1. GENERAL.

The flight controls are divided into two groups:

- Primary flight controls consisting of elevators, ailerons and rudder.
- Secondary flight controls consisting of trim system and the flaps.

All primary flight controls are conventional, manually operated rod and cable assemblies. All control surfaces are mass balanced.

The flaps are electrically controlled and hydraulically actuated.

The trim system is electrically controlled and electrically actuated.

Geared tabs are used with the elevator and aileron systems while a spring tab is used with the rudder system.

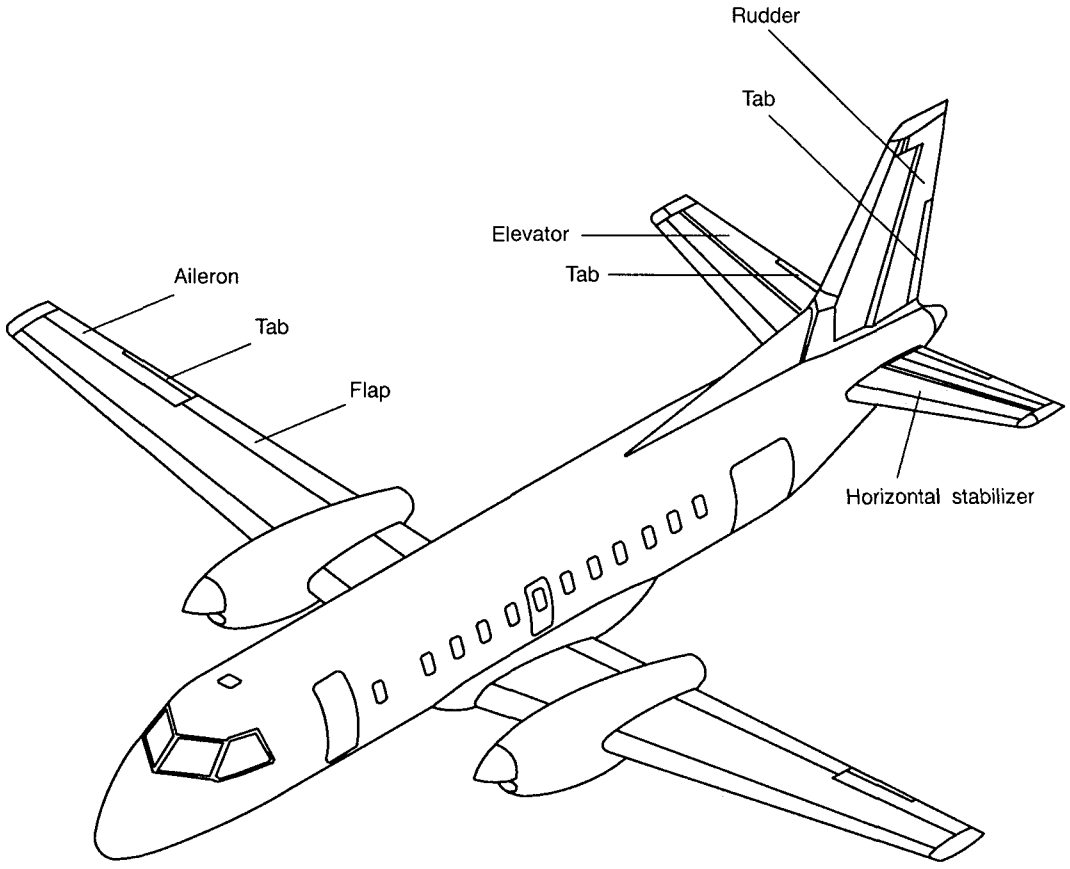
The geared tabs deflect proportionally to control surface movement to assist the control forces by means of aerodynamic effect on the tab.

The rudder pedals are mechanically linked to the spring tab, and via torsion bars to the rudder.

A rudder travel limiting system limits the control system operating range as a function of airspeed.

All tabs are controlled electrically from cockpit when used for trimming.

On ground, all primary flight controls can be locked by a gust lock system.



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2. MAIN COMPONENTS AND SUBSYSTEMS.

2. 1. Ailerons.

Each aileron is hinged to the wing trailing edge at two points.

The left and right aileron control channels are mechanically interconnected.

However, should one of the control channels become jammed, the other channel can be controlled by applying excessive force to the control wheel or disconnected by pulling the roll disconnect handle in the cockpit which separates the two channels from each other. If the handle is not pulled the disconnect function is automatically reset when the excessive control force no longer is applied.

