



CL-350 TRAINING MANUAL

FLIGHT CONTROLS

05

AIRCRAFT SYSTEMS
TRAINING MANUAL

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FLIGHT CONTROLS

I. INTRODUCTION

The Challenger 350 flight control system represents a sophisticated hydraulically-powered architecture designed to provide precise, responsive aircraft control throughout all phases of flight while maintaining multiple layers of redundancy and safety. The system utilizes three independent hydraulic systems; left, right, and auxiliary; to power primary flight control surfaces including ailerons, elevators, rudder, and multi-function spoilers.

The design employs dual-channel Power Control Units (PCUs) for critical control surfaces, with each channel powered by separate hydraulic systems to ensure continued controllability even after multiple hydraulic failures. Primary flight controls feature hydraulic actuation with mechanical reversion capability, while the rudder incorporates a unique dual PCU configuration that provides exceptional redundancy through dedicated connections to all hydraulic systems with the lower PCU automatically energized by the Auxiliary hydraulic system if Right is lost, providing redundancy across all three hydraulic systems.

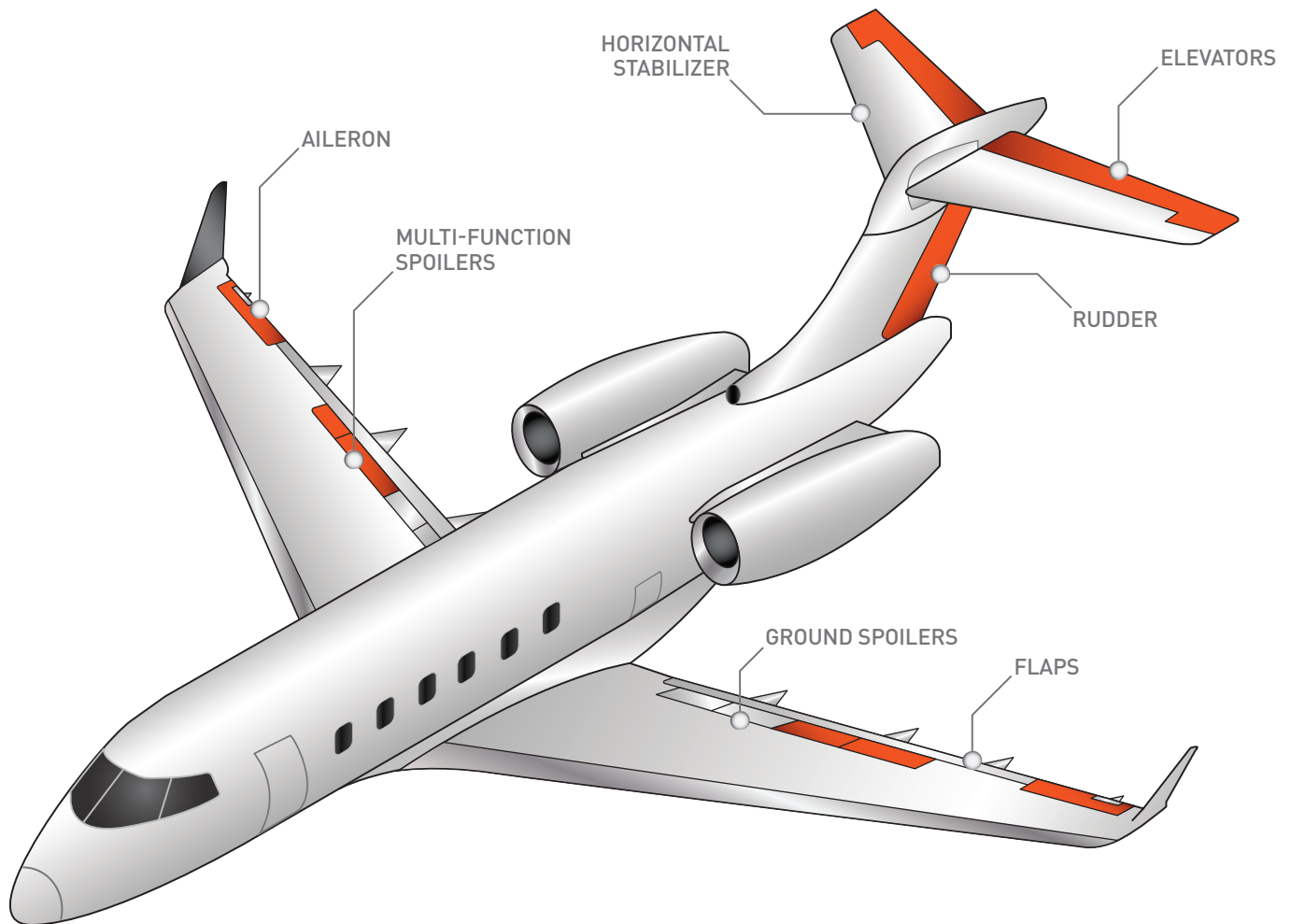
The system integrates advanced features including electronic yaw damper that provides turn coordination based on roll attitude for coordinated flight, automatic spoiler deployment for roll control and lift dumping, comprehensive artificial feel systems that provide appropriate control forces across the flight envelope, and multi-channel trim systems for all primary control axes. Safety is enhanced through strategically positioned shutoff valves, priority valves that ensure flight control hydraulic flow during high-demand situations, and integrated monitoring systems that provide real-time feedback on control surface position, hydraulic pressure, and system health.

The flight control computer continuously monitors control surface deflections and provides trim and stability augmentation inputs while interfacing with the EICAS system to alert crews to any abnormal conditions. This chapter will examine each component of this integrated flight control system, detailing normal operations, emergency procedures, manual reversion techniques, and the comprehensive monitoring systems that enable crews to maintain precise aircraft control

A. FLIGHT CONTROLS SPECIFICATIONS

Parameter	Value
Primary Flight Controls	Elevators, Rudder, Ailerons, Roll Spoilers
Secondary Flight Controls	Flaps, Spoilers (Symmetrically), Trim Systems
Aileron Control	Reversible mechanical cable system with Roll Disconnect
Elevator Control	Hydraulic PCUs with manual reversion and Pitch Disconnect
Rudder Control	Hydraulic PCUs with limited manual reversion
Spoiler Control	Electronic/hydraulic fly-by-wire system via SECU
Horizontal Stabilizer Range	0 to 15°
Spoilers (per wing)	Four (two ground, two multifunction)
Takeoff Trim Range (Green)	2.5 to 8.0 units
Flap Positions	0°, 10°, 20°, 30°

PRIMARY FLIGHT CONTROLS



II. PRIMARY FLIGHT CONTROLS

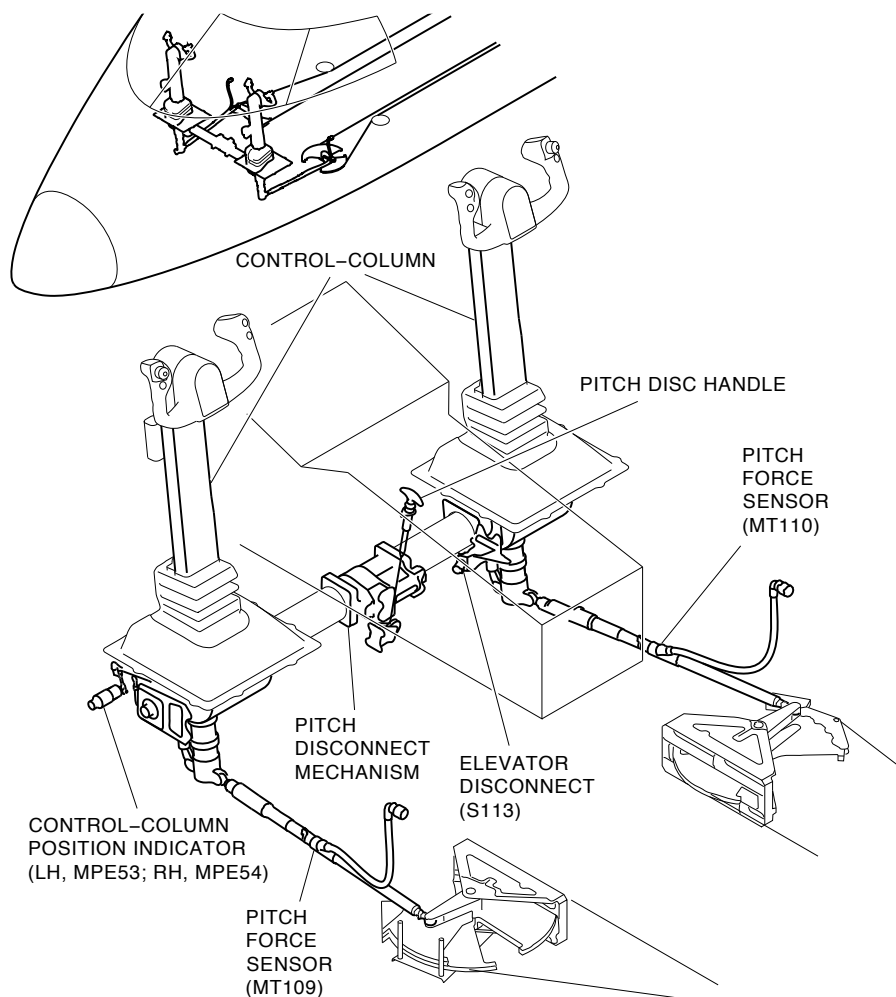
The Primary Flight Controls section covers the aircraft's fundamental control surfaces that provide direct pilot control over the three axes of flight. This section focuses on the elevators, rudder, ailerons, and roll spoilers - the systems that translate pilot inputs directly into aircraft movement and attitude changes.

