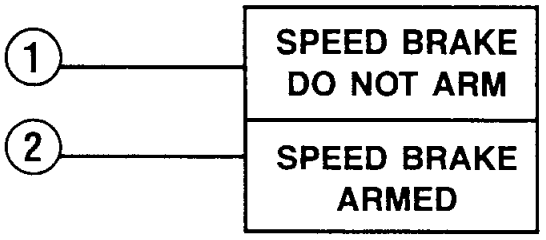
ARMED — Automatic speed brake system armed. All flight and ground spoiler panels extend upon touchdown (speed brake lever moves to UP position).

FLIGHT DETENT — All flight spoilers extended to their maximum position for inflight use.

UP — All flight and ground spoilers extended to their maximum position for ground use.

SPEED BRAKES (cont'd.)

CONTROLS AND INDICATORS (cont'd.)



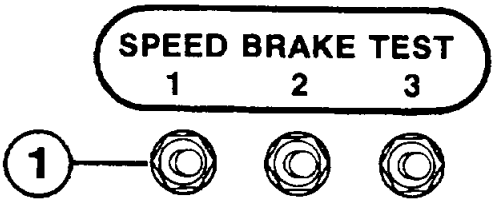
(Captain or Center Instrument Panel)

(1) SPEED BRAKE DO NOT ARM LIGHT (Amber):

ILLUMINATED — Indicates abnormal inputs to the speed brake system. The light is deactivated with the speed brake lever in the DOWN position.

(2) SPEED BRAKE ARMED LIGHT (Green):

ILLUMINATED — Indicates valid speed brake system inputs. The light is deactivated with the speed brake lever in the DOWN position.



(Center Panel)

(1) SPEED BRAKE TEST SWITCHES (if installed):

Press individually to check the speed brake fault detection circuits. The speed brake lever must be in the ARMED position. The SPEED BRAKE DO NOT ARM light illuminates.

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HIGH LIFT DEVICES

INTRODUCTION

High lift leading edge devices are used in combination with the trailing edge flaps to increase lift during takeoff and landing. The trailing edge flaps and leading edge devices, when extended, increase the wing chord and camber, which greatly increases lift, providing slower approach speeds and greater maneuvering capability. Trailing edge flap positions from 0 to 15 provide increased lift with relatively little increase in drag, while drag rises more rapidly than lift for positions greater than 15 and up to 40.

TRAILING EDGE FLAPS

Description

The flap lever positions a flap control valve that directs hydraulic pressure to actuate the flap drive unit to position the flaps. The drive unit also positions the leading edge control valve so that the leading edge devices operate in conjunction with the trailing edge flaps.

In the event of hydraulic system "B" failure, the trailing edge flaps can be operated electrically by the alternate flaps system. The guarded master switch (when armed) actuates a bypass valve to prevent hydraulic lock of the flap drive unit and arms the position switch. This switch controls an electric motor that operates the drive unit to extend or retract the trailing edge flaps.

If an asymmetrical condition was to develop between the right and left wing trailing edge flaps, hydraulic power will automatically be removed from the flap drive unit. No asymmetry protection is provided through the alternate (electrical) flap drive system.

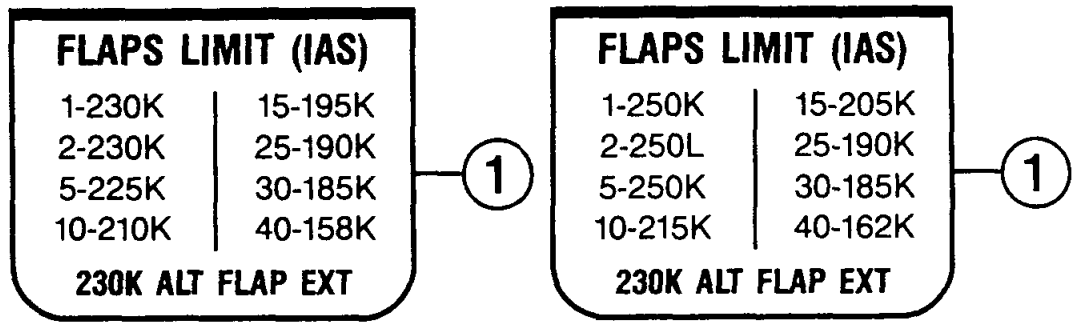
A flap load limiter is installed in the trailing edge flap drive system. When the flap lever is in the 40 detent, the flaps will retract automatically back to 30 if the airspeed exceeds 158 knots (−300) or 162 knots (−400). The flap lever does not move. The flaps return to 40 when the airspeed is reduced to 153 knots (−300) or 157 knots (−400). Normal tolerance is ±2 knots.

