CESSNA 510 MUSTANG

Systems Training

EXECUTIVE
FLIGHT TRAINING

General Systems

GENERAL CE-510

Weight and Dimensions

- Maximum ramp weight – 8,730 lbs.
- Maximum takeoff weight – 8,645 lbs.
- Maximum landing weight – 8,000 lbs.

43’.17

13’.10

40’.56

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LIMITATIONS

ENGINE START LIMITATIONS

Maximum Tailwind Component . . . . 10 Knots
Maximum Quartering Tailwind (within Tailwind component limits) . . . . .15 Knots
Maximum Crosswind Component . . . . 25 Knots
Maximum time to light-off . . . . 10 Seconds
Maximum Time to Stabilized Idle (Ground or Inflight/Starter Assist). . . . . 45 Seconds

ENROUTE OPERATIONAL LIMITS

GENERAL

Maximum Operating Altitude. . . . . 41,000 Feet
Maximum Altitude for Extension of Flaps . . . . 18,000 Feet
Minimum Temperature for Operation of Flaps . . . . -40°C RAT
Yaw Damper must be engaged above . . . . .FL300.

LIMITATIONS

OPERATING CONDITION	OPERATING LIMITS					
THRUST SETTING	TIME LIMIT (MINUTES)	ITT TEMPERATURE °C	N_2%	N_1%	OIL PRESSURE PSI	OIL TEMPERATURE °C
START	---	862 SEE FIGURE 2-3	---	---	0 TO 250 (NOTE 5)	-40 MINIMUM
GND IDLE	CONTINUOUS	---	48.6	---	24 MINIMUM	-40 TO 135 (NOTE 3)
FLT IDLE	CONTINUOUS	---	56.8 (MINIMUM) (NOTE 4)	---		22 TO 135
TAKEOFF (TO DETENT)	5 (NOTE 1)	830	100.0	100.0 (NOTE 1)		22 TO 135 (NOTE 3)
MAXIMUM CONTINUOUS (CLB DETENT)	CONTINUOUS	830	100.0	100.0 (NOTE 2)		22 TO 135
MAXIMUM CRUISE (CRU DETENT)	CONTINUOUS	830	100.0	100.0		22 TO 135
TRANSIENT	20 SECONDS	862	102.0	101.0	---	---
	90 SECONDS	---	---	---		135 TO 141
	15 / 500 SECONDS	---	---	---		---

NOTE

1. The total time during which takeoff thrust may be used is limited to five minutes per flight. The five minute time limit commences when the throttle is first advanced to the TO detent. This time may be extended to 10 minutes for one engine inoperative operation. The takeoff thrust (N_1) for the airplane is defined in Figures 4-13 and 4-14 and is more limiting than engine rotational limits and must be observed. Performance data including V_{MCA} and V_{MCG} in Section IV, is based on use of the appropriate Takeoff Thrust setting.
2. Maximum continuous thrust (CLB Detent) for the airplane is defined by Figures 4-15 and 4-16 (single-engine) and Figures 4-17 and 4-18 (multi-engine). These thrust settings (N_1) are more limiting than engine rotational limits and must be observed. Performance data in Section IV is based on the use of the appropriate maximum continuous thrust setting.
3. Oil temperature must be above 22°C for at least 5 minutes before takeoff. Once oil temperature is +10°C or warmer, it is acceptable to increase power up to the CRU detent to decrease the time required to warm the oil to 22°C.
4. Idle speed is a function of ambient pressure and temperature.
5. After initiation of the start cycle, oil pressure should indicate a steady increase within 20 seconds of the start of N_2 rotation.

LIMITATIONS

STARTER CYCLE LIMITATIONS

Starter Cycle Limitation. . . . . Three engine starts per 30 minutes.
Three cycles of operation with a 60-second rest period between cycles is permitted.
This limitation is independent of starter power source (i.e. battery, generator assisted cross start, or ground power unit) and applies to both starting and dry motoring of the engine.

GROUND POWER UNIT LIMITATIONS FOR STARTING

Minimum/Maximum Current . . . . 800/1100 amps.
Amperes Maximum Voltage . . . . .29 VDC.

BATTERY LIMITATIONS

Battery Start Limitation . . . . Three engine starts per hour
Minimum Voltage for Start. . . . . .24 Volts
Three generator assisted cross starts are equal to one battery start.
If a ground power unit is used for start, no battery cycle is counted.

BATTERY STARTS ARE PROHIBITED AT AIRPORT ELEVATIONS ABOVE 10,000 FEET. ABOVE 10,000 FEET, ENGINES MUST BE STARTED USING A GROUND POWER UNIT OR USING A GENERATOR ASSISTED CROSS START.

LIMITATIONS

PASSENGER COMPARTMENT

For taxi, takeoff, and landing, adjustable passenger seats must be positioned with seatbacks upright. Passenger seat belts must be properly fastened.

The maximum passenger seating, not including 2 crew seats, is four.

The use of the lavatory is prohibited for taxi, takeoff, and landing and is limited to one occupant in flight.

BAGGAGE COMPARTMENTS

Nose Baggage Compartment (L-R) . . . . .320 pounds maximum (combined)

Tailcone Baggage Compartment . . . . 300 pounds maximum

VORTEX GENERATORS AND STATIC WICKS

The following lists the number of vortex generators required for dispatch:

1. Wing - 16 installed (8 per side), 16 required.

The following lists the number of static wicks that may be missing or broken, but no more than two total:

1. Right-hand wingtip and aileron - 3 installed, 2 required.
2. Left-hand wingtip and aileron - 3 installed, 2 required.
3. Rudder and Tailcone - 4 installed, 3 required.
4. Elevators - 6 installed (3 per side), 5 required.

LIMITATIONS

ICE AND RAIN PROTECTION

The ENGINE ANTI-ICE switches must be selected ON at a RAT of +10°C (50°F) or colder when in visible moisture.

WING/STAB deice must be selected to AUTO at the first sign of ice accretion anywhere on the airplane.

Except for the ground preflight check, maximum RAT for operation of engine anti-ice with the throttles above idle is +20°C (+68°F).

Limit the ground operation of the pitot-static heat to two minutes to preclude damage to the pitot tubes and stall warning vane.

The airplane must be free of ice prior to takeoff. Anti-ice systems must not be used to deice engine inlets prior to takeoff. Dispatch with polished frost is prohibited.

Minimum airspeed for sustained flight in icing conditions (except takeoff, approach and landing) is 160 KIAS.

In icing conditions, operation at other than flaps UP and landing gear retracted is prohibited except during approach and landing.

The use of wing or tail de-ice boots is prohibited below -30°C RAT.

DOORS

The aircraft has five doors:

1. The Entrance Door.
2. The Emergency Exit Door.
3. Left nose baggage compartment door.
4. Right nose baggage compartment door.
5. Aft (tail cone) compartment door

ENTRANCE DOOR

The cabin entrance door is on the forward left side of the fuselage.

The door opens both outward and forward. It is secured in the closed position with eight locking pins that are attached to the door handle.

The exterior handle locks with a key.

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EMERGENCY EXIT

A plug type emergency exit is located on the right side of the fuselage, over the wing.

The emergency exit opens inboard and can be opened from outside or inside of the airplane.

EMERGENCY EXIT

- The emergency exit is secured by a safety pin with a REMOVE BEFORE FLIGHT streamer. This pin is removed prior to flight. The emergency exit is not connected to the door warning circuit.

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CABIN

The Mustang cabin measures 14 feet in length, 4.7 feet wide and 4.5 feet high.

It contains two aft-facing and two forward facing passenger seats.

A toilet is located on the right side of the fuselage. The toilet is not equipped with a safety belt and cannot be used as a passenger seat.

Dropout, constant-flow oxygen masks for emergency use are located in the cabin. For the comfort of passengers, cabin overhead panels contain individual air vent outlets and seat lighting.

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FLIGHT COMPARTMENT

The cockpit is equipped with dual controls that include control yokes, brakes, and rudder pedals.

There are two adjustable seats with seat belts and shoulder harnesses.

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TAILCONE COMPARTMENT

The tail cone compartment is an unpressurized area that contains major components of the environmental, electrical distribution, flight controls and engine fire extinguishing systems.

Access is through the tail cone baggage door on the left side of fuselage below the engine.

WING

- The aluminum wing incorporates 8 vortex generators and 1 stall strip per side. All 16 VG's are required for dispatch.
- Each wing includes an integral fuel tank.
- Attached to each wing are electrically operated speed brakes and flaps, and the hydraulically actuated main landing gear.

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FLIGHT TRAINING

EMPENNAGE

The empennage consists of a vertical stabilizer with T-tail mounted horizontal stabilizers.

The leading edges of horizontal and vertical stabilizers are deiced by inflatable deice boots.

NOSE SECTION

The nose section is an unpressurized area and contains the hydraulics components, pneumatic bottles, oxygen bottle, fresh-air duct, and the radar antenna. The 20 cubic foot nose baggage compartment holds up to 320lbs.