After the handle has been pulled, disconnection is permanent and the system can only be reset on the ground by use of the reset switch adjacent to the disconnect unit.

When the control channels are disconnected the left pilot has control of the left aileron while right pilot retains control of the right aileron, and the pilot whose aileron channel is free, maintains sufficient control of the aircraft with his wheel.

A centering spring unit is installed in each control system to improve the lateral stability at extreme sideslip angles. The spring unit also compensates the aerodynamic upfloat in case of a disconnection during flight.

A sensor supplies aileron position information to the flight recorder.

The autopilot aileron servo drive is mechanically linked to the right aileron channel.

2. 2. Elevators.

The elevators are hinged to the horizontal stabilizer at three points.

The left and right elevator control channels are mechanically interconnected.

However, should one of the control channels become jammed, the other channel can be controlled by applying excessive force to the control column or disconnected by pulling the pitch disconnect handle in the cockpit which separates the two channels from each other. If the handle is not pulled the disconnect function is automatically reset when the excessive control force no longer is applied.

After the handle has been pulled, disconnection is permanent and the system can only be reset on the ground.

When the control channels are disconnected the left pilot has control of the left elevator while the right pilot retains control of the right elevator, and the pilot whose elevator channel is free, maintains sufficient control of the aircraft with his column.

If left channel is jammed, no stick pusher movement is available, see AOM 19/4.1.

An elevator downspring is installed in each control system in order to improve the stick–force variation with speed at low speed. The spring acts with a constant force over the whole elevator range of travel. Additionally, an elevator upspring is installed in each control system as a complement to the downspring. The upspring only acts at elevator angles of 6° down or more. The spring–force increases with increased down deflection. The spring improves the pushover characteristics of the aircraft but has no function at manoeuvres encountered during normal operation.

Two sensors supply elevator position information to the flight recorder.

The autopilot elevator servo drive is mechanically linked to the left elevator channel.

2. 3. Rudder.

The rudder is hinged to the fin at two points and is operated with assistance of a spring tab. An aerodynamic balance horn is located at the top of the rudder.

Each pair of rudder pedals is mechanically interconnected. The pedal positions can be individually adjusted with a lever mounted in the center of each pair of pedals.

A sensor supplies rudder position information to the flight recorder.

The autopilot rudder servo drive is mechanically linked to the rudder control system.

Rudder Limiter System

The rudder control system includes a rudder limiter control unit that controls a rudder limiting mechanism to prevent overload conditions as a result of excessive rudder pedal displacement or excessive control forces on the rudder at high speed.

The rudder limiting system provides restrictions within following speed ranges:

- At airspeeds below 150 kts, the system permits full range of movement for the rudder.
- At airspeeds between 150 and 200 kts the system limits rudder deflection to 15 deg. in either direction.
- At airspeeds above 200 kts the system limits rudder deflections to 6.3 deg. in either direction.

In a malfunction of the system the RUDDER LIMIT light on the Central Warning Panel comes on. The Rudder Limiter Control Unit will consider one of the following cases as a system malfunction: power loss, limiting mechanism fails to enter proper position for corresponding airspeed, a failure in the speed sensors or excessive rudder command for corresponding airspeed due to mechanical failure.

The rudder limiter system can be overridden by setting the RUDDER LIMIT switch to the OVRD position. By setting the RUDDER LIMIT switch to OVRD the rudder limiting mechanism will be retracted by the override actuator enabling full range of movement for the rudder at any airspeeds. The RUDDER LIMIT light will then persist until the airspeed is below 140 kts, where actual position of the limiting mechanism will correspond with the airspeed thus extinguishing the warning light.

2. 4. Flaps

There is a single, slotted flap on each wing. The flaps are mechanically interconnected and are operated by hydraulic power and controlled with a handle on the center pedestal.

The flaps can also be powered by hydraulic hand pump pressure. Ref. AOM 10.1 and 10.2.

To prevent flap damage due to excessive air loads, a blow–back protection is incorporated in the hydraulic system.

There are four handle "detents", designated, 7, 15, 20 and 35, respectively. Cockpit indication is by way of a dual pointer instrument, with a white "band" at each setting.