To prevent excessive structural loads from increased Mach at higher altitudes, flap extension above 20,000 feet should not be attempted.

HIGH LIFT DEVICES (cont'd.)

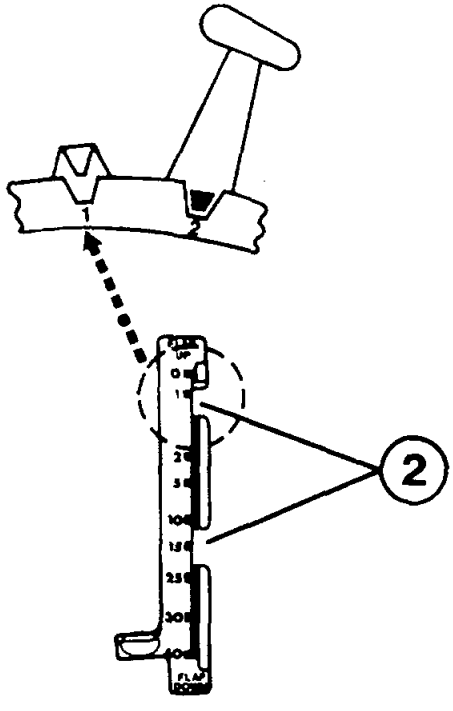
TRAILING EDGE FLAPS (cont'd.)

Controls and Indicators



(737-300) **(737-400)**

(Center Panel)



(1) FLAPS LIMIT PLACARD

(2) FLAP GATES:

Provides ease of rapid movement to:

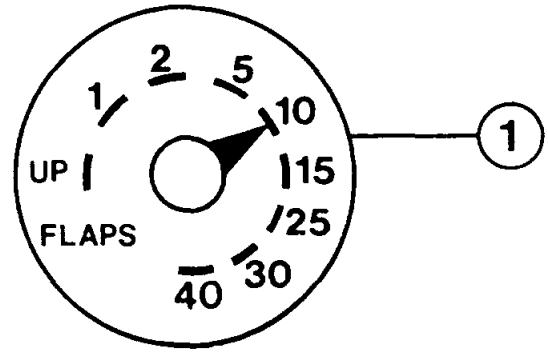
POSITION 1 — for one engine go-around.

POSITION 15 — for normal go-around.

HIGH LIFT DEVICES (cont'd.)

TRAILING EDGE FLAPS (cont'd.)

Controls and Indicators (cont'd.)



(1) **FLAP POSITION INDICATOR:**

Indicates the positions of the left and right trailing edge flaps. A significant difference between the pointers automatically shuts off hydraulic power to the flap drive unit for asymmetry protection.

HIGH LIFT DEVICES (cont'd.)

LEADING EDGE DEVICES

Description

The leading edge devices consist of 4 flaps and 6 slats. Two (2) flaps are inboard of each engine and 3 slats are outboard of each engine. Flaps are hinged surfaces that extend by rotating downward from the lower surface of the wing leading edge. Slats are sections of the wing leading edge that extend forward to form a slotted leading edge.

Leading edge devices are normally extended and retracted by hydraulic power from system "B". The leading edge control valve is positioned by the trailing edge drive unit so that the leading edge devices operate in accordance with trailing edge flap position. When the trailing edge flaps leave the UP position, the leading edge flaps will extend fully while the leading edge slats extend to an intermediate position. As the trailing edge flaps extend between the 5 and 10 position, the leading edge slats will then extend fully. When the flaps are retracted, the sequence is reversed.

In the event of hydraulic system "B" failure, the leading edge flaps and slats can be driven to the fully extended position using power from the standby hydraulic system. In this case, the alternate flaps master switch will energize the standby pump while the alternate flaps position switch will extend all of the leading edge devices fully when first moved to the DOWN position. The leading edge devices cannot be retracted by the standby hydraulic system.