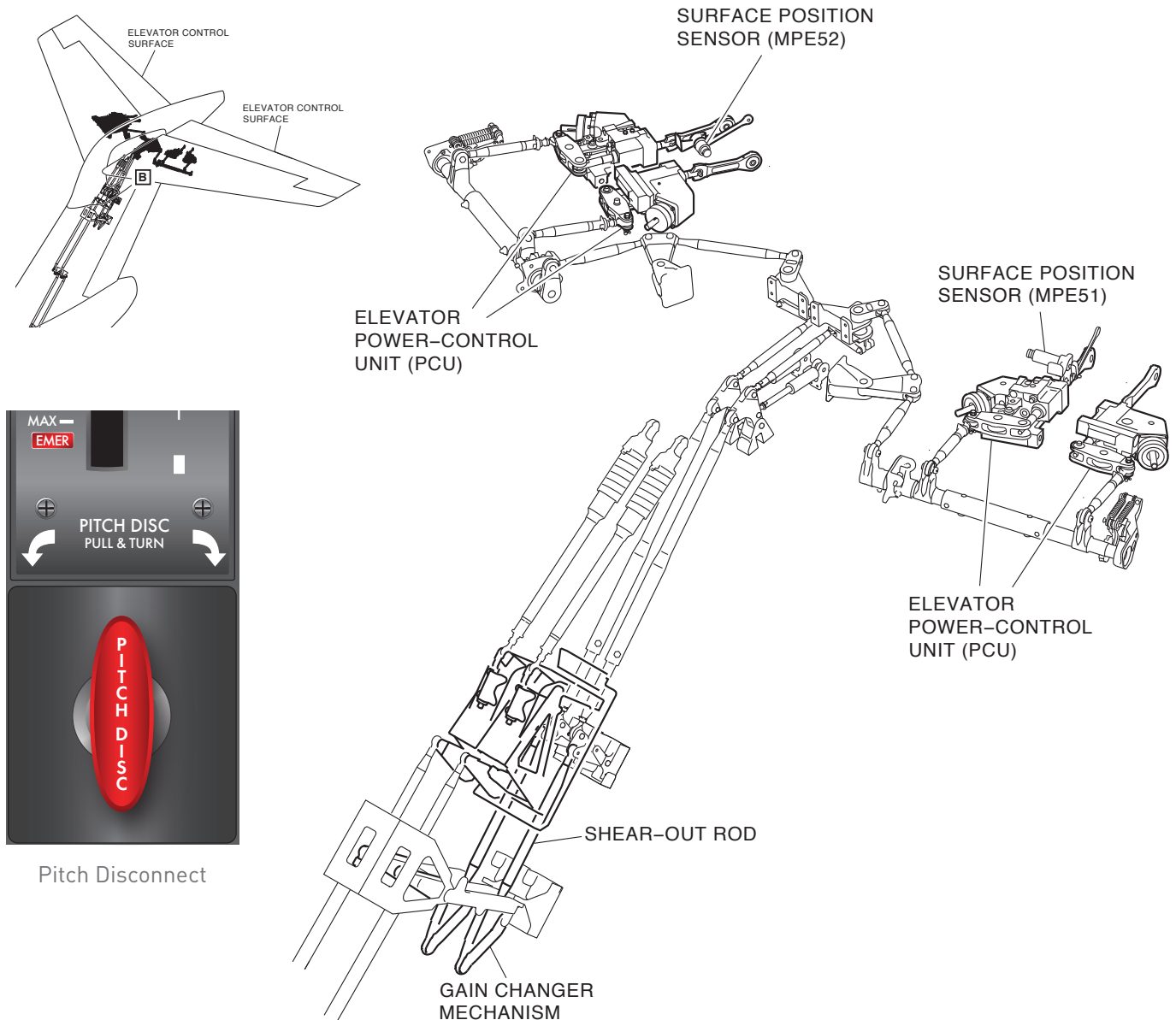
Key distinguishing characteristics of the primary flight control architecture include the cable-operated aileron system, the electronic/hydraulic fly-by-wire spoiler system, and the mechanically controlled, hydraulically powered elevator and rudder systems.

Each system incorporates specific reversion capabilities and backup systems to maintain control authority during various failure scenarios, from single system degradations to dual hydraulic failures.

A. ELEVATORS

- Hydraulic PCUs with manual reversion capability
- Powered by the left and right hydraulic systems
- Pitch feel simulator provides artificial feel forces
- Dual control columns normally connected through torque tube
- Elevator position shown on FLIGHT CONTROLS synoptic page
- Pitch Disconnect is available for control column separation
- **PITCH DISCONNECT (S)** CAS message is displayed while disconnected
- **PITCH DISCONNECT (W)** CAS on ground if throttles at or above CLB
- Stall Protection Integration with stick shaker and pusher systems attached
- Manual Reversion is available in event of dual hydraulic failure
- Provides pitch control supplemented by a movable horizontal stabilizer





Note: Elevator command path includes a gain changer mechanism (4-bar linkage) providing non-linear gearing between control column movement and elevator surface, plus a pitch feel simulator that provides

B. RUDDER SYSTEM

- Hydraulic PCUs with manual reversion
- Upper and lower rudder PCUs
- Left Hydraulic System – Upper PCU
- Right Hydraulic System – Lower PCU
- Lower PCU is automatically energized by the auxiliary hydraulic system if the right hydraulic system loses pressure

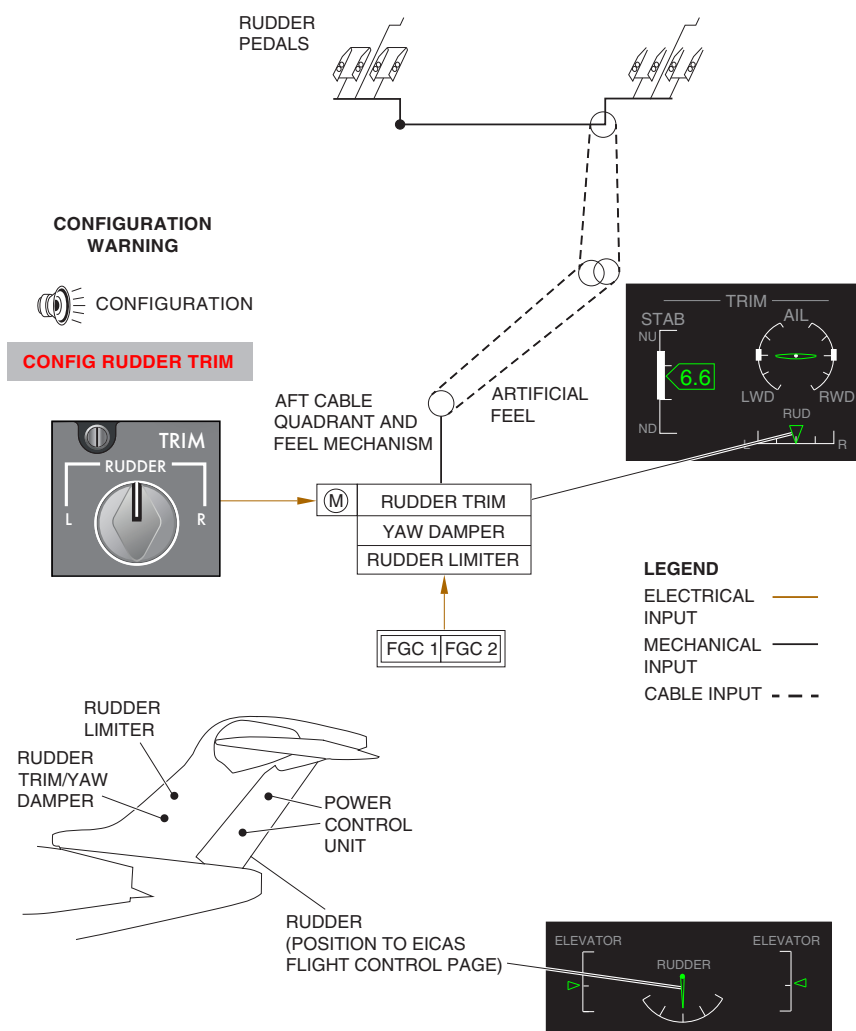


- Dual rudder pedals with cable and pushrod linkage
- Speed-sensitive travel limiting system controlled by the horizontal stabilizer trim electronic control unit (HST ECU)
- Rudder position indicated on EICAS flight control page
- **CONFIG RUDDER TRIM** (W) CAS for improper trim
- Rudder-Control feel unit provides simulated pedal load to pilots