ELECTRICAL SYSTEM

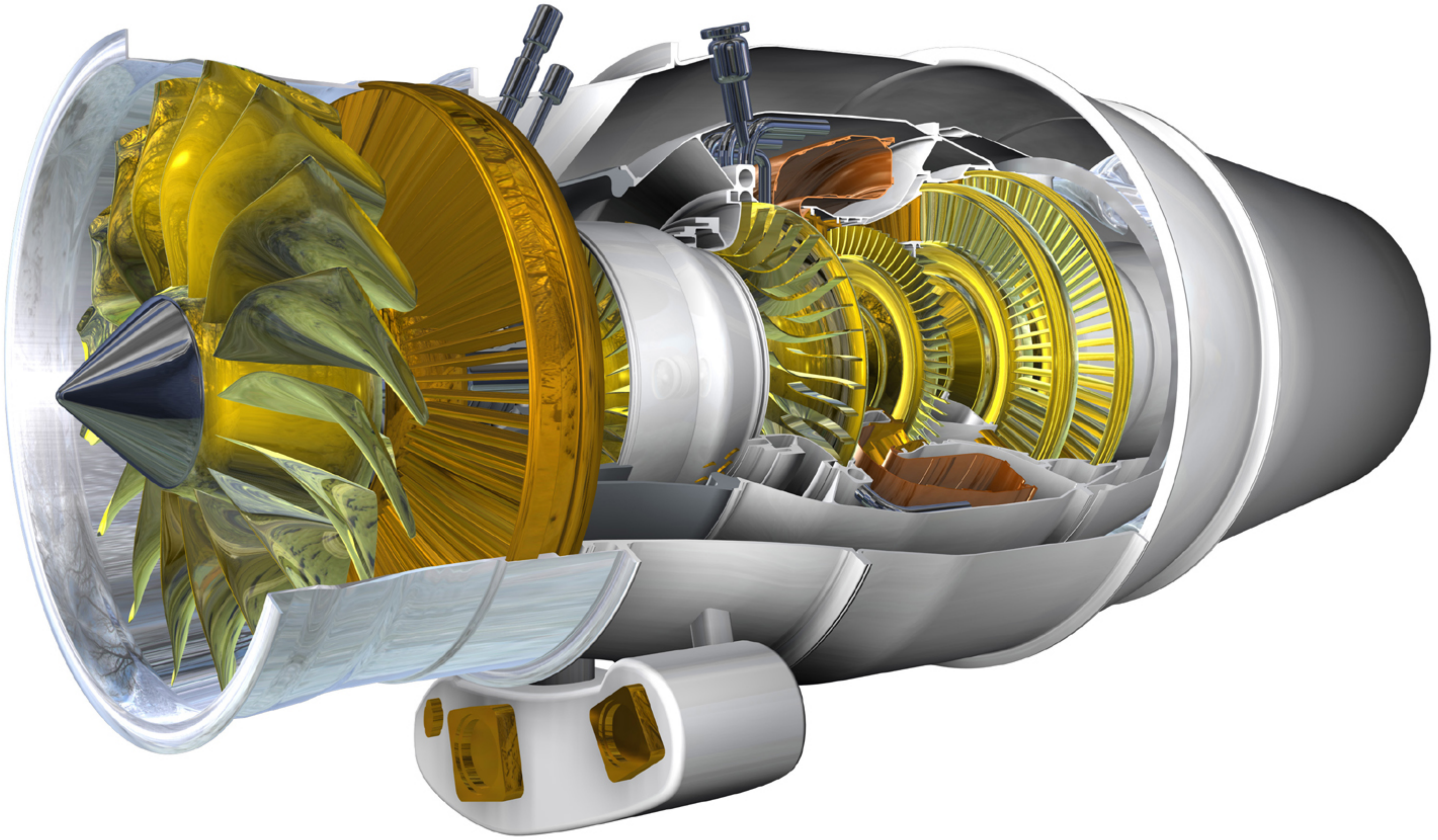
- The Mustang is an all-DC aircraft.
- The 28-VDC power is supplied by two starter-generators and one 24-volt, 28 amp-hour sealed lead acid battery.
- An external power receptacle is located below the right engine pylon.
- There are two DC power outlets provided in the cabin, powered by the electrical system through a converter. One outlet is in the cabinet behind the copilot seat and the other is found in the aft center console.

FUEL SYSTEM

The fuel system has two distinct and identical halves.
Each wing tank stores and provides fuel to its respective engine.
Fuel transfer capability is available.
The fuel is heated by an oil-to-fuel heat exchanger which eliminates the need for PRIST or other fuel anti-ice inhibitors.

ENGINES

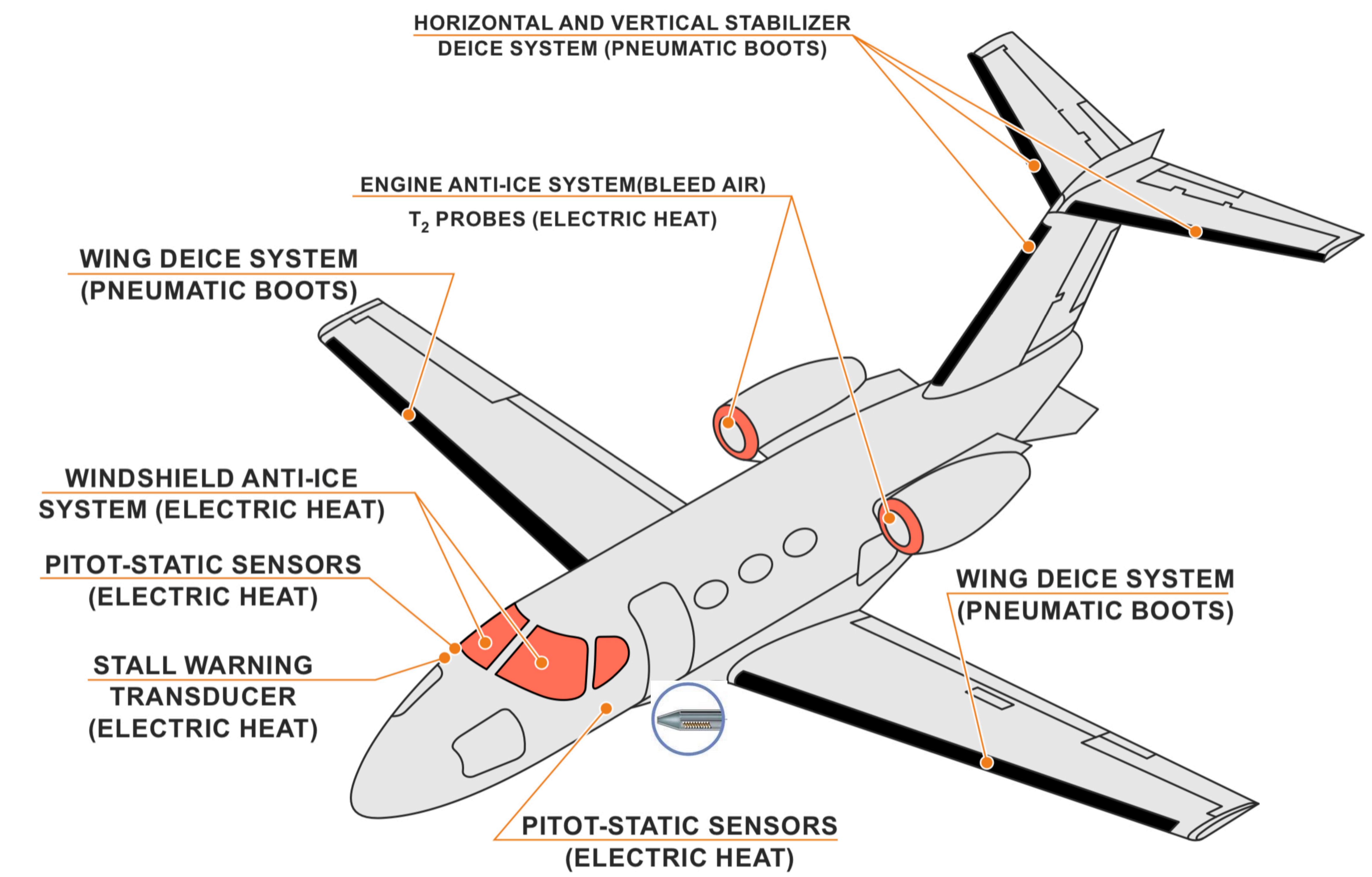
- On the rear fuselage are two pylon-mounted Pratt & Whitney PW615F turbofan engines.
- Each engine produces approximately 1,460 pounds of thrust.
- The engines are controlled by dual-channel full authority digital engine controls (FADECs).
- Engines are started with the electrical starter-generators, which are powered by the battery or GPU.
- Each engine has an ice-protection, fire-detection and fire-extinguishing system.
- The engine pylons have ram-air inlets and exhausts to provide cooling airflow through cabin air heat exchangers.



EXECUTIVE
FLIGHT TRAINING

ICE PROTECTION SYSTEMS

- Bleed air is used to heat the engine inlets and generator inlets.
- The wings, vertical tail, and horizontal stabilizers are deiced by boots inflated by engine bleed air.
- The windshields are electrically anti-iced and defogged. Electric heat is also used to anti-ice the pitot-static systems, stall-warning vane, and engine inlet-mounted T2 sensors.
- Two windshield ice detection lights are located on the glareshield.
- To detect icing on the wings at night, a light is installed on the outside left fuselage.



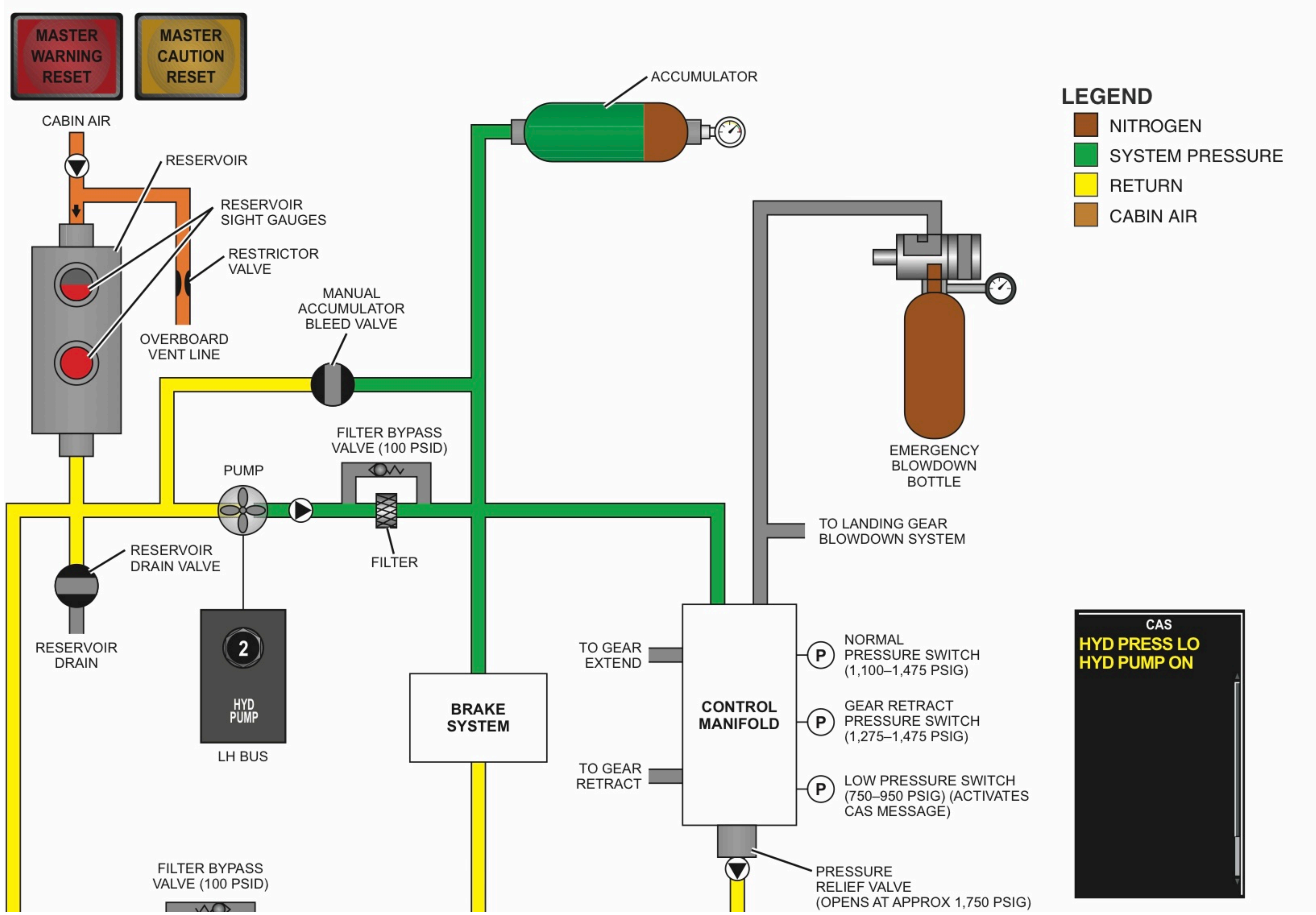
EXECUTIVE FLIGHT TRAINING

HYDRAULIC SYSTEM

A single electric hydraulic pump supplies pressure to operate the landing gear and wheel brakes utilizing a closed center system.