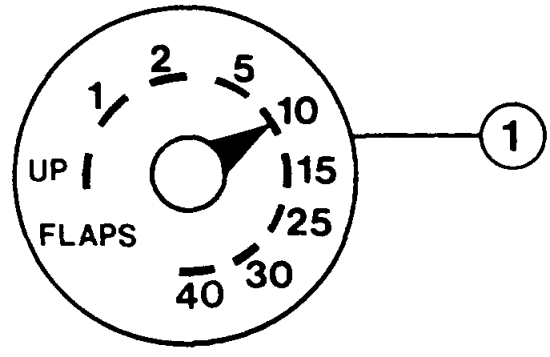
Indicator lights on the center panel provides overall leading edge device position status, while the leading edge devices annunciator on the aft overhead panel will indicate the position of the individual flaps and slats.

(cont'd.)

HIGH LIFT DEVICES (cont'd.)

TRAILING EDGE FLAPS (cont'd.)

Controls and Indicators (cont'd.)



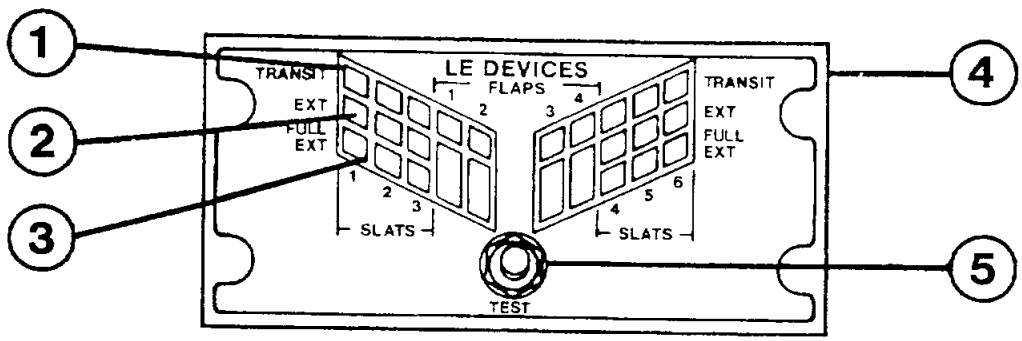
(1) **FLAP POSITION INDICATOR:**

Indicates the positions of the left and right trailing edge flaps. A significant difference between the pointers automatically shuts off hydraulic power to the flap drive unit for asymmetry protection.

HIGH LIFT DEVICES (cont'd.)

LEADING EDGE DEVICES (cont'd.)

Controls and Indicators



(Aft Overhead Panel)

(1) LE DEVICES TRANSIT LIGHTS (Amber):

ILLUMINATED — Corresponding leading edge device intransit.

(2) LE DEVICES EXT LIGHTS (Green):

ILLUMINATED — Corresponding leading edge slats in intermediate position.

(3) LE DEVICES FULL EXT LIGHTS (Green):

ILLUMINATED — Corresponding leading edge device fully extended.

(4) LE DEVICES ANNUNCIATOR PANEL:

Indicates position of individual leading edge flaps and slats.

EXTINGUISHED — Corresponding leading edge device retracted.

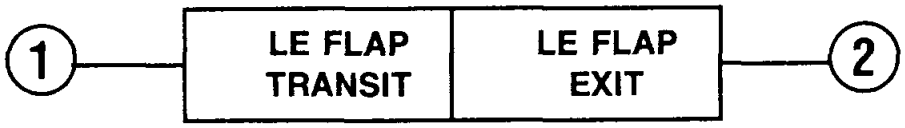
(5) LE DEVICES ANNUNCIATOR TEST SWITCH:

Press to test all annunciator panel lights.

HIGH LIFT DEVICES (cont'd.)

LEADING EDGE DEVICES (cont'd.)

Controls and Indicators (cont'd.)



(Center Panel)

(1) **LE FLAP TRANSIT LIGHT (Amber):**

ILLUMINATED — Any leading edge device intransit, or not in programmed position with respect to trailing edge flaps. Light is inhibited during autoslat operation.

(2) **LE FLAP EXT LIGHT (Green):**

ILLUMINATED — All leading edge flaps are fully extended and all leading edge slats in intermediate extend position (trailing edge flap positions 1, 2, and 5) OR all leading edge devices fully extended (trailing edge flap positions 10 through 40).

HIGH LIFT DEVICES (cont'd.)