Note: Rudder cables are routed separately through the engine rotor burst zone — a severed cable in this zone retains rudder functionality through the unaffected cables

Electronic Yaw Damper

- Mechanically limited to 5° of rudder motion
- Provides turn coordination and damping of Dutch roll
- Does not move the rudder pedals
- Active on the ground but disable above 60 KIAS until weight is off the wheels
- If yaw damper channel fails or disconnects - **YAW DAMPER FAIL** (C) CAS is displayed



C. AILERON SYSTEM

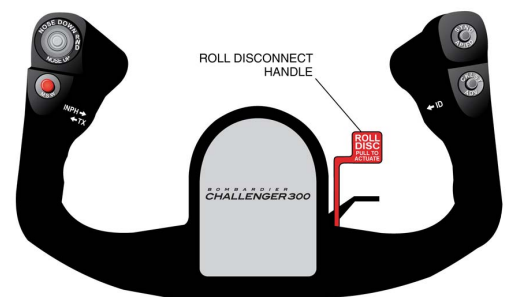
- Manual cable and pushrod mechanism (no PCUs)
- Geared balance tabs on each aileron can travel $\pm 20^\circ$ relative to aileron surface
- Permanently set tabs to minimize surface upfloat
- Left aileron equipped with electrically operated trim tab
- Two aileron position sensors for data recording and EICAS position display
- Direct mechanical linkage through cable system with Roll Disconnect
- Gust lock system prevents aileron damage when aircraft parked

Roll Disconnect

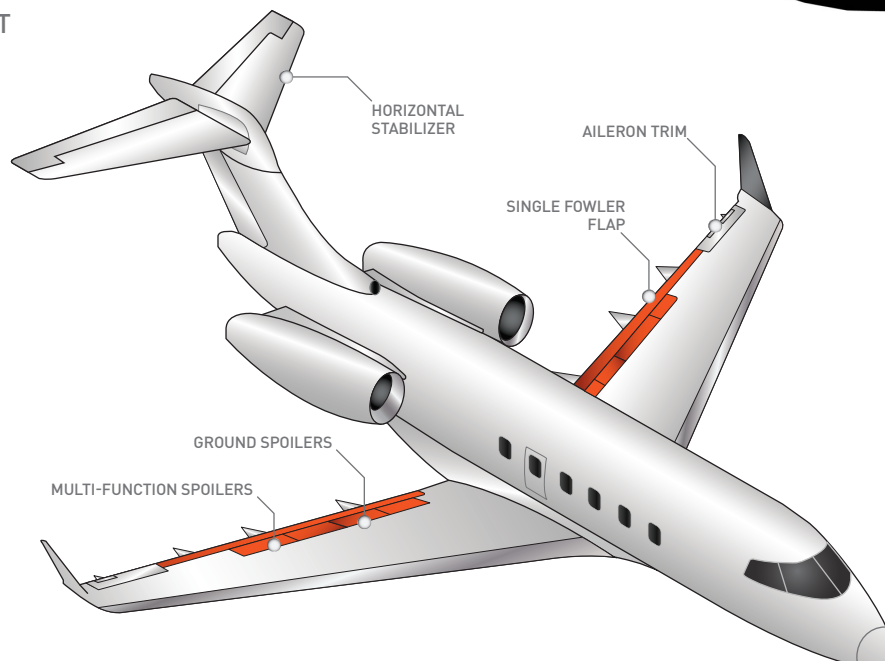
- Isolates left control wheel in event of mechanical aileron jam
- Left Control wheel retains roll control via multifunction spoilers
- Right control wheel remains mechanically connected to ailerons
- **ROLL DISCONNECT** (S) CAS message is displayed while disconnected
- **ROLL DISCONNECT** (W) CAS on ground if throttles at or above CLB
- Roll spoilers can be disabled in the event a jam occurs in the left control wheel

D. ROLL SPOILERS

- Provide roll assist, proportional lift dump, ground lift dump
- Electronic/hydraulic fly-by-wire system
- Spoiler Electronic Control Units (SECU 1 and SECU 2)
- Left and right hydraulic systems power
- Control wheel angular movement input



SECONDARY FLIGHT CONTROLS



- Maximum 45° displacement from stowed position
- Primary and secondary roll assist schedules
- 8° control wheel movement about neutral (primary schedule)
- Two inboard panels, two outboard panels per wing

III. SECONDARY FLIGHT CONTROLS

The Secondary Flight Controls section encompasses the aircraft's auxiliary control systems that enhance flight characteristics, provide trim functions, and support various flight phases. This section covers flaps, multifunction spoilers, ground spoilers, and the horizontal stabilizer, aileron, and rudder trim systems - all of which work in coordination with the primary flight controls to optimize aircraft performance and handling.

Key architectural features of the secondary flight control systems include the electrically controlled and hydraulically actuated flap system, the spoiler electronic control unit (SECU) managing multifunction and ground spoilers, and the electrically operated trim systems. These systems incorporate advanced automation features such as configuration trim that automatically adjusts stabilizer position during flap and spoiler deployment, and Mach trim that compensates for aerodynamic center shifts at varying speeds.

A. HORIZONTAL STABILIZER TRIM

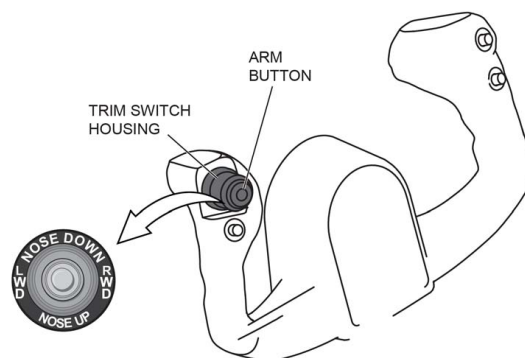
- Electric motor-driven jackscrew system
- Variable trim rate based on airspeed (Mach)
- Constant trim rate of 0.2 degree/second (secondary channel)
- 0 to 15 degrees angle of incidence
- Normal takeoff range 2.5 to 8.0 units (green)
- **CONFIG STAB TRIM** (W) CAS for out-of-range trim
- Automatic inputs from autopilot, flaps, spoilers, Mach trim
- Each trim motor equipped with brake to prevent trim runaway
- Digital readout on EICAS and synoptic page indicates stabilizer position in trim units, corresponding to horizontal stabilizer angle of incidence

Primary Channel Trim Rates:

- 0.4 degree/second up to Mach 0.4
- Linear decrease to 0.1 degree/second at Mach 0.8
- 0.1 degree/second above Mach 0.8
- Default 0.2 degree/second if Mach data unavailable

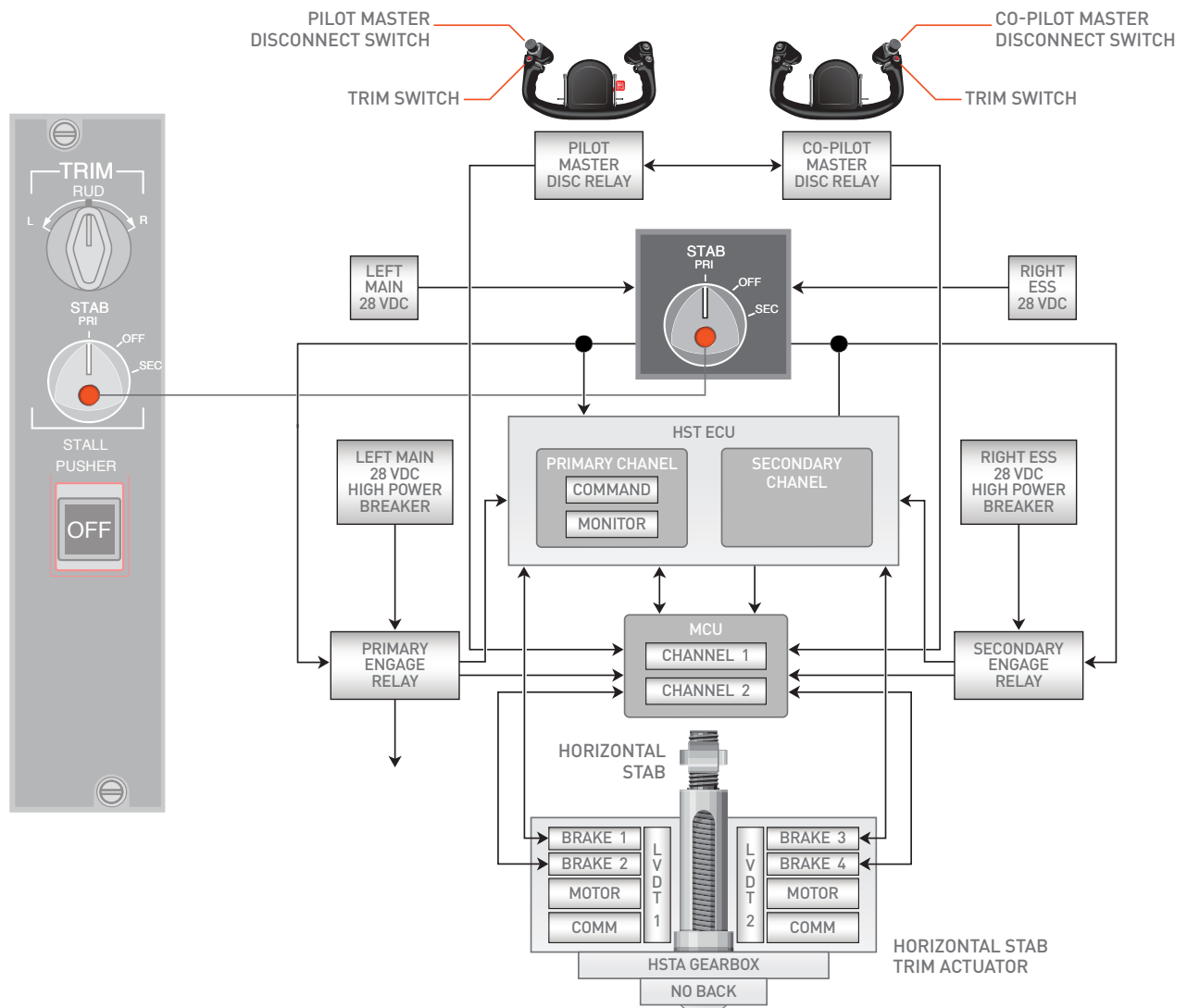
Manual primary (PRI) or secondary (SEC) Pitch trim or Roll trim commands are done through the control wheel Trim switch, located on the outer horn of either control wheel. The trim and arm functions are controlled by the same switch. The commanded trim (pitch or roll) is initiated by depressing and holding the arm button (center button) and then actuation of the control wheel trim switch (housing) in the desired direction (NOSE UP, NOSE DOWN, LWD or RWD).