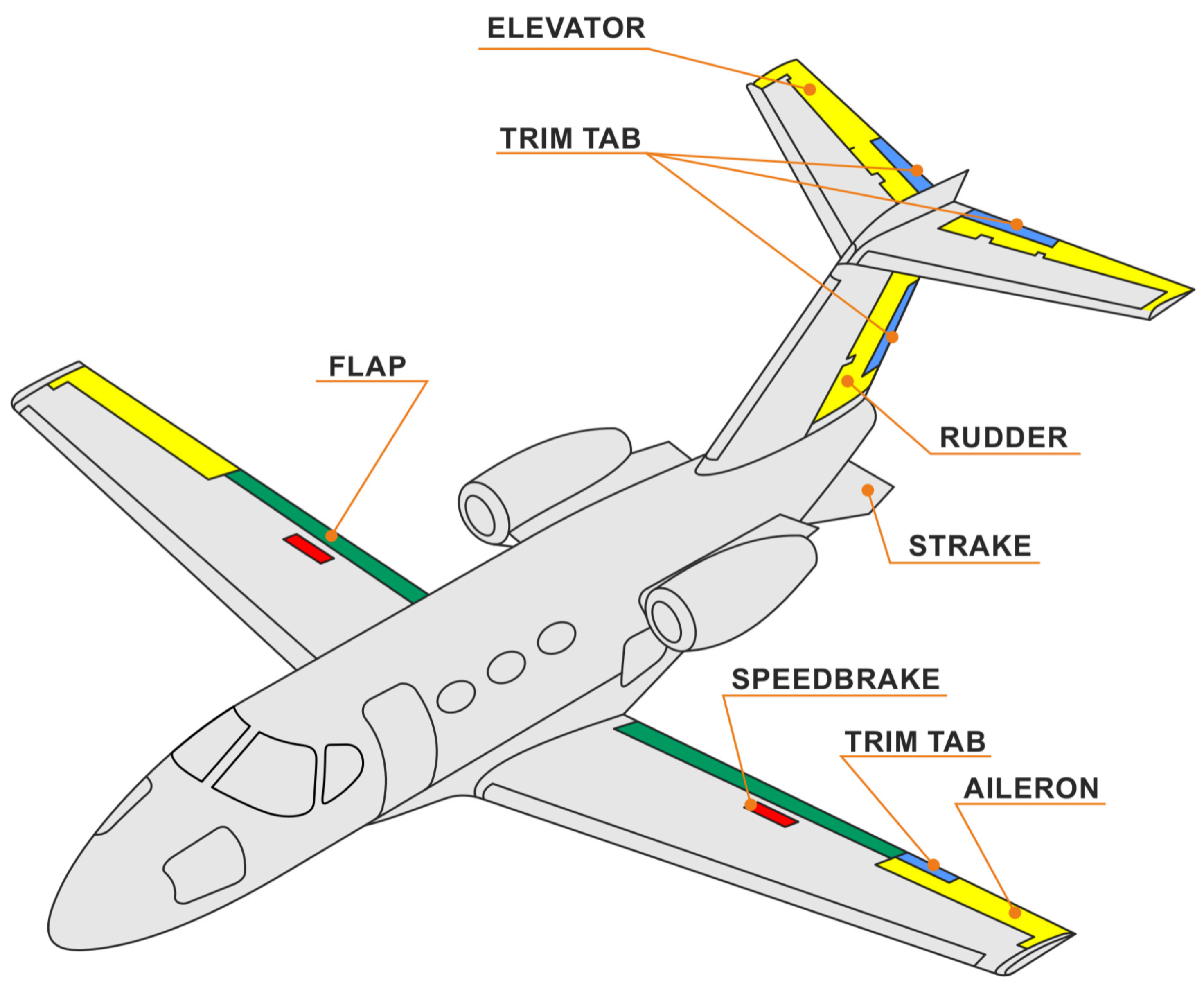
The main gear is equipped with hydraulically operated antiskid brakes.

A pneumatic blow down bottle provides a backup for emergency landing gear extension and braking.



FLIGHT CONTROLS

- Primary flight control is accomplished by cable-operated surfaces.
- Aileron-rudder interconnect provides lateral stability.
- Trim is provided on aileron, elevator, and the rudder.
- Elevator trim is mechanically and electrically actuated.
  - Aileron and rudder trim are both electrically activated.
  - Flaps are electrically actuated and are found on the trailing edges of the wing.
- Electrically powered speed brakes are located on upper and lower wing surfaces.
- The nosewheel steering is controlled mechanically by rudder pedals through steering bungees.

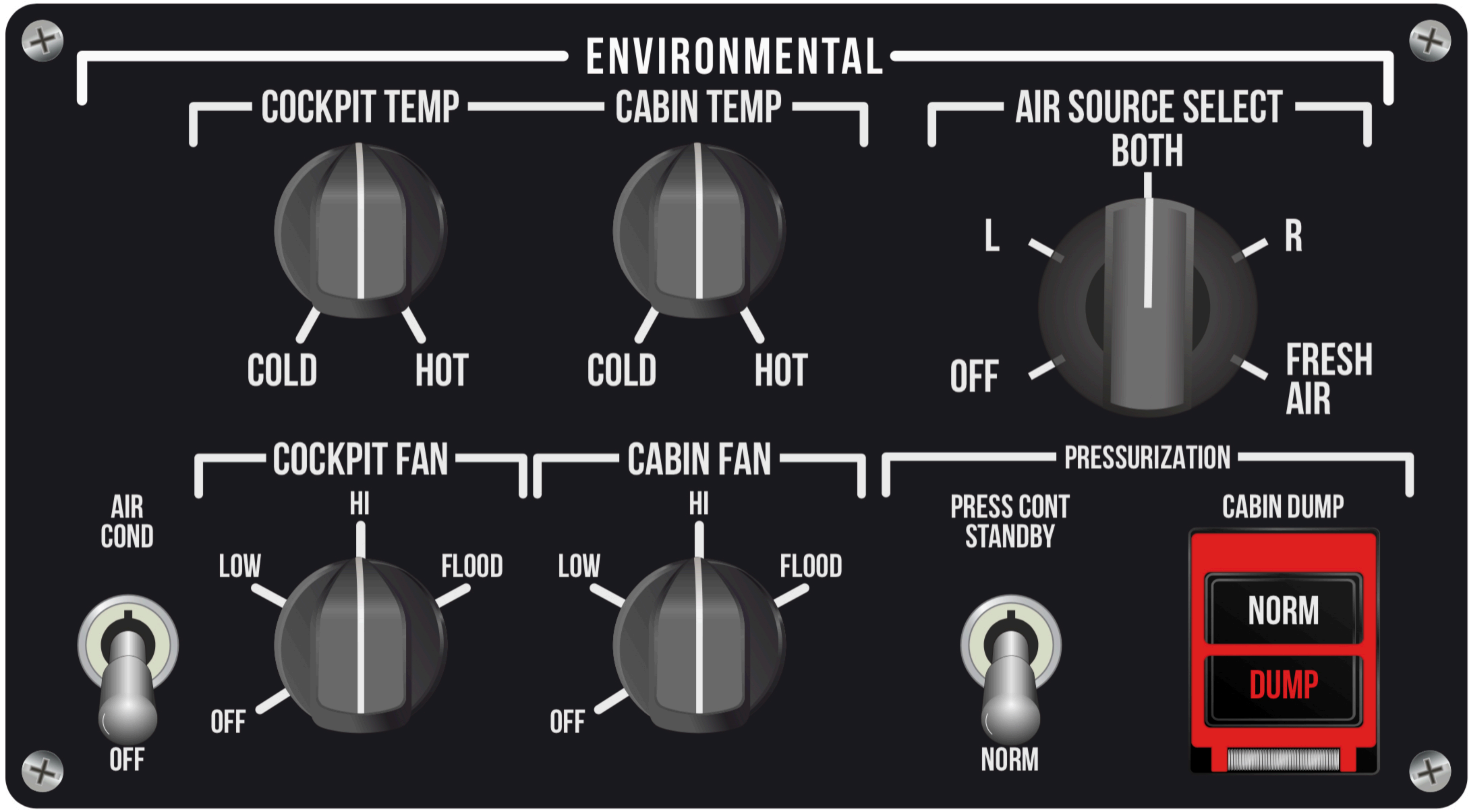


EXECUTIVE
FLIGHT TRAINING

ENVIRONMENTAL SYSTEM

The aircraft is equipped with a two-zone automatic temperature control system, labeled Cabin Temp and Cockpit Temp.

There is also an independent vapor cycle air-conditioning system that provides cooling to cabin and cockpit.



EXECUTIVE FLIGHT TRAINING

AVIONICS

The Garmin G1000 presents indications for flight instrumentation, navigation, avionics and aircraft systems.
The Garmin G1000 contains integrated EICAS.
It can manage instrument and engine displays, autopilot, flight guidance systems and flight director.
Terrain and traffic avoidance systems and color radar come standard in the Garmin G1000.