The actual flap deflection achieved at each setting varies with airspeed. At the maximum airspeed allowed for a setting the air loads on the flap surfaces make the pointers stop at the "upper end" of the white band, whereas on ground they may stop closer to the "lower end". The white band thus indicates a "range", to accommodate the flexing of the flap surfaces at different airspeeds.

A left flap position sensor supplies signals used for:

- Left flap position indicator pointer in cockpit
- Position feedback for flap operation.
- Takeoff configuration warning (CONFIG)
- Flight recorder.
- Left stall warning channel.

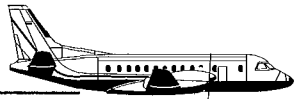
A right flap position sensor supplies signals used for:

- Right flap position indicator pointer in cockpit
- Landing configuration warning (CONFIG)
- Right stall warning channel

A flap position signal for the GPWS is also supplied directly from the flap control unit.

If there is a malfunction in the flap electrical control system the FLAPS light on the CWP illuminates.

A flap control system TEST lamp and a TEST switch are installed on the overhead panel.



2. 5. Gust locks.

The gust lock is controlled with a handle on the center pedestal in the cockpit. The system locks the elevator and aileron controls mechanically and the rudder electrically. Either of the control columns must be pushed forward in order to get the elevator gust–lock into grip.

With the gust lock engaged, power lever movement is limited to prevent the aircraft from taking off with the controls locked.

The gust lock handle also controls the following electrical functions.

With the gust lock engaged the following is possible:

– Operation of the right engine propeller brake

– Erasing of cockpit voice recorder.

Should any disconnection occur in the gust lock control link system, the system fails in the disengaged position.

If the gust lock handle is in off position but the rudder gust lock remains engaged, the GUST lock light on the CWP illuminates.

2. 6. Trim systems.

Main roll trim is accomplished by operating the ROLL trim switches to actuate the left aileron trim tab.

Standby roll trim is accomplished by operating the STBY ROLL trim switches to actuate the right aileron trim tab.

Yaw trim is accomplished by operating the YAW trim switches to actuate the rudder tab.

All these switches are located in the trim panel on the center pedestal in the cockpit.

Main pitch trim is accomplished by operating the trim switches on either control wheel to actuate the left elevator trim tab, and via a synchronization system, the right trim tab. The left pilot's switches override the right pilot's switches.

Built–in monitoring circuits deactivate the synchronization in case of a discrepancy, and illuminate the PITCH TRIM light on the CWP.

Standby pitch trim is accomplished by operating the STBY PITCH trim switches on the center pedestal. These switches actuate the right elevator trim tab only.

Standby pitch trim also deactivates the synchronization. In this case it can be reset with the PITCH RESET switch on the trim switch panel.

With the pitch trim synchronization deactivated both main (left) and standby (right) trim tabs can be operated individually by the control wheel trim switches and the STBY PITCH trim switches respectively.

All trim switches are dual switches to prevent runaway trim, and must be operated together to complete the necessary electrical circuit.

A common trim tab position indicator is located on the center instrument panel.

2. 7. Takeoff configuration warning.

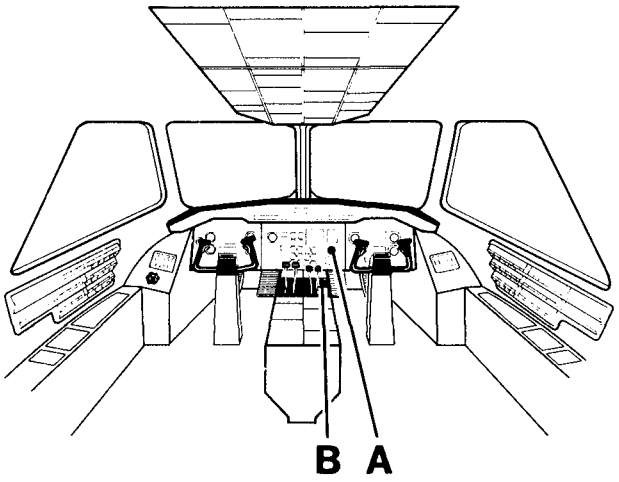
The trim and flap positions are fed into the CONFIG (configuration) warning circuit of the master warning system. With the aircraft weight on the wheels, flaps at takeoff position (within 0 to 15 degrees range), pitch trim in the normal takeoff range (green band), and condition levers set for maximum PROP RPM, the configuration for takeoff is correct. The power levers can then be advanced to maximum power for takeoff without a CONFIG warning. However, if any of these conditions are not met, the master warning is activated. The CONFIG warning light on the center warning panel flashes bright red, an intermittent horn sounds and the red master warning light come on flashing.