NOTE: Pilot side trim commands have priority over the copilot side trim commands.



Control Wheel Trim Switch

FLIGHT CONTROLS HORIZONTAL STAB SCHEMATIC



B. CONFIGURATION TRIM

- Automatic nose-up trim with flap extension
- Automatic nose-down trim with spoiler extension
- Reduces control column forces during configuration changes
- Works with horizontal stabilizer trim system
- Activates with flap or spoiler movement

C. MACH TRIM

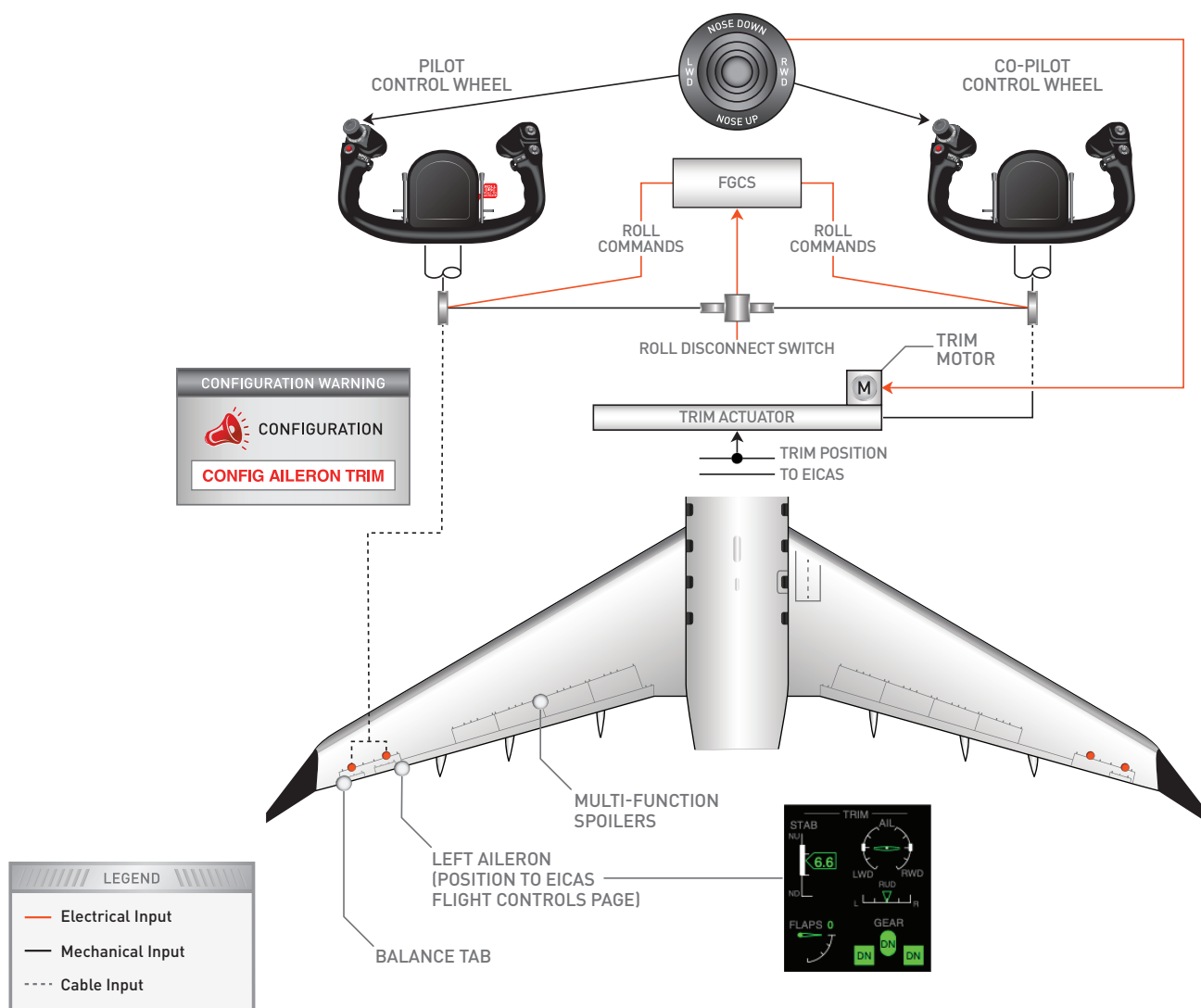
- Compensates for aerodynamic center shift as Mach increases
- Air Data Computers (ADCs) provide data source



- Active when autopilot disengaged
- Slight nose-up trim input for speed increase stability
- Slight nose-down trim input for speed decrease stability
- Continuously monitored with EICAS fault display

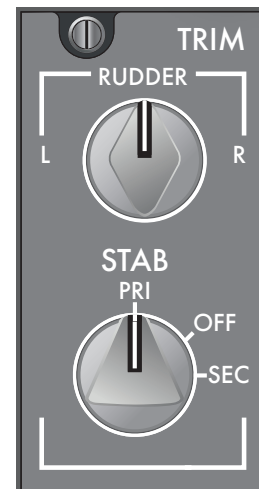
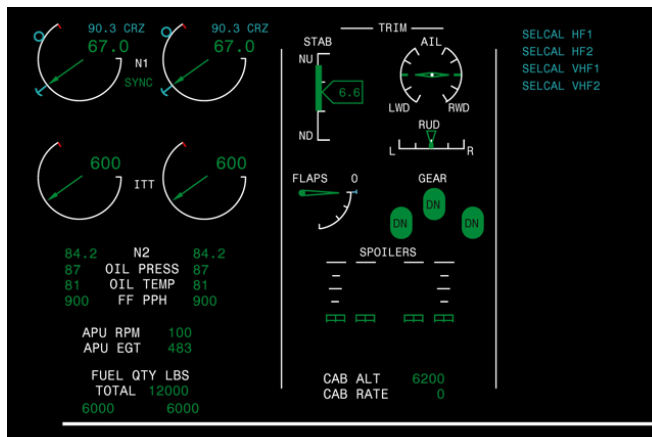
D. AILERON TRIM

- Left aileron trim tab only
- Electromechanical actuator
- Reduce aerodynamic loads on pilot controls
- **CONFIG AILERON TRIM** (W) CAS for improper setting
- Trim position shown on EICAS synoptic page



E. RUDDER TRIM

- Electromechanical actuator system
- Direct rudder surface movement (no trim tabs)
- RUD TRIM switch on center pedestal
- Signals to rudder Power Control Units
- **CONFIG RUDDER TRIM** (W) CAS for improper takeoff setting
- Rudder trim position on EICAS