Electrical System

ELECTRICAL SYSTEM

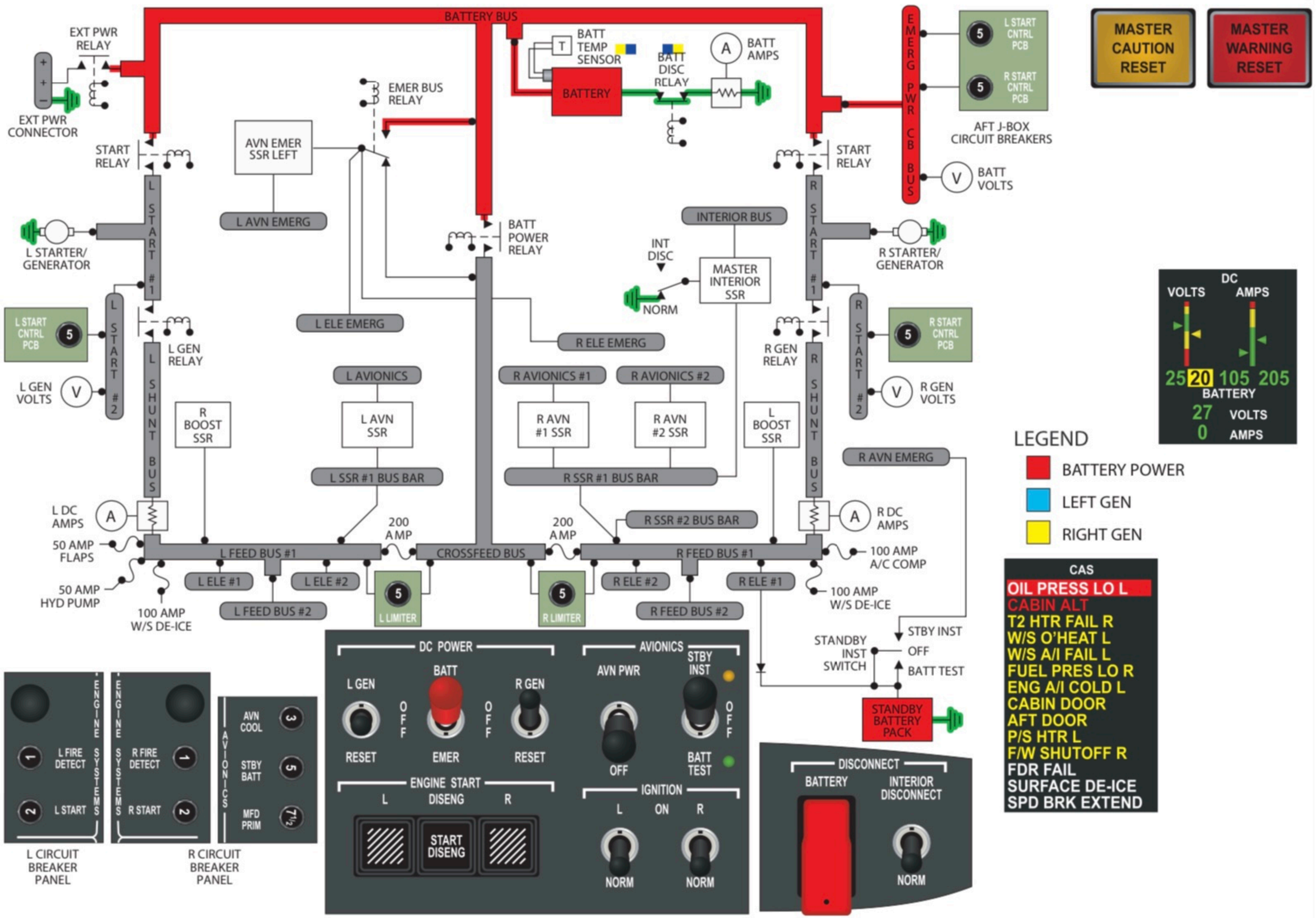
The normal aircraft system voltage is 28.5 volts. Although two generators normally provide the primary power, one generator is capable of powering the entire electrical system. The secondary power sources are the battery or external power.

DC power is distributed by a left and right feed bus which are connected by a crossfeed bus. This allows either generator to power the entire system in the event of a generator failure. More commonly, the generators work together and share the system load.

The battery and emergency buses usually tie to the main system, but they may isolate to only the battery or external power sources. When the aircraft is on the ground, an external DC power unit can supply electrical power to all buses.

STATUS	LIMIT
On Ground, Idle	150 Amps
On Ground, Above Idle	300 Amps
Air ≤ 30,000 Feet	300 Amps
Air > 30,000 Feet	280 Amps

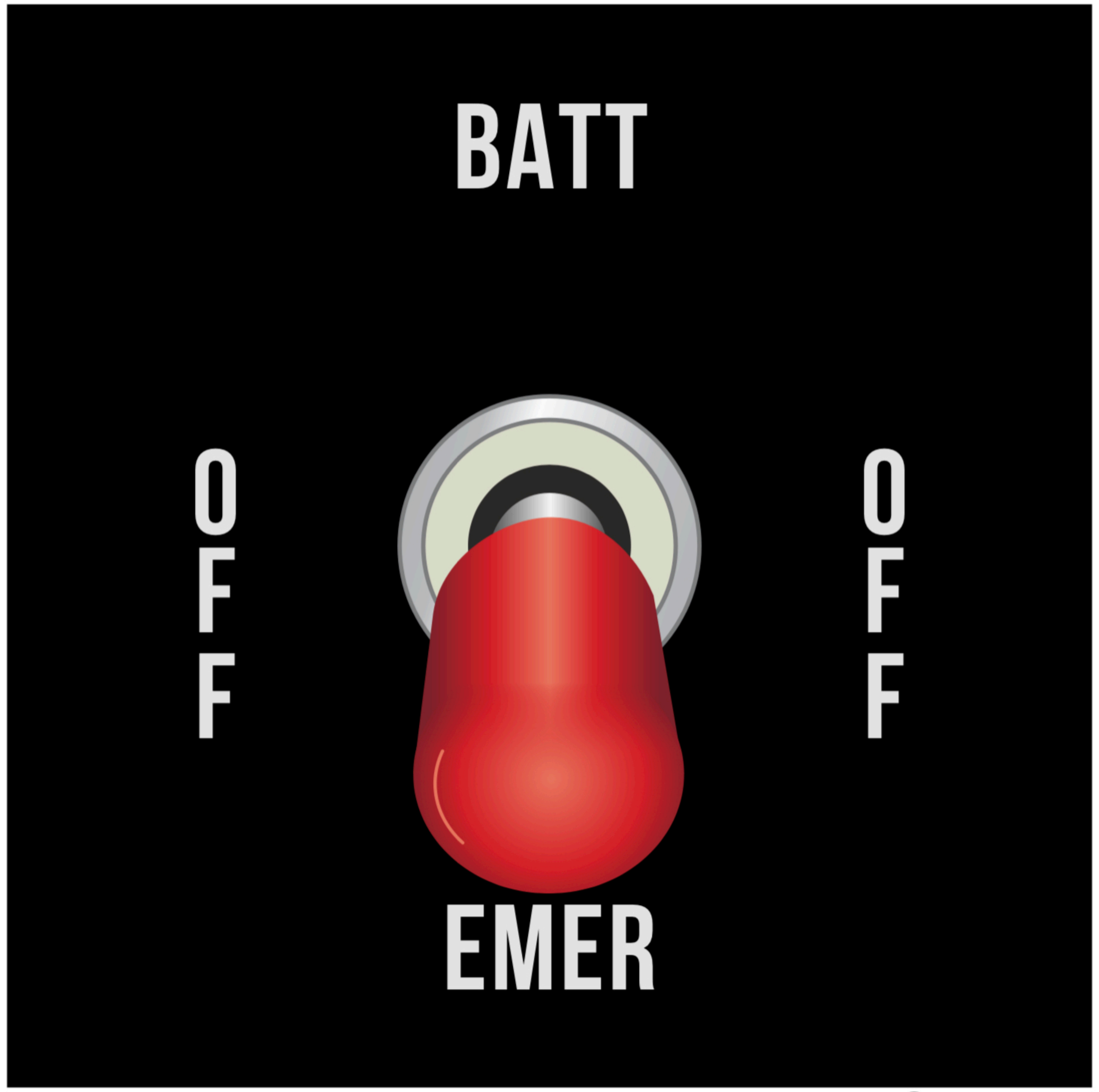
Electrical Bus Schematic



EXECUTIVE FLIGHT TRAINING

ELECTRICAL SYSTEM

Normally, the generator fed electrical system provides 28-VDC power to operate the electrical system. However, if one generator fails, the other generator is capable of supplying all standard electrical requirements. If both generators fail, the BATT switch is placed in the EMER position, supplying emergency DC power from the battery bus through the emergency power relay to the emergency bus circuit breakers on each cockpit CB panel. If the battery switch is in the BATT position, generator power is supplied through the battery relay to the hot battery bus to charge the battery and from the crossfeed bus through the emergency relay to the emergency power buses.



EXECUTIVE
FLIGHT TRAINING

BATTERY

Located in the tail cone, the standard lead acid or optional NiCad battery provides 24 volts and 28 amp hours. It has a manual quick-disconnect, and can be accessed through the tail cone door.

BATTERY LIMITATIONS

Battery Start Limitation . . . Three engine starts per hour
Minimum Voltage for Start. . . . . .24 Volts

EXECUTIVE FLIGHT TRAINING

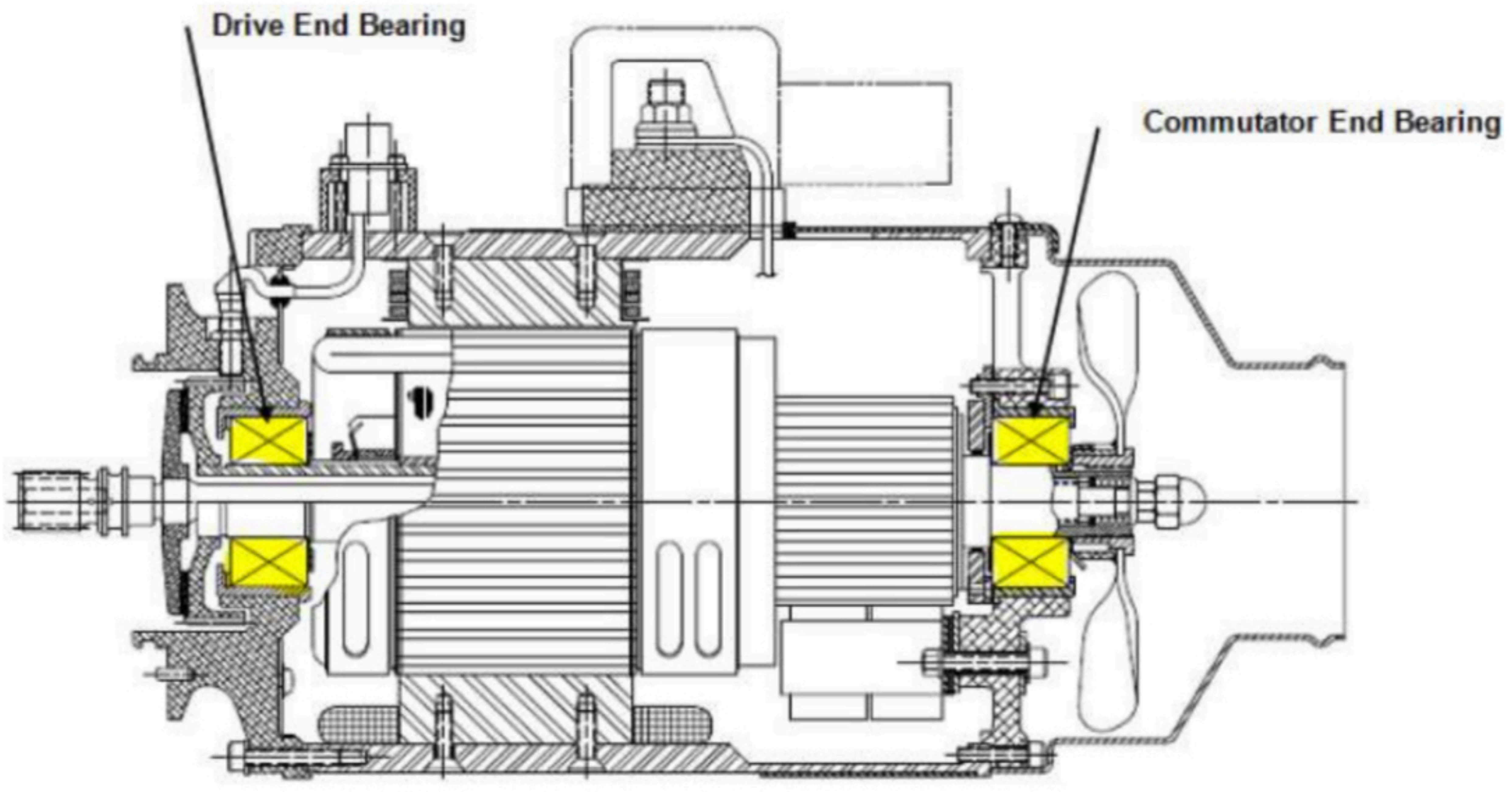
STANDBY BATTERY

The standby instrument battery is a 28 volts, 1.2 amp hour NiCad battery. It is controlled with the AVIONICS STBY INST switch.