Pressing the master warning light cancels the horn, the light goes off, and the CONFIG light changes to steady.

2. 8. Landing configuration warning.

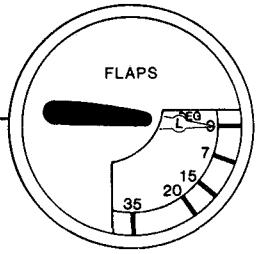
The flap warning system is part of the Ground Proximity Warning System (GPWS). See AOM 19/2.1

3. CONTROLS AND INDICATORS.

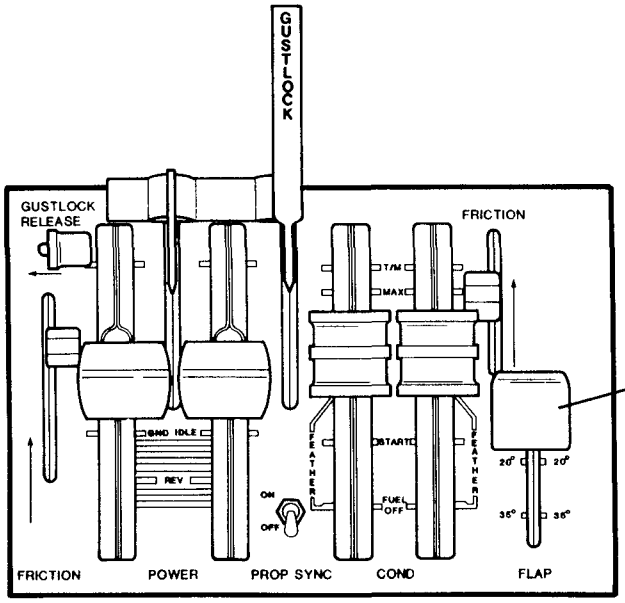


A FLAP POSITION INDICATOR

Flap position indicator.
Dual pointers (L and R) indicate position of left and right flaps.

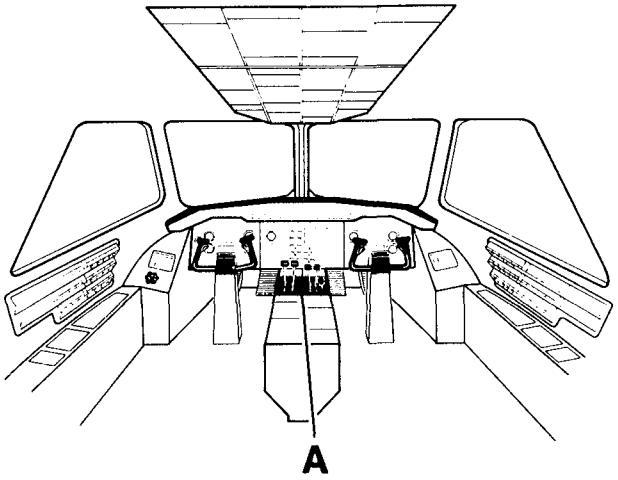


B FLAP HANDLE

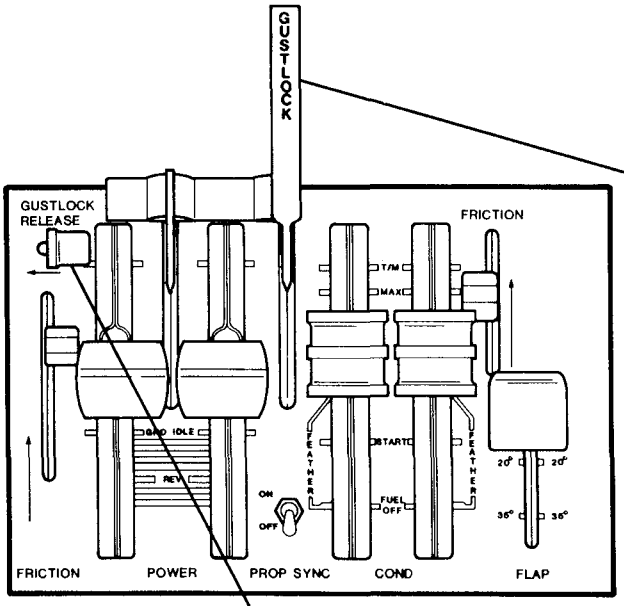


Flap handle.
Used to select flap positions as indicated on the handle placard.
Detents at 7°, 15°, 20° and 35°.
For flaps up selection there are gates at 20° and 7°.