F. FLAP SYSTEM

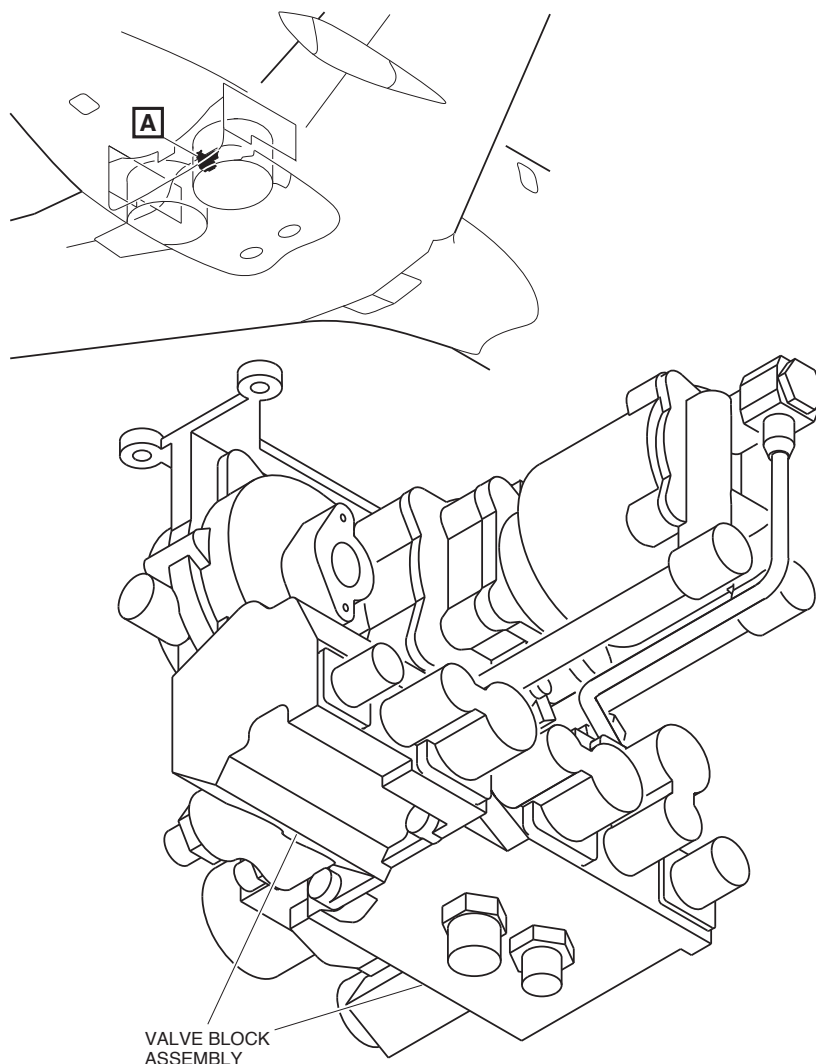
- Single Fowler flap per wing
- Electrically controlled by Flap Control Unit (FCU)
- Hydraulically actuated by the Flap Power Unit (FPU)
- 0°, 10°, 20°, 30° positions
- Right hydraulic system (primary)
- Left hydraulic system when ALTN FLAPS selected
 - **FLAPS ALT PRESS** (Green) EICAS when ALTN FLAPS selected
 - **FLAPS RATE LOW** (A) CAS w/Right Engine Failure or ALTN FLAPS selected
- Flap position on MFD and synoptic page
- When ALTN FLAPS is selected ON, the FLAPS ALT PRESS lamp illuminates in green on the EICAS
- Variable extension/retraction rates
 - Normal Rate – 0° to 30° extension - 20 Seconds
 - On RH DCMP or ALTN FLAPS – 0° to 20° is 60 to 70 seconds

Flap Alerting System activates overspeed warning horn above these speeds:

- VFE 210 kt – 10°
- VFE 210 kt – 20°
- VFE 175 kt – 30°

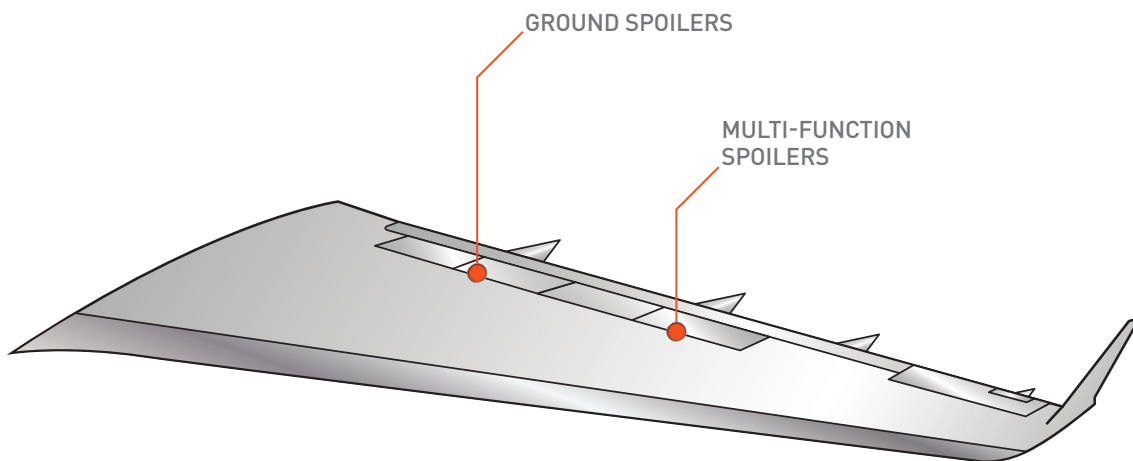
Flap Control Unit performs the following functions

- Controls flap panel movement according to pilot commands
- Monitors critical conditions
 - Runaway or Uncommanded movement
 - Surface Asymmetry
 - System Jam or Overspeed/speed differential
- Switches the system to fail-safe when necessary
- Monitors the FPU for internal or external hydraulic leakage and notifies flight crew
- Communicates flap position to the EICAS and stall protection system
- Provides data for cockpit indication and maintenance
- Contains the left and right Flap Position Indicator Unit (FPIU)



G. MULTIFUNCTION SPOILERS (MFS)

- Two multifunction spoiler panels per wing
- Roll assist, proportional lift dump, ground lift dump
- Electronic/hydraulic system (fly-by-wire)
- SECU 1 and SECU 2 control (Spoiler Electronic Control Unit) and received input from
 - Control Wheel Angular Input
 - Flight Spoiler Control Lever (FSCL) Position
 - Ground Lift Dump (GDL) inputs
 - Flap Position
- Asymmetric operation for roll control (SECU 2 Primary, SECU 1 secondary)
- Symmetric operation for ground spoiling (SECU 1 primary)
- Available for in-flight speed braking
- Spoiler position on EICAS synoptic page



The aircraft's multifunction spoilers (MFS) utilize two distinct roll assist schedules, primary and secondary, to aid the ailerons in providing roll control. The outboard MFS, controlled by SECU 2, operate on the primary schedule. This schedule incorporates an 8° dead zone for control wheel input around the center position, meaning there is no spoiler deployment for small initial wheel movements. Conversely, the inboard MFS, normally controlled by SECU 1, follow the secondary schedule, which initiates spoiler deployment when handwheel rotation reaches $\pm 50^\circ$ with flaps set to 0°.

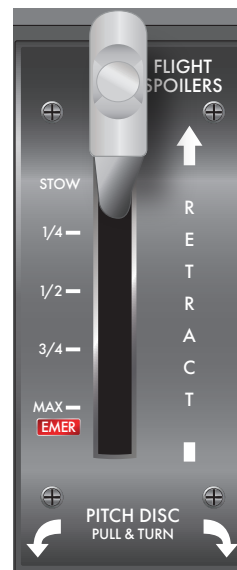
Both inboard and outboard MFS achieve full deployment with a full deflection of the control wheel. The roll schedule is also designed to reduce spoiler roll authority for small control wheel inputs when the flap settings are greater than 0°. In the event of certain failures affecting the outboard MFS, the inboard MFS panels are capable of adopting the primary schedule.

H. GROUND SPOILERS

- Two ground spoiler panels (inboard) per wing
- Fully retracted or fully deployed positions (60°)
- Ground lift dumping functions only
- Tied together with multifunction spoilers
- Via Spoiler Electronic Control Units
- Left MFD display declutters spoiler graphic after 60 seconds retracted