The standby instrument battery is located in the radome on the avionics shelf. The battery will automatically supply electrical power to the standby airspeed, attitude, altitude instruments, and the lighting for the magnetic compass if normal electrical power is lost.

STARTER GENERATOR

Two engine-driven, 29 volt, DC starter-generators are the primary source of aircraft electrical power and supply power to all the DC buses. Each generator is air cooled and regulated to 28.5 volts by the GCU.



GROUND POWER UNIT

A GPU connects to the aircraft DC system through a receptacle in the fuselage below the right engine nacelle. External power is routed through the external power relay to the battery bus. Regardless of the battery switch position, the battery charges from the GPU.

A GPU providing a maximum voltage of 29 VDC can be used. The left and right start controllers monitor GPU voltage and open the external power relay to disconnect the GPU from the aircraft if voltage exceeds approximately 32.5 VDC.

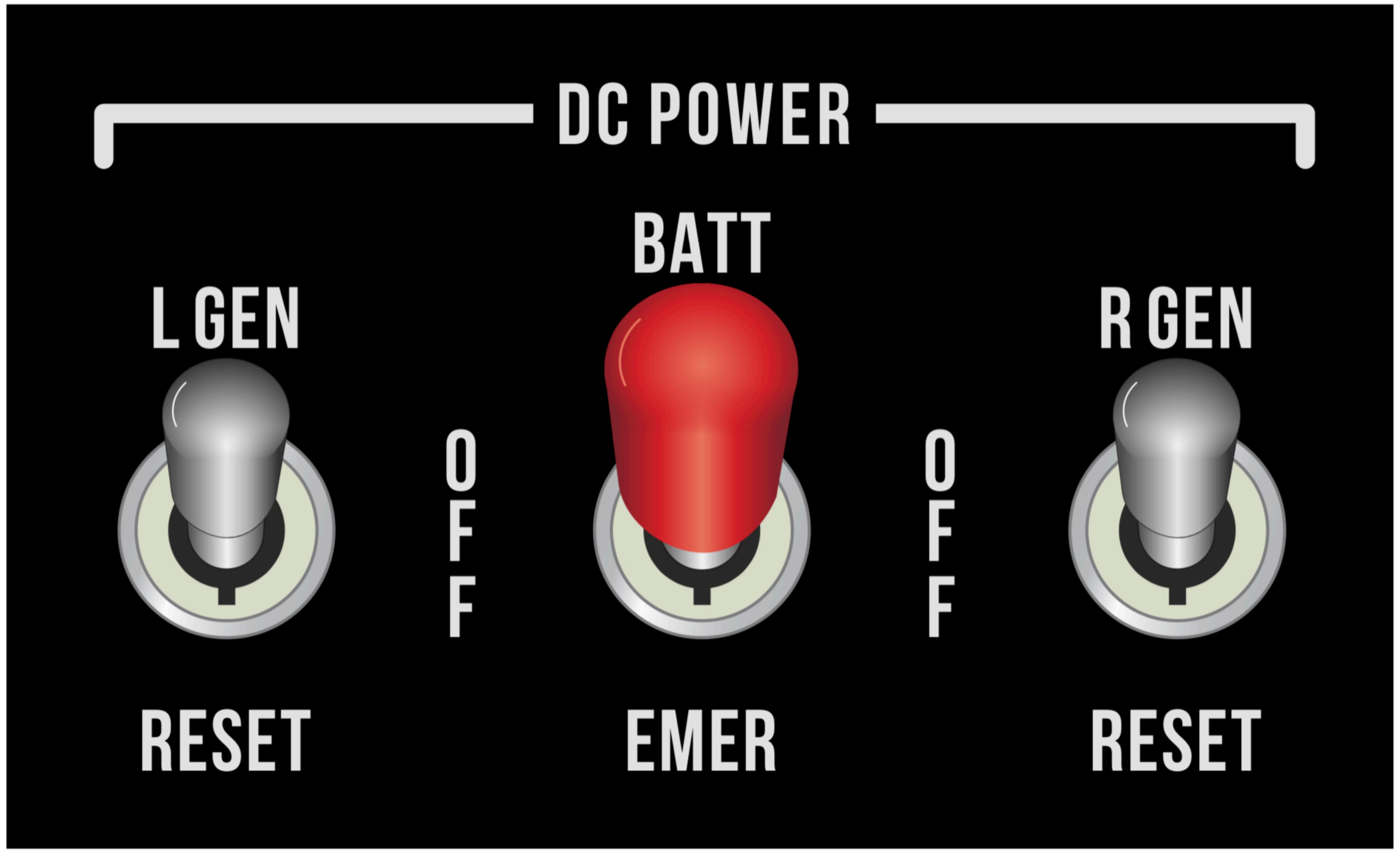
GROUND POWER UNIT LIMITATIONS FOR STARTING

Minimum/Maximum Current . . . . 800/1100 Amperes
Maximum Voltage . . . . .29 VDC

EXECUTIVE
FLIGHT TRAINING

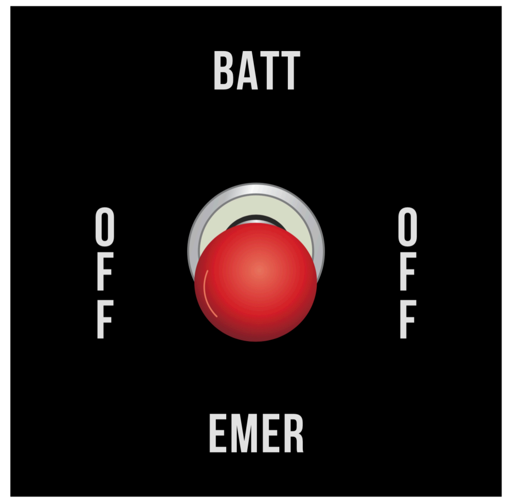
CONTROLS AND INDICATIONS

DC power is controlled by the battery switch and two generator switches.

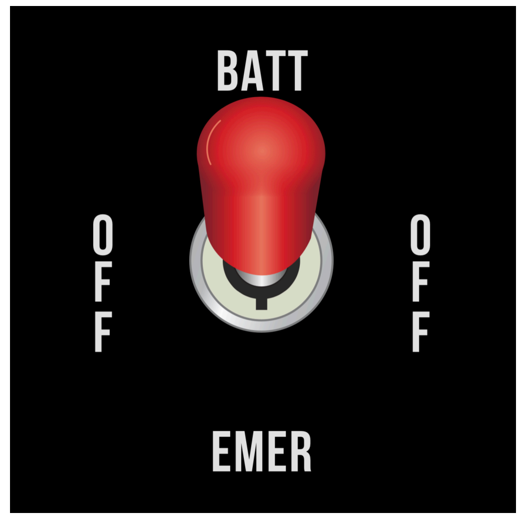


BATTERY SWITCH

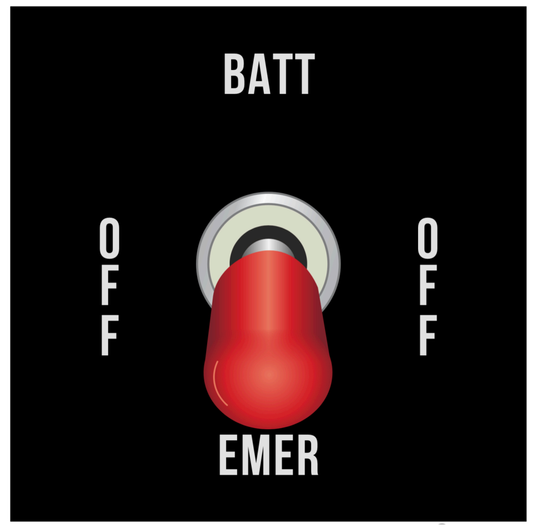
The battery switch has three positions: **BATT**, **OFF**, and **EMER**.



If the battery switch is in the OFF position, the battery bus will isolate from all other buses in the system with the exception of the emergency power circuit-breaker bus.