Fig. 2. Flight controls - controls and indicators.



A GUST LOCK



Gust lock handle.
Moving the gust lock handle fully aft locks the elevators and the ailerons mechanically and the rudder electrically. When engaged, the movement of the power levers is limited by a stop on the gust lock handle.

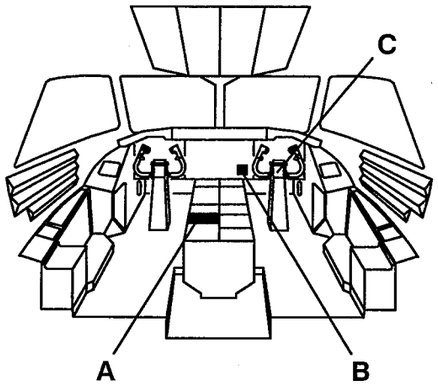
With the gust locks engaged, the following is possible:

- Operation of right engine propeller brake.

- Erasing of cockpit voice recorder.

Gust lock release knob.
When moved sideways, the gust lock handle can be operated.

Fig. 3. Flight controls - controls and indicators.



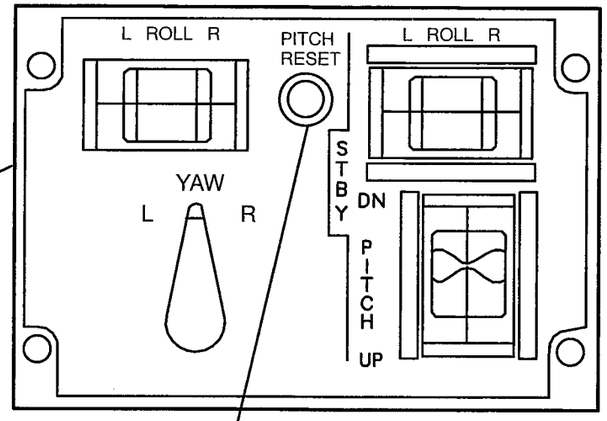
A TRIM SWITCHES

Trim switches.
Normal roll trim is accomplished by operating the left set of roll trim switches simultaneously, thereby controlling the left aileron trim tab.

Standby roll trim switches (right set, guarded) control the right aileron trim tab.

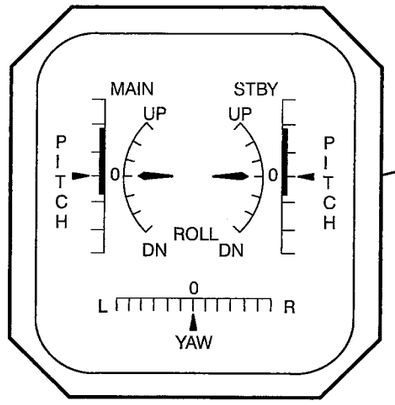
Yaw trim is accomplished by operating the yaw trim switches simultaneously.

Standby pitch trim switches (guarded) control the right elevator trim tab.



Pitch reset switch.
When depressed pitch trim synchronization re–engages.

B LCD TRIM INDICATOR
(Mod No. 2949)



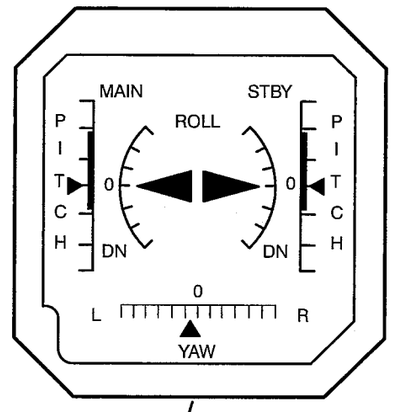
LCD Trim indicator.
Displays trim tab deflection for pitch, roll and yaw. The indicator shows trim tab deflection for both main and standby systems in units.

Green band indicates takeoff range.

At power up, the built in test will illuminate all segments for 5 seconds.
NOTE: Loss of main or standby power results in segments flashing during test sequence.

Pointer indication moves in descrete steps (at intermediate trim settings segments may alternate between two positions).