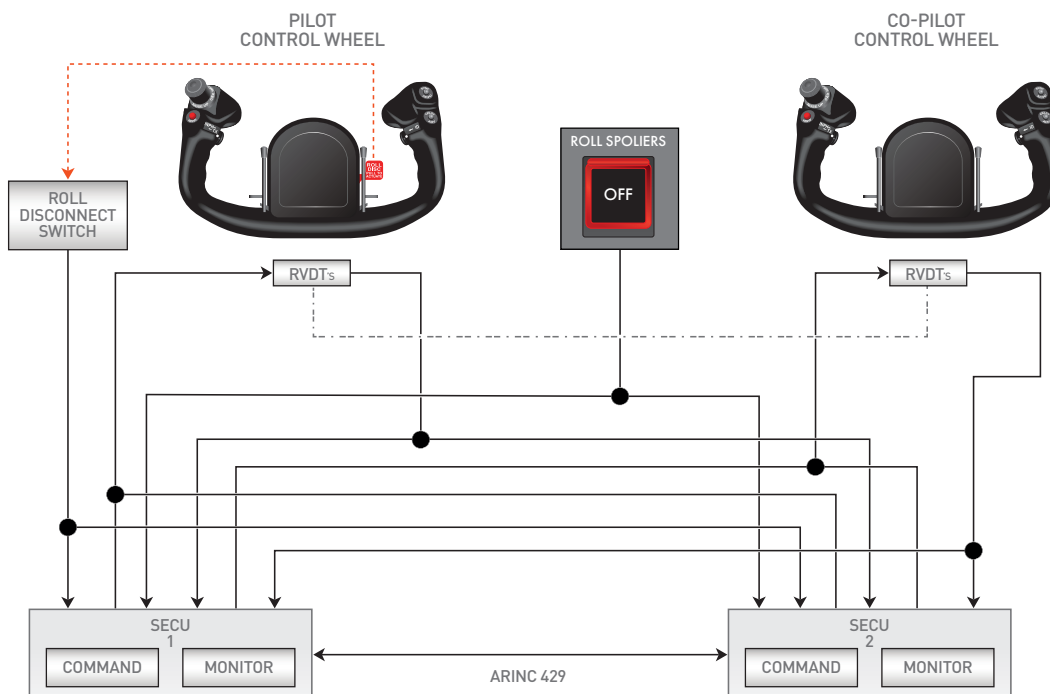
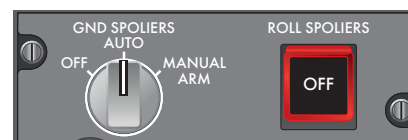
Requirements to Deploy (unless in manual arm)

- Throttles at idle and at least two of the following criteria:
 - RA less than 7'
 - Weight on Wheels
 - Wheel speed greater than 16 knots
- When deployed, extend to 60° while the MFSs extend to 45°

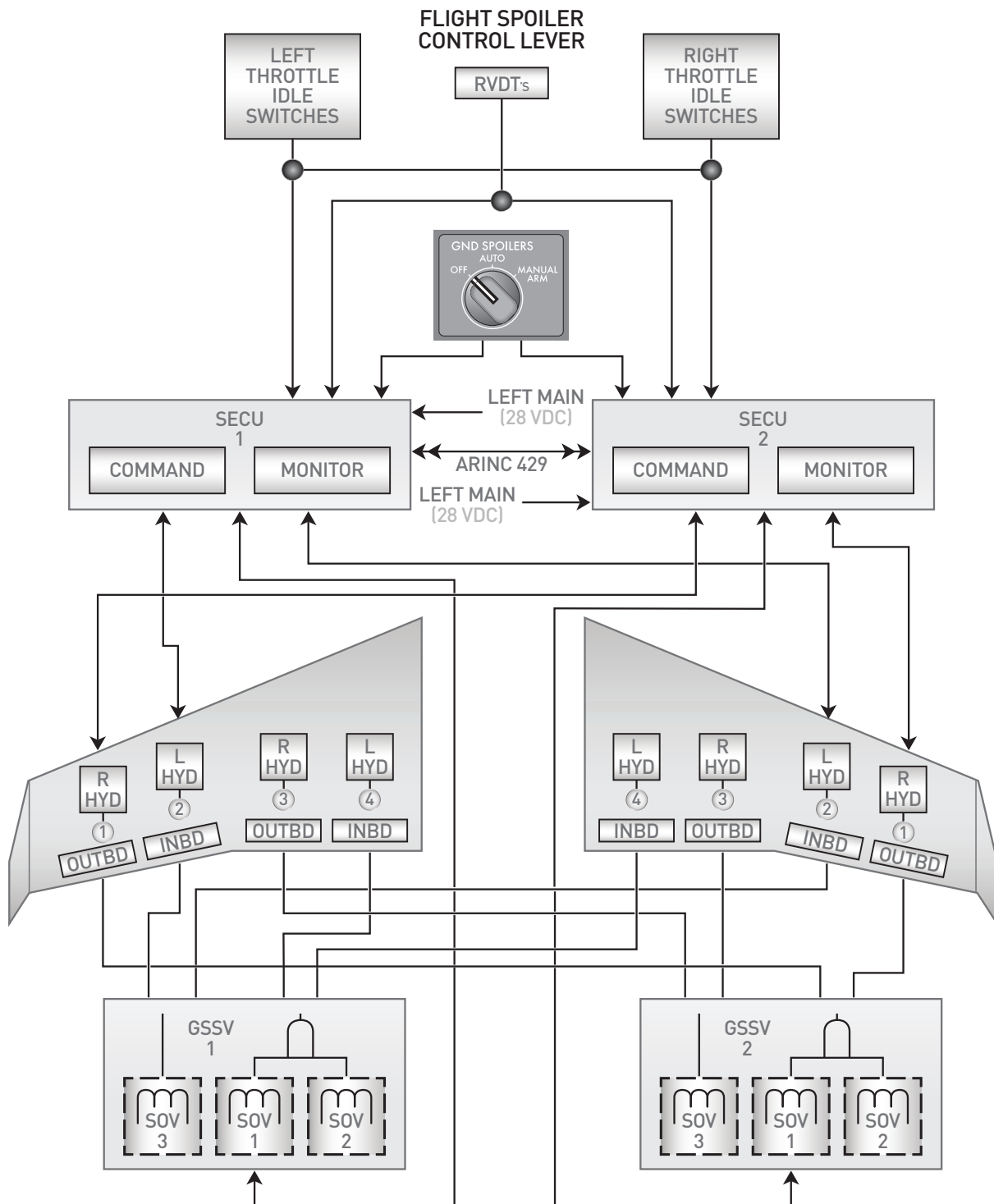


I. SPOILER SYSTEM OPERATION

- Single power control unit per spoiler
- Flight Spoiler Control Lever (FSCL) selects position
- Nine detented positions, between 0 and MAX, the 0 Position is gated
- 10th position for EMER only or a required by a procedure and is gated
- Proportional Lift Dump during flight
- Float position if power lost



FLIGHT SPOILER SCHEMATIC





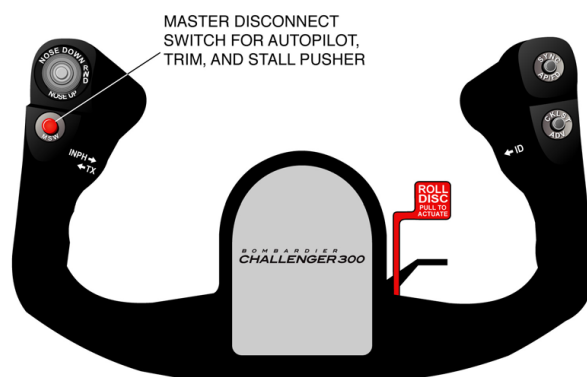
IV. STALL PROTECTION SYSTEM (SPS)

The Stall Protection System section covers the aircraft's stall prevention and recovery architecture designed to provide multiple layers of crew alerting and automatic intervention. This system delivers progressive warnings through aural, visual, and tactile indications culminating in automatic stick pusher activation to prevent inadvertent stall conditions.

The stall protection system utilizes a dual-channel stall protection computer that continuously monitors angle-of-attack sensors, lateral acceleration, flap position, weight-on-wheels, and air data parameters to calculate dynamic angle-of-attack trip points. The system incorporates intelligent logic that adjusts activation thresholds based on angle-of-attack increase rates, preventing the aircraft from progressing too deeply into stall conditions during rapid pitch attitude changes.

A. COMPONENTS

- One stick shaker on each control column
- Single stick pusher mechanism on left pitch control system
- Dual-channel stall protection computer
- Left and right angle-of-attack transducers (vanes)
- Flap position monitoring
- WOW 1 and WOW 2 inputs
- ADC 1, ADC 2, and standby instrument inputs
- Lateral acceleration inputs from IRS

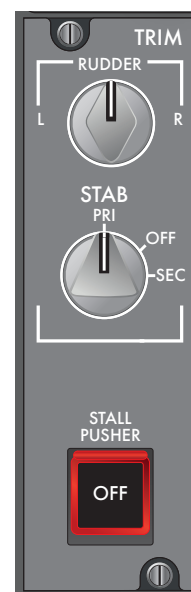


B. SYSTEM OPERATION

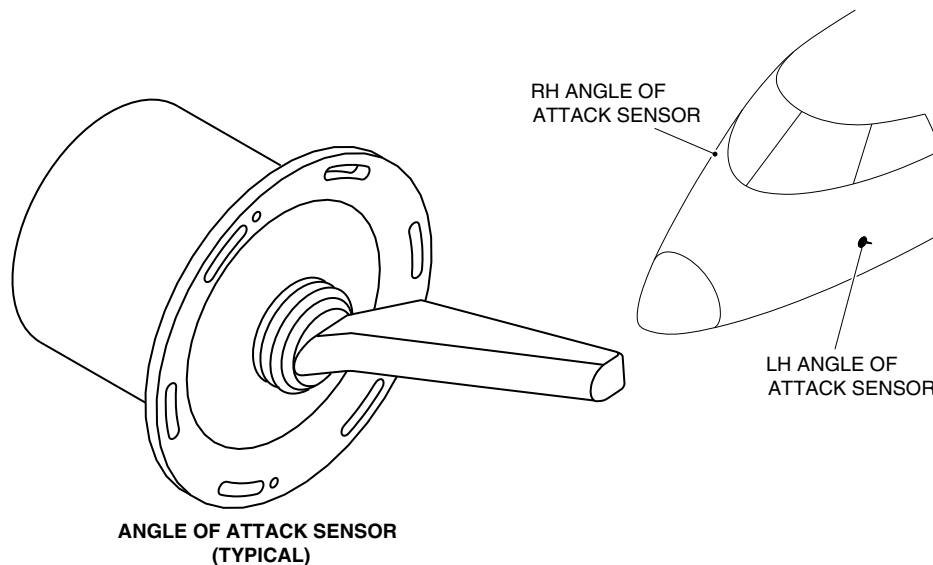
- Continuous angle-of-attack assessment
- Dynamic AOA limits based on configuration
- ADC data for stall margin adjustment
- Stick shaker and ignition activation together
- Lowers trip point if AOA increase $>1^\circ/\text{second}$
- Prevents deep stall penetration