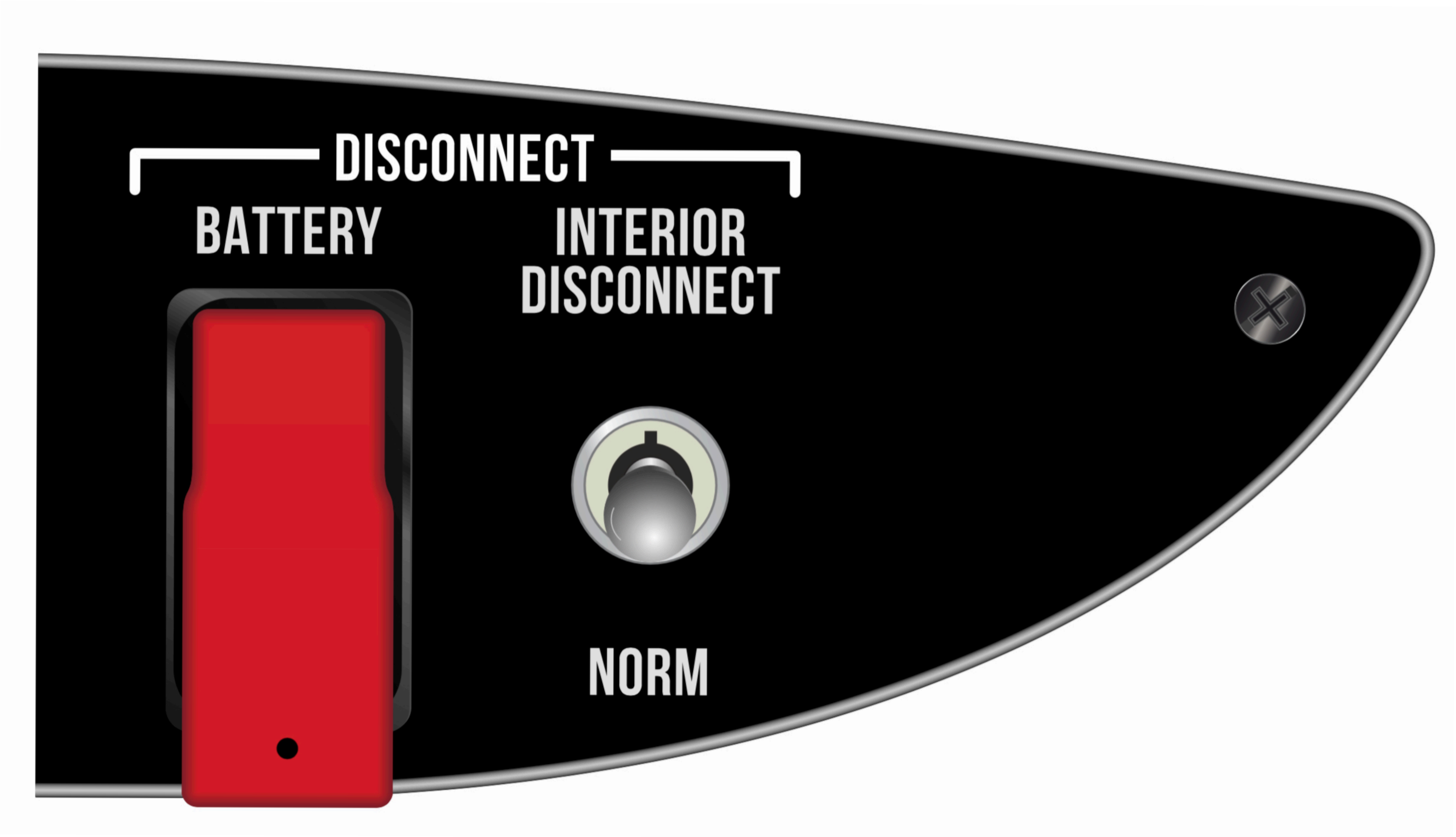
When the battery switch is in the BATT position, the battery power relay closes, completing a circuit to the crossfeed bus. While the battery relay is in the BATT position, the emergency relay de-energizes and completes a circuit to the emergency buses from the crossfeed bus.



In the EMER position, only the emergency power relay energizes, which connects the emergency buses to the battery bus. These buses receive power from either the battery or external power. When external power is not applied to the aircraft and the generators are online, placing the battery switch in EMER or OFF will isolate the battery from any charging source.

BATTERY DISCONNECT SWITCH

A guarded battery disconnect switch is located above the pilot armrest on the left side console panel. The switch has two positions: BATTERY (disconnect) and NORM. It disconnects the battery and is used only for abnormal operations involving a stuck start relay or a battery over temperature. Activating this switch uses battery power to open the battery disconnect relay on the ground side of the battery. If the battery disconnect switch is open, the battery cannot supply electrical power to the aircraft or be charged from the generators.



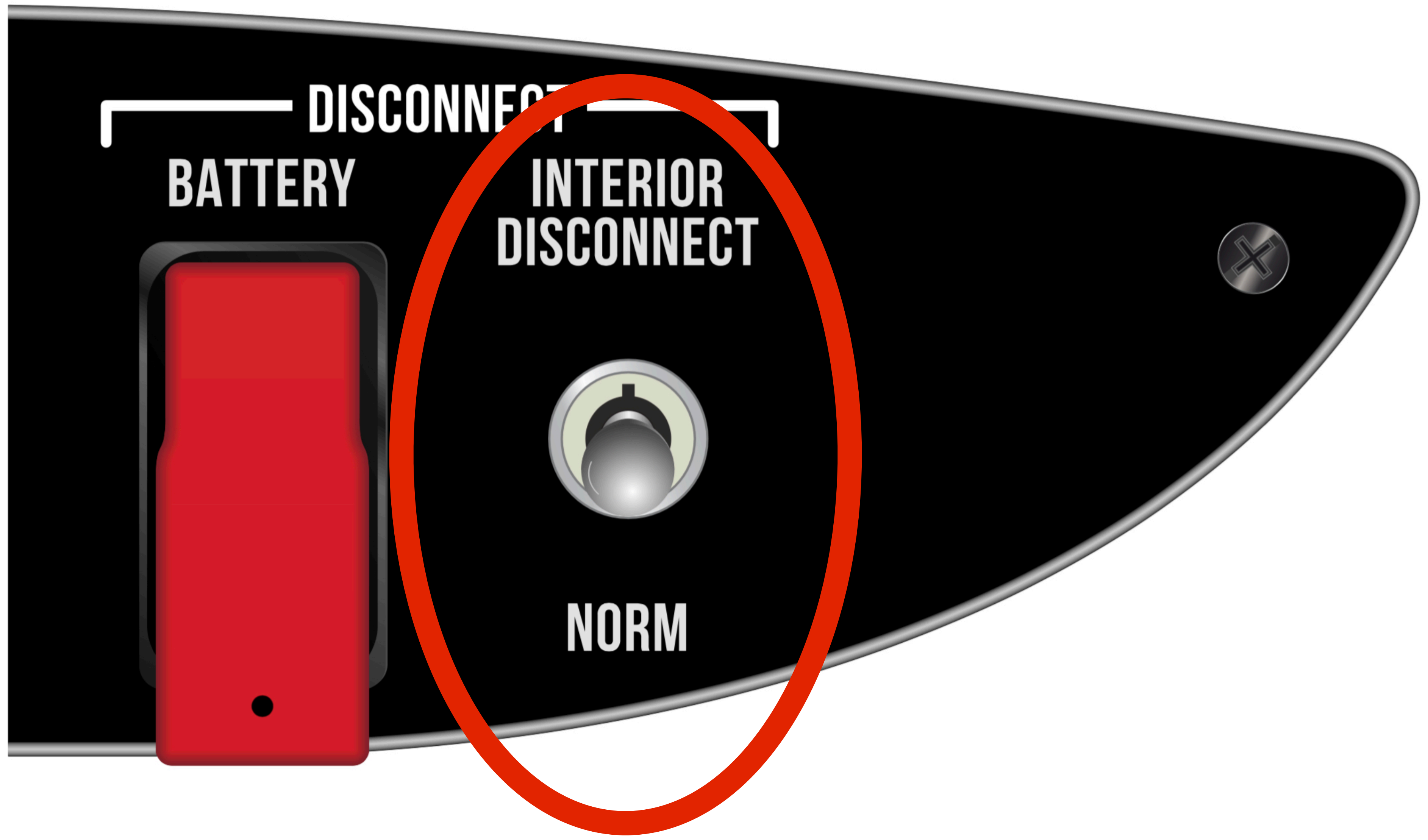
! **NOTE**: In order for the battery disconnect switch to operate, the aircraft battery switch must be in the BATT position.

AVIONICS STANDBY INSTRUMENT SWITCH

The interior disconnect switch is located above the pilots armrest on the left console panel by the battery disconnect switch. The interior disconnect switch disconnects the cabin lights (except for the emergency exit lights operated by the pax safety switch), the cabin DC-DC converters, as well as the cabin XM radio.

The avionics standby instrument switch is located on the AVIONICS pilot switch panel in the cockpit. The avionics standby instrument switch can be set to the STBY INST, OFF, or BATT TEST position. This switch supplies power to the right avionics emergency bus.

When the standby battery is powering the standby instruments, the amber light adjacent to the switch will illuminate. Selecting BATT TEST performs a capacity check on the standby battery. A green light adjacent to the switch indicates a successful test.



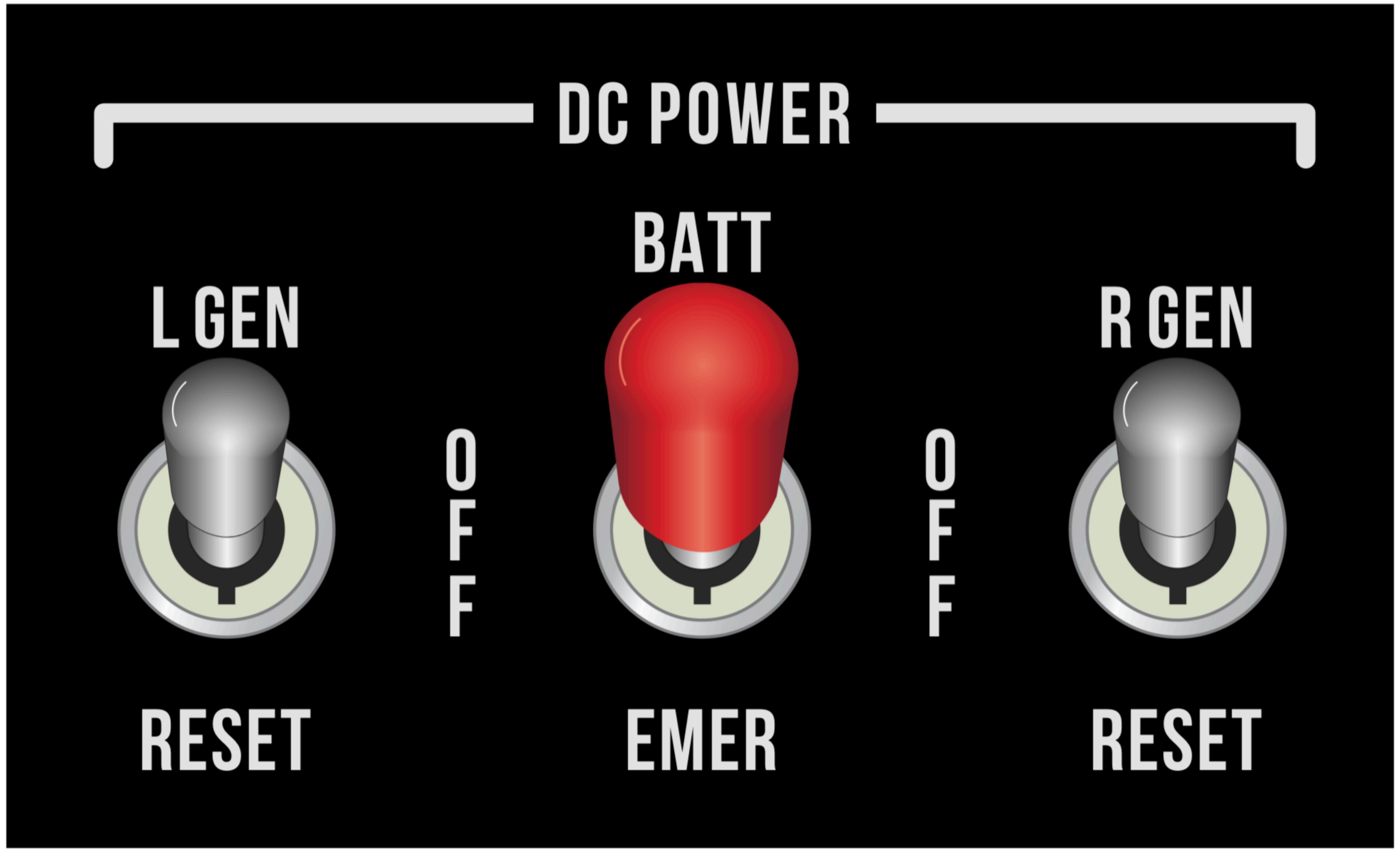
GENERATOR SWITCHES

Two generator switches (L GEN and R GEN) are located on the pilot DC POWER subpanel. The three positions on the generator switch are: L (or R) GEN, OFF, and RESET.