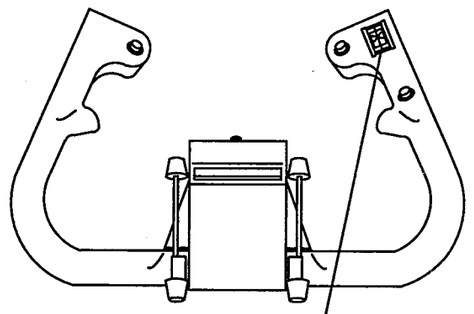
B TRIM INDICATOR



Trim indicator.
Displays trim tab deflection for pitch, roll and yaw. The indicator shows trim tab deflection for both main and standby systems in units.

Green band indicates takeoff range.

C PITCH TRIM SWITCHES



Pitch trim switches.
Normal pitch trim is accomplished by operating both pitch trim switches simultaneously.
This controls the left elevator trim tab, and via the synchronization system, the right trim tab.

The left pilot's switches override the right pilot's switches.

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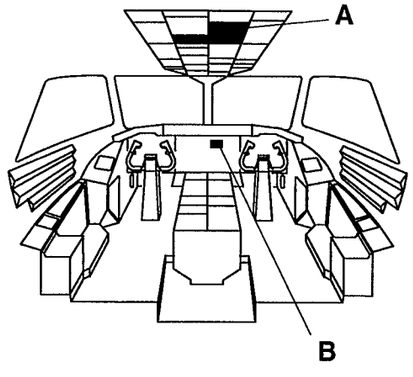
FIG 4 Flight control – controls and indicators.



PITCH TRIM light (amber).

The PITCH TRIM lights comes on when pitch trim synchronization is deactivated.

FLAPS light (amber).

The FLAPS light comes on if there is a malfunction in the flap electrical control system. The light will also come on when FLAPS test switch is activated.

GUST LOCK light (amber).

The GUST LOCK light comes on if gust lock handle is in off position but the rudder gust lock remains engaged.

B CENTRAL WARNING PANEL

	A	B	C	D	
1	L ENG FIRE	AVIONIC SMOKE	LAV SMOKE	R ENG FIRE	1
2	L ENG OIL PRESS	CARGO SMOKE	CABIN PRESS ↓	R ENG OIL PRESS	2
3	L TAIL P HOT		PROP BRAKE	R TAIL P HOT	3
4		AUTO TRIM	CONFIG		4
5	AUTO COARSEN		PITCH TRIM	RUDDER LIMIT	5
6	L FIRE DET FAIL	FUEL ↑	ELEC ↑	R FIRE DET FAIL	6
7	ICE PROT ↑	ENGINE ↑	FLAPS	AIRCOND ↑	7
8	PARK BRK ON	HYDR ↓	EMER LTS UNARMED	OXYGEN	8
9	A–SKID INOP ↓	AVIONICS	AVIONICS VENT	DOORS ↑	9
10	L STALL FAIL	GUST LOCK	PUSHER SYSTEM	R STALL FAIL	10

CONFIG light (red).

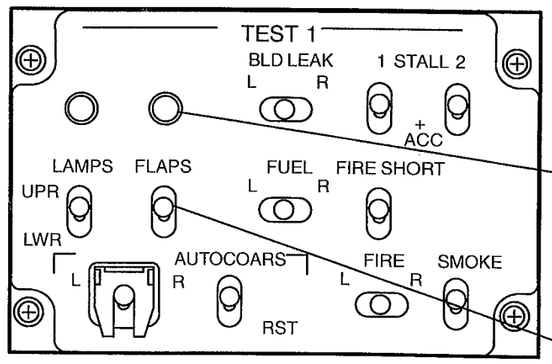
The CONFIG light comes on when applying take–off power on ground for:

- Pitch trim tabs out of take–off range (green band).
- CL not in MAX position.
- Flaps not in take–off position.

RUDDER LIMIT light (amber).

The RUDDER LIMIT light comes on if the rudder limiting system fails.

A TEST 1 PANEL



FLAPS test light (green).

Comes on flashing when FLAPS test switch is activated and the flap position does not correspond to flap handle position or the flap system is inoperative.

Comes on steady when FLAPS test switch is activated and the flap position corresponds to flap handle position and the flap system is operative. It can also come on if a flap fault is detected and the FLAPS light on the CWP is on.

FLAPS test switch.