AUTOSLAT SYSTEM

The autoslat system provides improved handling qualities at high angles of attack during takeoff or approach to landing. When trailing edge flaps 1 through 5 are selected, the leading edge slats are in the EXTEND position. As the airplane approaches the stall angle, the slats automatically drive to the FULL EXTEND position, prior to stickshaker activation. The slats return to the EXTEND position when the pitch angle is sufficiently reduced below the stall critical attitude.

Autoslat operation is normally powered by system "B" hydraulics. An alternate source of power is provided by system "A" through a power transfer unit if a loss of pressure from the system "B" engine-driven pump is sensed. The power transfer unit provides system "A" pressure to power a hydraulic motorized pump, pressurizing system "B" fluid to provide power for autoslat operation.

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STALL WARNING SYSTEM (STICK SHAKER)

DESCRIPTION

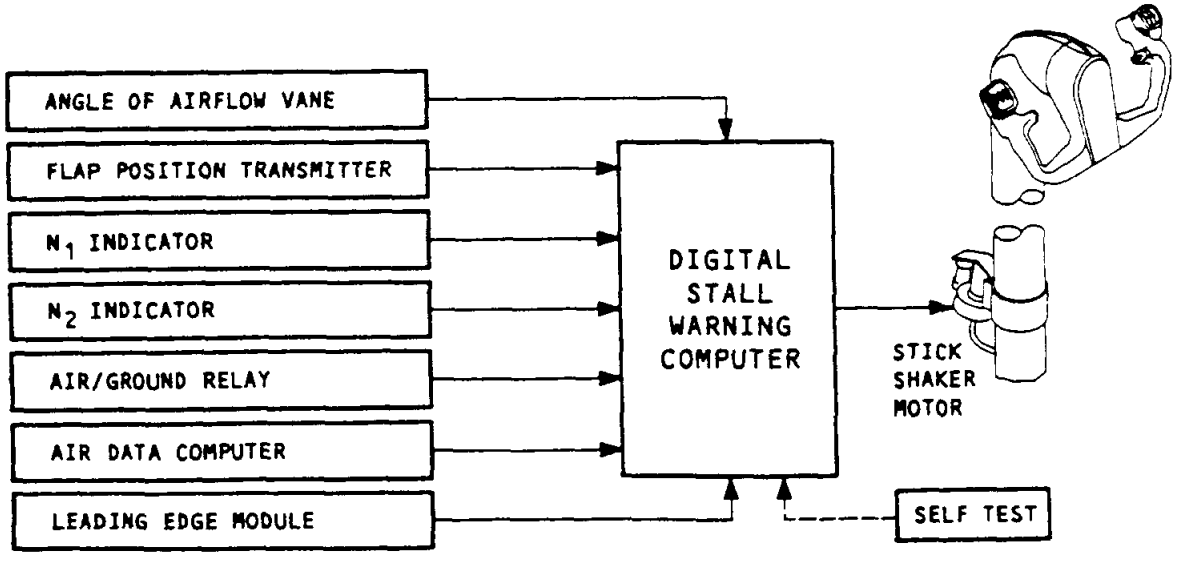
In some configurations, the margin between stall and aerodynamic stall warning (buffet) is insufficient, therefore an artificial stall warning device, a stick shaker, is used to provide the required warning.

The stall warning system or "stick shaker" is designed to alert the pilots before a stall develops. The warning is given by vibrating both control columns. No ON-OFF switch is provided because the system must be energized in flight at all times. The system is deactivated on the ground by the air-ground safety sensor.

The stall warning system consists of a control column shaker (eccentric weighted motor), heated airflow vanes to sense angle of attack, a flap position sensor, a stall warning amplifier, a main landing gear operated switch, and two test switches on the pilots' overhead panel.

Two independent digital computers are installed which compute the proper stall warning based on angle of attack, flap configuration and thrust. In addition, the stall warning occurs when the airspeed falls below a specified value for the selected flap setting, this is referred to as the Speed Floor. The computers receive inputs from the angle of airflow vanes, the flap position transmitter, the N1 and N2 indicators, the air/ground relay, the air data computers, and the leading edge module.