Setting the switch to L GEN or R GEN enables the GCU to connect the generator to its feed bus. The ammeter indicates the generator output to the feed buses.

When the switch is in the OFF position, the generator relay opens and the ammeter shows no generator load to the feed buses.

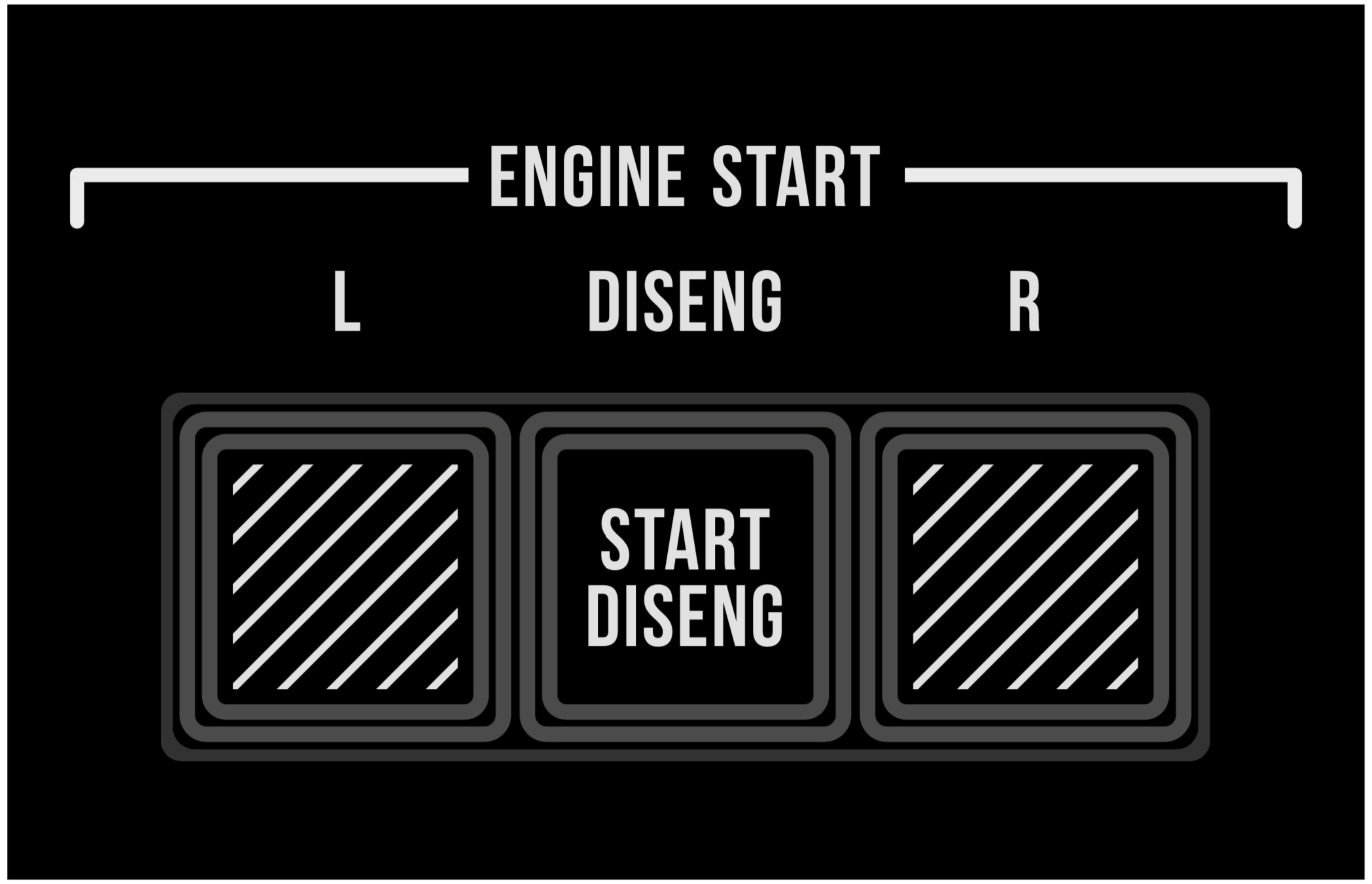
When the switch is in the spring-loaded RESET position the field voltage increases allowing a reset attempt of a generator that has tripped off line as a result of a fault condition.



ENGINE START BUTTONS

Two ENGINE START buttons (L and R) activate a start relay allowing current to flow to the starter. A starter disengage (DISENG) button will open the start circuit if manual termination of the start sequence is required.

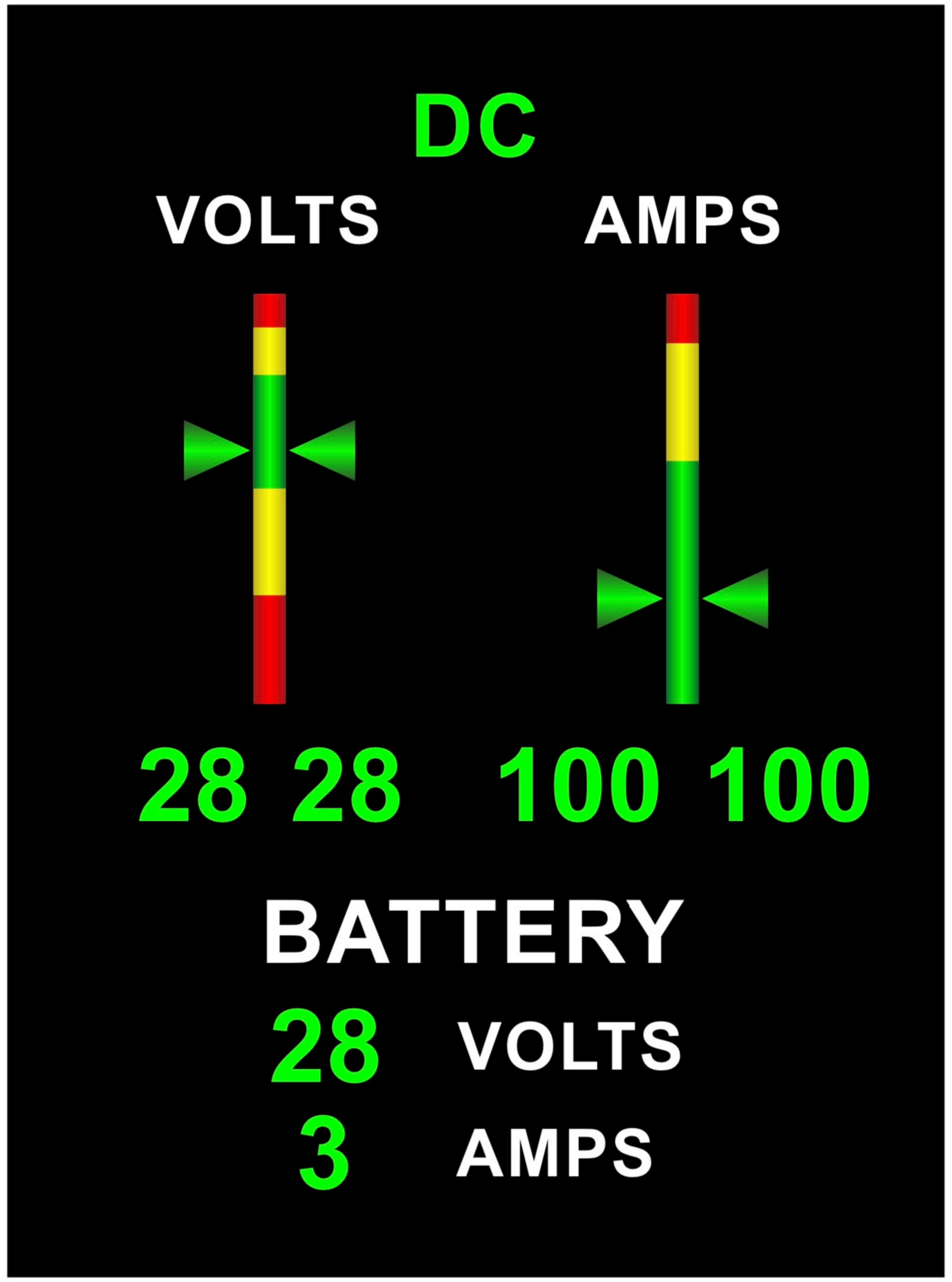
A white light will illuminate in the engine starter button indicating that the start relay is closed.



INDICATIONS

The DC electrical system is monitored by:

- Crew alerting system (CAS) messages
- Engine indicating and crew alerting system (EICAS) display window
- DC AMPS display
- DC VOLTS display
- BATTERY AMPS display
- BATTERY VOLTS display
-



OPERATION

PREFLIGHT

During the exterior preflight, check the battery for signs of deterioration or corrosion before connecting external power. Place the generator switches to GEN if starting using battery power. Place the GEN switches to the OFF position if using external power. Then place the battery switch to BATT and verify the voltage display is at or above 24 volts minimum.

STARTING (IN FLIGHT)

- An engine start in flight using the start button is a battery start only. When in flight, the squat switch disables generator-assist capability. The associated start relay will close and the boost pump on that side will activate.

- The only difference between an in-flight start and a ground start with one generator online, is that the start relay on the same side as the operating generator does not close and the battery power relay opens. This isolation of the start circuit from the operating generator and buses in flight is through left squat switch logic and is required by certification regulations.

- The protection circuit for the 200-amp current limiter is the same as previously described. Please refer to the “Airstart Envelope” graph in “Limitations” of the Airplane Flight Manual (AFM).

EXECUTIVE
FLIGHT TRAINING

STARTING (ASSISTED BY EXTERNAL POWER UNIT)

- If a GPU is used for starting the engine, the maximum voltage is 29 VDC and 800/1,100 amps.
- When external power starts are planned, the generator switches will remain in the OFF position until there is removal of external power from the aircraft. Otherwise, once the first generator comes online, the external power relay opens and the GPU automatically disconnects from the battery bus. The second engine start then becomes a generator-assist battery start.