When actived, the FLAPS light on CWP with associated warnings, and flaps test light come on steady indicating an operative system.

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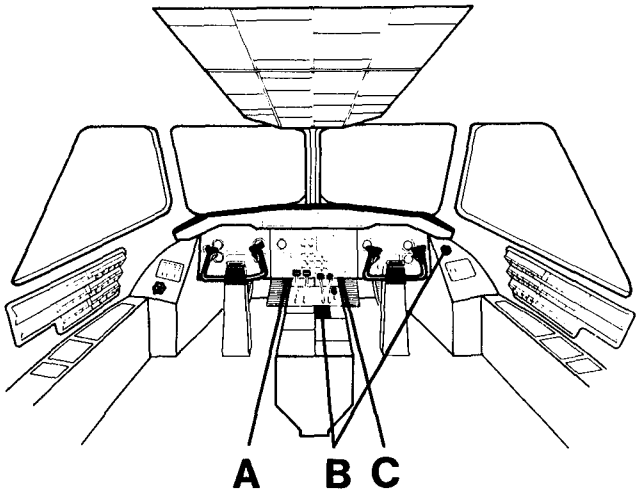
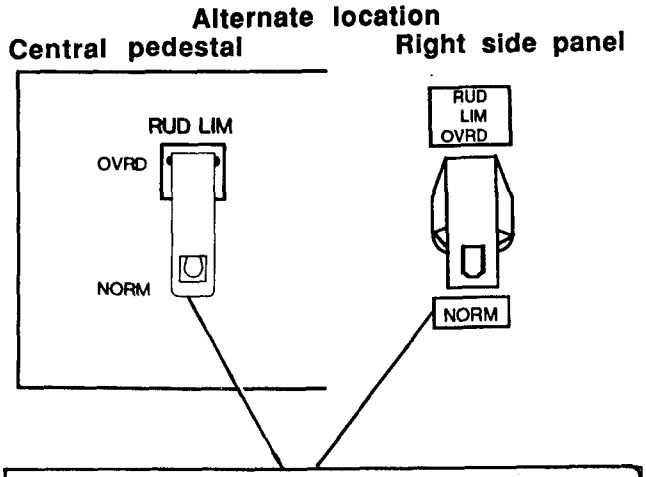
FIG. 5. Flight controls – controls and indicators.

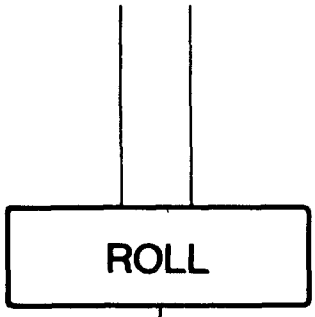


B RUDDER LIMIT OVERRIDE SWITCH



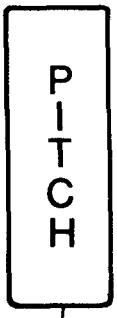
Rudder limiter override switch
With the switch in OVRD position, the rudder limit mechanism is retracted thus enabling full range of movement for the rudder. The switch is operated in the event of system failure only.

A ROLL DISCONNECT HANDLE



Roll disconnect handle.
Pulling the handle activates an electrical actuator which permanently separates the interconnection between left and right aileron control channels.

C PITCH DISCONNECT HANDLE



Pitch disconnect handle.
Pulling the handle activates an electrical actuator which permanently separates the interconnection between left and right elevator control channels.

C A U T I O N

Store only suitable accessories in the pedestal stowages in such a way that they do not interfer with the ROLL and PITCH disconnect handles. Placing too big accessories (manuals, checklists etc) in the stowages or placing accessories in a thoughtless manner could, inadvertantly, prevent a quick activation of the ROLL and PITCH disconnect handles, located at the juncture of the pedestal and the center instrument panel.

Fig. 6 Flight controls - controls and indicators.