C. STICK PUSHER FEATURES

- Master disconnect switches stop pusher
- Available when MSW released
- Disconnect function inoperable on EASA aircraft
- STALL PUSHER switch to OFF for manual disable in case of incorrect activation of pusher



Note: Pressing and holding either Master Disconnect Switch (MSW) also disengages the autopilot and renders stabilizer, configuration, Mach, aileron, and rudder trims inoperative while the switch is depressed.



V. PROXIMITY SENSING SYSTEM

The Proximity Sensing System section covers the aircraft's comprehensive position monitoring network that ensures accurate component status information across multiple aircraft systems. This system provides critical input data for flight safety systems by continuously monitoring the physical relationship between various aircraft components and their commanded positions.

The Challenger 350's proximity sensing system centers on the proximity sensing electronic unit (PSEU) which processes positional data from landing gear, weight-on-wheels sensors, thrust reverser mechanisms, and fuselage door positions. The system utilizes proximity switches and sensors that generate "near" and "far" signals based on component positioning, enabling the PSEU to determine actual component status versus commanded positions and provide accurate feedback to dependent aircraft systems.

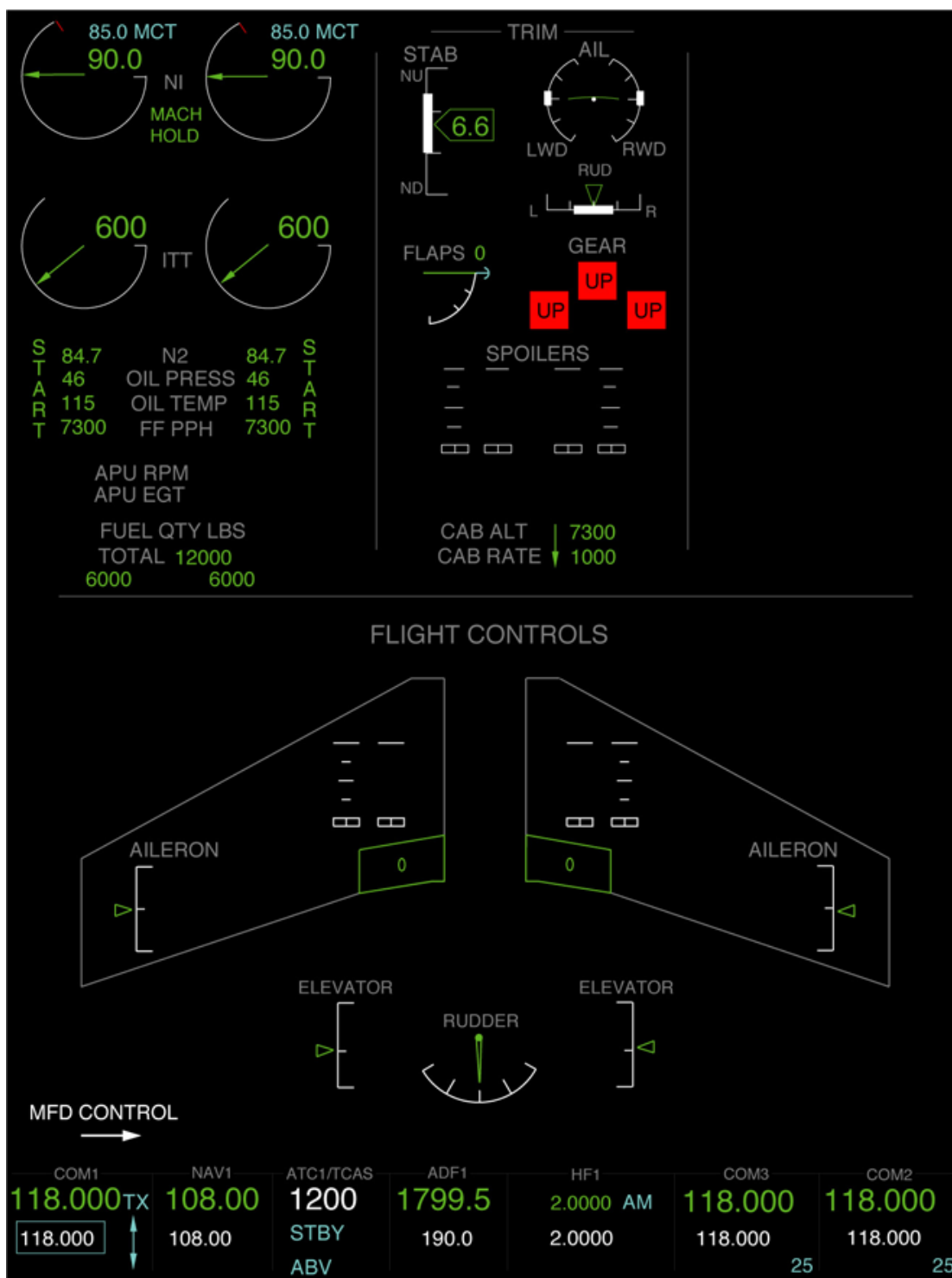
A. COMPONENTS

- Proximity Sensing Electronic Unit (PSEU)
- Multiple position sensing devices
- Component relationship monitoring
- Gear position monitoring
- Weight-on-wheels position data
- Reverser position monitoring
- Fuselage door position data

B. SYSTEM OPERATION

- "Near" and "far" signals based on component proximity
- PSEU processes all sensor inputs
- Provides commands to other aircraft systems
- Controls takeoff configuration warning system
- System failures indicated on EICAS display

FLIGHT CONTROL SYNOPTIC PAGE



VI. EICAS MESSAGES – GROUPED BY SEVERITY

A. WARNING MESSAGES

WARNING MESSAGES

Immediate crew action required

Message	Meaning	Inhibits
CONFIG AILERON TRIM	Aileron trim is not in the takeoff range (green band)	—
CONFIG AUTOPILOT	Autopilot not configured for takeoff	—
CONFIG FLAPS	Flaps not in takeoff position	—
CONFIG RUDDER TRIM	Rudder trim is not in the takeoff range (green band)	—
CONFIG SPOILERS	Spoilers are not in takeoff position	—
CONFIG STAB TRIM	Stabilizer trim is not in the takeoff range (green band)	—
PARK/EMER BRAKE ON	Emergency brake is engaged with throttles at or above climb	—
PITCH DISCONNECT	Pitch disconnect has occurred on the ground with throttles at or above CLB	—
ROLL DISCONNECT	Roll disconnect has occurred on the ground with throttles at or above CLB	—

B. CAUTION MESSAGES

CAUTION MESSAGES

Timely crew awareness/action needed

Message	Meaning	Inhibits
ELEVATOR SPLIT	Left and right elevator surface positions difference exceeds allowable tolerance (differential angle is a function of airspeed)	—
FLAPS FAIL	The flap system has shutdown due to a failure. The flaps are not resettable	TO
FLAPS FAULT	The flaps are operating in a degraded mode. The fault may be resettable by movement of the flap selector handle	TO
FLAPS NORM PRESS LOW	The flaps normal hydraulic pressure is low. This will be accompanied by a FLAPS FAULT (C) CAS message. Alternate pressure may be available	TO/LAND
FLT SPOILERS DEPLOY	The flight spoilers are deployed below 500 ft, or the flight spoilers are deployed and the throttles are at CLB or above	—
FLT SPOILERS FAIL	All flight spoilers have failed	—
FLT SPOILERS FAULT	Either the inboard or outboard spoilers have failed	TO
GND SPLRS NOT ARMED	The ground spoilers are not armed and not selected OFF	—
GND SPOILERS FAIL	The ground spoilers have failed	—