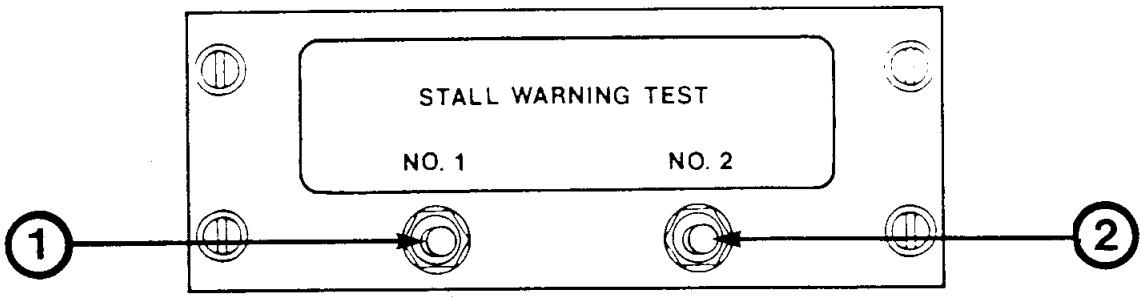
Two test switches are installed in the aft overhead panel. Pressing either of these initiates a self-test of the respective stall warning channel. The No. 1 activates the Captain's stick shaker, the No. 2 the F/O's stick shaker. Either stick shaker vibrates both columns.



STALL WARNING SYSTEM

STALL WARNING SYSTEM (STICK SHAKER) (cont'd.)

CONTROLS AND INDICATORS



(Aft Overhead Panel)

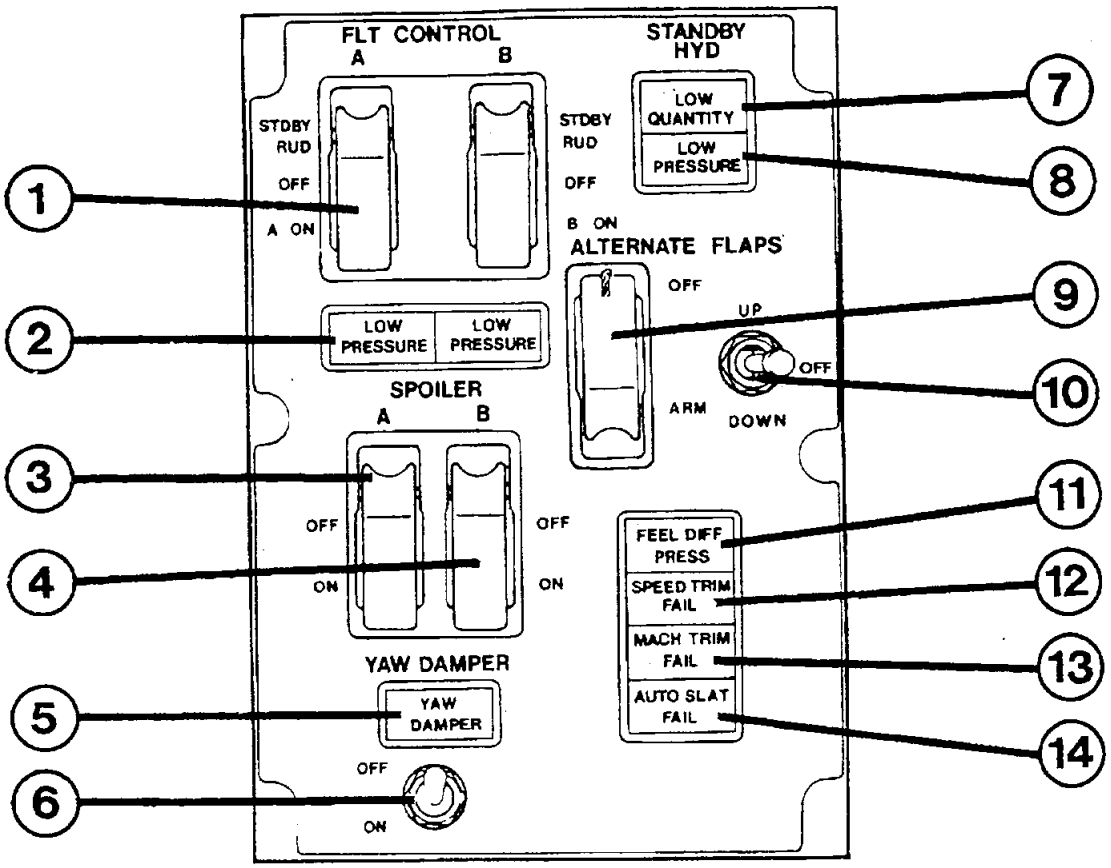
(1) STALL WARNING TEST BUTTON NO. 1:

Pressing the NO. 1 test button will initiate the self-test for System #1, activating the stick shaker.