4. ELECTRICAL POWER SUPPLY.

Flap indicator	R BAT BUS	N-8	FLAP IND
Flap control	L BAT BUS	G-6	FLAP CONTROL
Rudder gust lock	L ESS BUS	G-4	RUDDER GUST LOCK
Roll trim	R BAT BUS	N-1	TRIM PITCH ROLL
Yaw trim	R BAT BUS	N-2	TRIM YAW
Pitch trim	R BAT BUS	N-1	TRIM PITCH ROLL
Pitch trim sync	R BAT BUS	N-6	PITCH TRIM SWITCH
Pitch roll disconnect	L BAT BUS	G-3	PITCH-ROLL DISC
Rudder limiter	L AVIONIC START BUS	G-5	RUDDER LIMIT
Rudder limiter override	R BAT BUS	N-7	RUDDER LIMIT OVRD
Trim indicator	R BAT BUS	N-3	TRIM IND
Stby trim control right	R BAT BUS	N-4	STBY TRIM R PWR CONTROL
Stby trim control left	L BAT BUS	G-2	STBY TRIM L PWR CONTROL
Stby trim indicator right	R BAT BUS	N-5	STBY TRIM R PWR IND
Stby trim indicator left	L BAT BUS	G-1	STBY TRIM L PWR IND

1. LIMITATIONS.

1. 1. OPERATING LIMITS.

– Max speed for flap extension ..... See section 27.

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2. 1. OPERATION OF PRIMARY FLIGHT CONTROLS.	Operation of the primary flight controls is conventional. 1. Check rudder pedal adjustment. 2. Move rudder pedals fully left and right and check for free and full travel. (Do not slam the rudder against the stops). 3. Rotate control wheel to its maximum throw left and right and check for free and full travel. 4. Pull and push control column to its full travel against the stops and check for free movement.
2. 2. OPERATION OF TRIM SYSTEM. (Cont'd)	Check and set trim tabs as follows: 1. Actuate both pitch trim switches on either control wheel and check both MAIN PITCH and STBY PITCH trim indicators to move towards UP and DN positions. 2. Check that left pilot's pitch trim switches override right copilots'switches. – Check that the MAIN PITCH trim can not be operated by one of the trim switches on pilot's side. Repeat on copilot's side. 3. Actuate both SBTY PITCH trim switches on pedestal to UP and DN positions and check STBY PITCH trim indicator to move towards corresponding positions. – Master caution and PITCH TRIM on CWP starts flashing. – Equalize NORM and STBY PITCH trim within 1/2 unit. – Push PITCH RESET button to reengage pitch trim synchronization. – Check PITCH TRIM caution light to go out. – Check both trim indicators to be synchronized. – Check that STBY PITCH trim can not be operated by just one switch.

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	4. Actuate both ROLL trim switches on pedestal to L and R positions and check MAIN ROLL indicator to move towards corresponding positions. Reset to 0. – Check that ROLL trim can not be operated by just one switch. 5. Actuate both STBY ROLL trim switches on pedestal to L and R positions and check STBY ROLL trim indicator to move towards corresponding positions. Reset to 0. – Check that STBY ROLL trim can not be operated by just one switch. 6. Actuate both YAW trim switches on pedestal to L and R positions and check YAW trim indicator to move towards corresponding positions. Reset to 0. – Check that YAW trim can not be operated by just one switch.
2. 3. FLAP SYSTEM TEST.	NOTE Check flap area to be free from obstructions. Check and set flaps as follows: 1. Flap handle ..... FULL DOWN – Check flap indicator pointers to move simultaneously to correct indication. 2. Flap handle ..... 20° – Check flap indicator pointers to move simultaneously to 20° 3. FLAPS test switch ..... PRESS AND HOLD – Check flaps test light to come on. – Set flap handle FULL DOWN and then UP and check in both positions that the flap indications do not respond and that the FLAPS caution light and the FLAPS test light start flashing. – Release FLAPS test switch. – Check FLAPS caution light and FLAPS test light to go out. – Check flap indicator pointers to move simultaneously to 0°

CONDITIONS	NORMAL PROCEDURES
2. 4. RUDDER SUB TAB TRIM CURVES TEST.	The following test is required by AMM section 27–22–25–2 Rudder Trim Tab / Procedure 1 – Adjust Rudder Sub Tab. Flight conditions and aircraft configuration: Altitude: According to Table 201 in referenced AMM section. Airspeed: According to Table 201 in referenced AMM section. Flaps/Gear: According to Table 201 in referenced AMM section. Yaw Damper: Engaged. Autopilot: As required. The aircraft must be free of ice and the flight should be performed in stable atmospheric conditions. 1. Power ..... SET – Set power for level flight with equal torque on both engines. 2. Trims ..... SET – Trim the aircraft at the conditions specified in AMM table 201 with wings level, constant heading and slip ball centered. 3. Yaw trim ..... RECORD – Record yaw trim indicator value at each airspeed and trim condition.