B. CAUTION MESSAGES

CAUTION MESSAGES

Timely crew awareness/action needed

Message	Meaning	Inhibits
MACH TRIM FAIL	The Mach trim has failed	TO/LAND
PRI STAB TRIM FAIL	The stabilizer trim has failed. Mach trim, flap and spoiler config trim inoperative	—
ROLL SPOILERS FAIL	Roll assist function has failed but flight and ground spoilers have not. Roll control forces will be higher	—
ROLL SPOILERS FAULT	Either the inboard or outboard roll spoilers have failed. Roll control forces will be higher	—
ROLL SPOILERS OFF	The roll spoilers have been turned off with the ROLL DISC not activated	—
RUDDER LIMITER FAIL	The rudder limiter has failed	—
SEC STAB TRIM FAIL	The secondary stabilizer trim has failed. This message should not be displayed unless the primary stabilizer trim has already failed	—
SPOILERS FAIL	The spoilers have failed. If the spoilers were deployed, they will retract down to a float position. The spoilers will not float up.	—
SPOILERS FAULT	At least one ground spoiler is up prior to touchdown, or one spoiler panel has failed	—
STALL PROTECT FAIL	Stall protection has a failure in channel A or B, or pusher/AOA sensor failed, or miscompare detected between essential inputs	—
STALL PUSHER OFF	The control wheel master disconnect switch has been pressed for at least ten seconds, or a stall protection system failure has occurred that has inhibited operation of the stall pusher	—
YAW DAMPER FAIL	Yaw Damper has failed	TO/LAND

C. ADVISORY MESSAGES

ADVISORY MESSAGES

Crew awareness - no immediate action required

Message	Meaning	Inhibits
FLAPS FAULT	There is a fault in the flap system. The flaps should operate normally	TO
FLAPS RATE LOW	The flap extension and retraction rates are slower than normal. This message will illuminate when the right engine is shutdown, or if the engine driven pump is shutdown	TO/LAND

ADVISORY MESSAGES

Crew awareness - no immediate action required

Message	Meaning	Inhibits
RUDDER LIMITER FAULT	A minor failure resulting in the loss of redundancy has occurred in the rudder limiter system. The rudder travel limiter will continue to function	TO
SPOILERS FAULT	There is a fault in the spoiler system that does not affect spoiler operation. Removing all power from the aircraft and re-powering will cause the message to clear	TO/LAND
STAB TRIM FAULT	A minor failure has occurred causing a loss of redundancy in the horizontal stabilizer trim system. The stabilizer trim will continue to function	TO/LAND
STALL PROTECT FAULT	The Stall Protection Computer has automatically reverted to settings for flaps 30	TO/LAND
L (R) STALL SHAKER FAIL	The respective stall shaker has failed	TO/LAND
STALL WARN BASIC	The SPC has incorrectly reverted to basic mode while no engine thrust mismatch condition exists	TO/LAND

D. STATUS MESSAGES

STATUS MESSAGES

Information only - no crew action required

Message	Meaning
GND SPOILERS OFF	The ground spoilers are selected OFF
PITCH DISCONNECT	The pitch disconnect has been selected. The pilot's control column moves the left elevator. The copilot's control column moves the right elevator. Autopilot will disengage and not re-engage
ROLL DISCONNECT	The roll disconnect has been selected. The pilot's control wheel moves the roll spoilers. The copilot's control wheel moves the aileron. The autopilot will disengage and not re-engage
ROLL SPOILERS OFF	The roll spoilers have been turned off and the roll disconnect has been activated
RUD LIMITER IN TEST	The rudder travel limiter system is conducting the manually activated system test
SEC STAB TRIM ON	The secondary channel of the horizontal stabilizer trim system is selected. The autopilot will be inoperative
STAB TRIM OFF	The STAB TRIM switch is in the off position. The autopilot will be inoperative
STALL PUSHER OFF	The stall pusher has been manually deactivated
YAW DAMPER OFF	The yaw damper is selected off

**NOTES**

- All warning messages are accompanied by a triple chime
- All caution messages are accompanied by a single chime
- Aural warnings are continuous
- "TO/LAND" indicates the message is inhibited during takeoff and landing phases
- "TO" indicates the message is inhibited during takeoff only
- L (R) notation indicates the message can appear for either left or right system
- Configuration messages are accompanied by "CONFIGURATION" voice warning
- Elevator split tolerance is inversely proportional to airspeed (CAS). Approximately 32.5° at 150 kt CAS, decreasing to 7.5° at 320 kt CAS
- Flight spoiler deployment warnings consider both altitude and throttle position

VII. LIMITATIONS

A. Airspeed Limitations

Rudder Limiter Failure	Maximum 185 KIAS
Rough Air Penetration Speed (VRA)	265 KIAS / 0.75 MI
Maximum Flap Extended Speed (VFE)	Flaps 10: 210 KIAS Flaps 20: 210 KIAS Flaps 30: 175 KIAS
Flight Spoilers	Not to be extended below approach speed + 8 KIAS
Pitch Control Jam	Maximum 200 KIAS or speed at which jam occurred (whichever is greater)

B. Altitude Limitations

Spoiler Panel Jammed	Maximum 41,000 feet
Yaw Damper Off	Maximum 31,000 feet
Flight Spoilers	Not to be extended below 500 feet AGL
Flaps	Prohibited to extend above 18,000 feet

C. Control Surface Deflection and Rate Limitations

Primary Stabilizer Trim Rate	0.4 deg/sec maximum
Secondary Stabilizer Trim Rate	0.2 deg/sec constant
Balance Tab Travel	$\pm 20^\circ$ relative to aileron surface
Spoiler Roll Authority	Maximum 45° from stowed
Maximum Rudder Deflection (Standard Aircraft)	30° either side of center
Maximum Rudder Deflection (Airplanes 20813+ or SB 350-27-008)	31° either side of center
Yaw Damper Limitation	Mechanically limited to $\pm 5^\circ$ rudder motion

D. Operational Limitations

Flight Spoilers to EMER	Only permitted in emergencies or required procedures
Intentional Stall Warning Activation	Prohibited unless for flight test or training
Maximum Crosswind Component - Takeoff	28 knots demonstrated
Maximum Crosswind Component - Takeoff	24 knots demonstrated
Flap Extension Time	0° to 30° : 20 seconds normal rate
ALTN FLAPS Extension	0° to 20° : 60-70 seconds



VIII. FLIGHT CONTROLS SYSTEM CIRCUIT BREAKERS

Flight Controls System Circuit Breakers

CB Name	Bus	Location
STAB TRIM PRI 1	LEFT ESS	CB1-D1
STAB TRIM PRI 2	RIGHT ESS	CB2-D1
STAB TRIM SEC	LEFT MAIN	CB3-C1
FLAPS NORM	RIGHT MAIN	CB4-C1
FLAPS EMER	LEFT ESS	CB1-D2
YAW DAMPER	LEFT MAIN	CB3-C2
SPOILERS L	LEFT MAIN	CB3-C3
SPOILERS R	RIGHT MAIN	CB4-C3
SECU 1	LEFT ESS	CB1-D3
SECU 2	RIGHT ESS	CB2-D3
STALL PROT 1	LEFT ESS	CB1-D4
STALL PROT 2	RIGHT ESS	CB2-D4
STICK PUSHER	LEFT MAIN	CB3-C4
STICK SHAKER L	LEFT ESS	CB1-D5
STICK SHAKER R	RIGHT ESS	CB2-D5
AILERON TRIM	LEFT ESS	CB1-D6
RUDDER TRIM	RIGHT ESS	CB2-D6

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IX. FLIGHT CONTROLS QUIZ

1. What type of control system is used for the ailerons on the Challenger 350?
 - A) Hydraulic power control units
 - B) Manual cable and pushrod mechanism
 - C) Electric actuators
 - D) Fly-by-wire system
2. What is the normal takeoff range for horizontal stabilizer trim?
 - A) 0 to 15 degrees
 - B) 2.5 to 8.0 units
 - C) 0.2 to 0.4 degree/second
 - D) ± 20 degrees
3. How many spoiler panels are located on each wing?
 - A) Two panels
 - B) Three panels
 - C) Four panels
 - D) Six panels
4. What happens when the angle-of-attack increase rate exceeds 1 degree per second?
 - A) The stick shaker activates immediately
 - B) The stick pusher activates immediately
 - C) The stall protection computer lowers the activation trip point
 - D) The system automatically disengages
5. Which hydraulic systems power the elevator control?
 - A) Left system only
 - B) Right system only
 - C) Left and right systems
 - D) Auxiliary system only
6. What is the maximum travel range for the aileron balance geared tabs?
 - A) ± 15 degrees
 - B) ± 20 degrees
 - C) ± 30 degrees
 - D) ± 45 degrees
7. What is the primary channel horizontal stabilizer trim rate at Mach 0.6?
 - A) 0.1 degree/second
 - B) 0.2 degree/second
 - C) Between 0.1 and 0.4 degree/second
 - D) 0.4 degree/second

8. How many flap positions are available on the Challenger 350?
- A) Three positions
 - B) Four positions
 - C) Five positions
 - D) Six positions
9. What does the proximity sensing system monitor?
- A) Flight control surface positions only
 - B) Engine parameters only
 - C) Aircraft systems for correct operation and configuration
 - D) Hydraulic system pressures only
10. What is the maximum airspeed limitation with a rudder limiter failure?
- A) 150 KIAS
 - B) 175 KIAS
 - C) 185 KIAS
 - D) 200 KIAS



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