(2) STALL WARNING TEST BUTTON NO. 2:

Pressing the NO. 2 test button will initiate the self-test for System #2, activating the stick shaker.

CONTROLS AND INDICATORS



(1) FLT CONTROL SWITCHES A & B:

ON — Normal position, flight control shutoff valve is OPEN.

OFF — Flight control shutoff valve is CLOSED, LOW PRESSURE light (below switch) is illuminated.

STDBY RUD — Turns on standby pump, opens standby rudder shutoff valve, and pressurizes standby rudder power control unit. With switch in STDBY RUD, the LOW PRESSURE light (below switch) extinguishes when standby rudder shutoff valve is OPEN.

(2) FLT CONTROL LOW PRESSURE LIGHTS (2, Amber):

ILLUMINATED — Indicates low pressure of corresponding hydraulic system to ailerons, elevator, elevator feel, and rudder. FLT CONT annunciator and MASTER CAUTION lights will also be illuminated.

EXTINGUISHED — Pressure normal or corresponding flight control switch is positioned to STDBY RUD and standby rudder shutoff valve has opened.

(cont'd.)

CONTROLS AND INDICATORS (cont'd.)

(3) **SYSTEM "A" SPOILER SWITCH:**

Controls inboard flight spoilers shutoff valve.

(4) **SYSTEM "B" SPOILER SWITCH:**

Controls outboard flight spoilers shutoff valve.

→(5) **YAW DAMPER LIGHT (Amber):**

ILLUMINATED — Indicates yaw damper is disengaged. FLT CONT annunciator and MASTER CAUTION lights will also be illuminated.

(6) **YAW DAMPER SWITCH:**

ON — Engages yaw damper to rudder.

OFF — Disengages yaw damper from rudder.

(7) **STANDBY HYD LOW QUANTITY LIGHT (Amber):**

ILLUMINATED — Indicates low fluid level in standby hydraulic reservoir. FLT CONT annunciator and MASTER CAUTION lights are also illuminated.

(8) **STANDBY HYD LOW PRESSURE LIGHT (Amber):**

ILLUMINATED — Indicates low output pressure of electric motor driven standby pump. Armed only when standby pump operation has been selected. FLT CONT annunciator and MASTER caution lights are also illuminated.

(9) **ALTERNATE FLAPS MASTER SWITCH:**

ARM — Turns standby pump ON; closes trailing edge flap bypass valve; and arms alternate flaps control switch and standby hyd LOW PRESSURE light.

(cont'd.)

CONTROLS AND INDICATORS (cont'd.)

(10) ALTERNATE FLAPS CONTROL SWITCH:

Functions only when alternate flap master switch is in the ARM position.

OFF — Switch is spring-loaded to OFF from DOWN position, but will remain in UP position.

DOWN — Electrically extends trailing edge flaps and hydraulically extends leading edge devices.

UP — Electrically retracts trailing edge flaps, but leading edge devices remain extended.

(11) FEEL DIFF PRESS LIGHT (Amber):

ILLUMINATED — Indicates hydraulic systems "A" and "B" differ more than the desired amount from the feel computer. The light is armed ONLY when trailing edge flaps are UP. FLT CONT annunciator and MASTER CAUTION lights are also illuminated.

(12) SPEED TRIM FAIL LIGHT (Amber):

ILLUMINATED — Indicates failure of both FCC channels. Indicates failure of a single FCC channel when MASTER CAUTION light recall is activated, and light will extinguish when Master Caution system is reset. →

(13) MACH TRIM FAIL LIGHT (Amber):

ILLUMINATED — Indicates failure of both channels. Indicates failure of a single channel when MASTER CAUTION light is activated. Light may be extinguished by activating Master Caution switch. →

(cont'd.)

CONTROLS AND INDICATORS (cont'd.)

(14) **AUTO SLAT FAIL LIGHT (Amber):**

ILLUMINATED — Indicates failure of both auto-slat channels. Indicates failure of single auto-slat channel when MASTER CAUTION annunciator is activated. Light may be extinguished by activating the Master Caution switch.