Lighting Systems

LIGHTING


LANDING
BEACON
EXTERNAL
LIGHTING
NAV
COCKPIT
DISPLAYS
OFF
OFF
OFF
OFF
OFF
OFF

INTERIOR LIGHTING

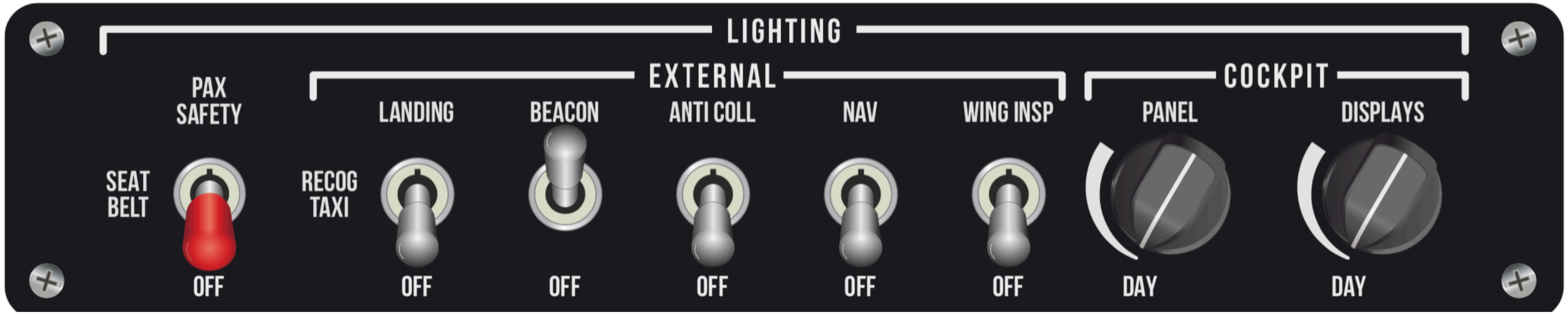
The interior lights of this aircraft are DC powered. Interior light circuit breakers are located on the right CB panel. Panel back lighting is provided by light emitting diodes (LEDs), while overhead lights are halogen and have liquid crystal displays (LCDs).

EXECUTIVE
FLIGHT TRAINING

FLIGHT COMPARTMENT LIGHTING

The External Panel switches control:

- Landing Lights
- Beacon
- Anti Collision
- Navigation lights
- Wing Ice Inspection light



The Panel Dimmer knob controls:

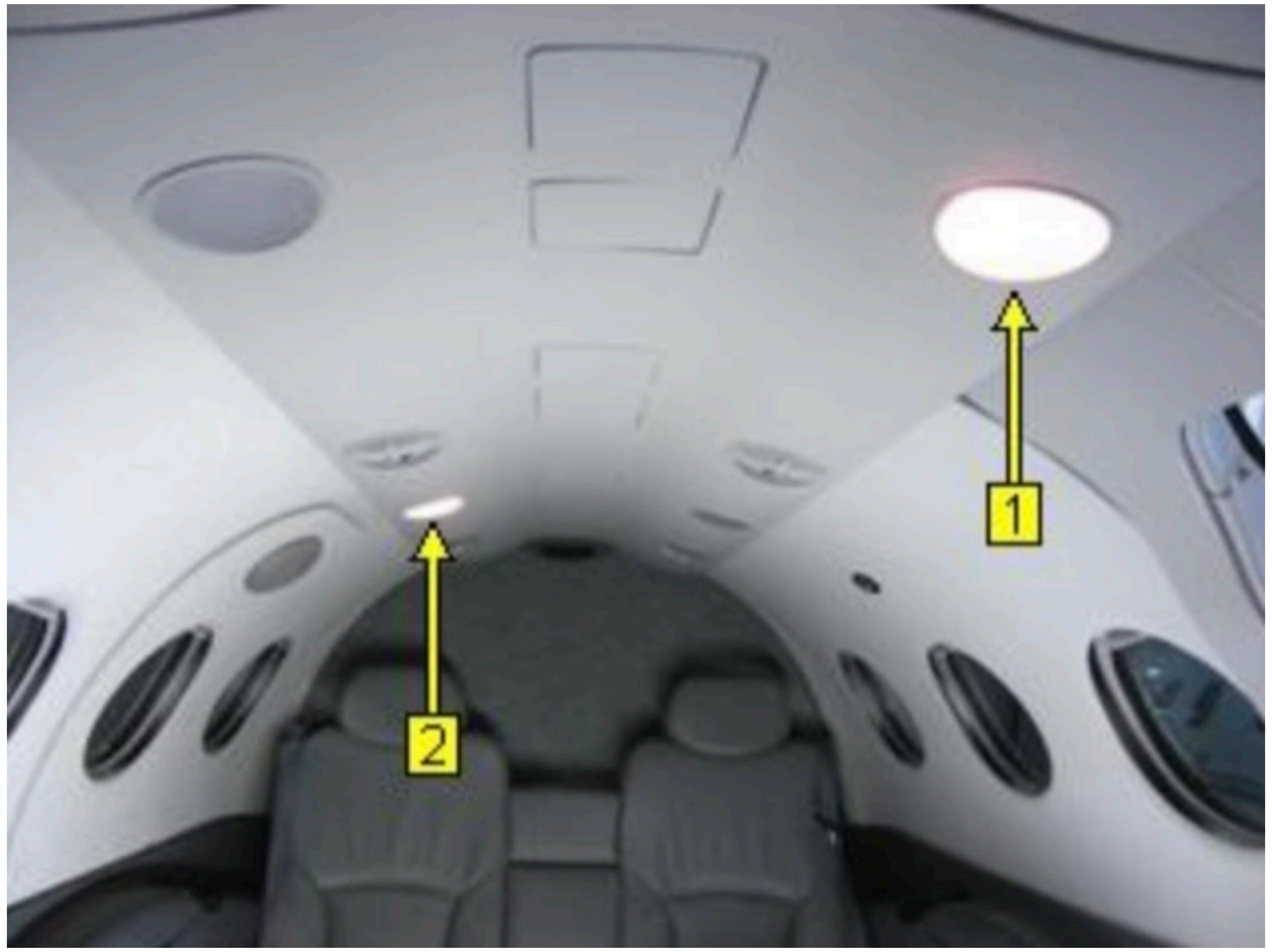
- Switch lights
- Oxygen gauge lighting
- Magnetic compass light
- Landing gear position lights
- Three standby instruments
- Audio panels and display bezels

A DISPLAYS dimmer knob controls the dimming of the Garmin avionics and is located on the LIGHTING panel.

By rotating the DISPLAYS dimmer knob clockwise, the intensity of the Garmin displays increases. Rotating the knob counterclockwise dims the displays; while rotating the knob fully counterclockwise (to the DAY position) causes the intensity to be set automatically in response to photocell sensors.

PASSENGER SAFETY LIGHT SYSTEM

- The passenger safety lights are located above the entry door (**1**) over the emergency exit (**2**). with the PAX SAFETY light switch, located on the light switch grouping below the multifunction display (MFD). These two lights can also be activated by exceeding the 5-G switch.



EXECUTIVE
FLIGHT TRAINING

EXTERIOR LIGHTING

LANDING/RECOGNITION/TAXI LIGHTS
This aircraft comes with two lamps that illuminate for landing and taxi purposes. These landing lights consist of two 50-watt sealed high intensity discharge (HID) lamps in the belly fairing, forward of the forward wing spar. The lamps are protected behind tempered glass covers. They are positioned so the flight compartment is shielded from glare.

A LANDING–RECOG TAXI switch located on the LIGHTING panel controls the landing lights. The LANDING position is able to provide the brightest illumination for landing. The RECOG TAXI position dims the lights to a lower intensity.

Master Warning System

MASTER WARNING SYSTEM

The master warning system provides a warning of aircraft system malfunctions or indications of unsafe operating conditions that require immediate attention.

CAS MESSAGE TYPES

Red (Warning) Message

The red CAS message indicates a warning of a hazardous situation that requires immediate pilot corrective action. When a message displays, it flashes the MASTER WARNING light. Pressing the MASTER WARNING light acknowledges the message, extinguishes the MASTER WARNING light, as well as changes the CAS message to a steady ON state. The red CAS messages are displayed until the situation is corrected. All red CAS messages are grouped together and located at the top of the CAS display window. Any new red CAS message will be displayed at the top of the red CAS group.

Amber (Caution) Messages

Amber indicates a caution that requires eventual pilot corrective. When an amber CAS message appears, it flashes in conjunction with the illumination of the MASTER CAUTION lights. Pressing the MASTER CAUTION light acknowledges the message, turns off the MASTER CAUTION lights, and changes the CAS message to a steady ON state.

MASTER INDICATOR LIGHTS

Master indicator lights illuminate to direct attention to new CAS messages. A MASTER WARNING and MASTER CAUTION light is located on the instrument panel above each PFD. Each master indicator light has an integral momentary-contact pushbutton switch. Pressing the light will reset the light and acknowledge the CAS message.

EXECUTIVE
FLIGHT TRAINING

ROTARY TEST KNOB

Positioning the knob to ANNU will cause the MASTER CAUTION lights, MASTER WARNING lights, and other lights to illuminate.

During the rotary test, audio warnings are also tested and some other associated system indications appear.

POSITION	INDICATIONS	ILLUSTRATIONS
FIRE WARN	• Red L ENGINE FIRE and R ENGINE FIRE lights illuminate. • MASTER WARNING lights illuminate.	
LANDING GEAR	• Three green gear downlock lights illuminate. • Red gear UNLOCK light illuminates. • Gear warning horn sounds. Alternates between pilot and copilot speakers.	
CABIN ALT	• Red CABIN ALT message appears. • Amber CABIN ALT message appears. • MASTER WARNING/CAUTION lights illuminate.	
STALL	• Amber STALL WARN FAIL message appears. • Stall warning tone sounds and alternates between pilot and copilot speakers. • Amber STALL WARN HTR message appears. • White STALL WARN HI message appears. • MASTER CAUTION lights illuminate.	
FLAPS	• The flap indicator on the MFD is replaced with a red X for 3 seconds. • Amber FLAPS FAIL message appears. • Amber STALL WARN FAIL message appears for 3 seconds. • MASTER CAUTION lights illuminate.	

OVERSPEED	• The overspeed warning tone sounds and alternates between pilot and copilot speakers.	
ANTI SKID	• Amber ANTISKID FAIL message appears for 6 seconds. • White NO TIRE SPINDOWN message appears for 6 seconds. • MASTER CAUTION lights illuminate.	
ANNU	• MASTER CAUTION illuminates and cannot be cancelled. • MASTER WARNING illuminates and cannot be cancelled. • Autopilot mode control panel indicators illuminate. • Audio panel indicators illuminate. • Red DUMP illuminates on Cabin Dump switch. • Test audio tone sounds. • Amber STANDBY BATTERY DISCHARGE light illuminates (near STBY INT switch) (aircraft configuration AF).	

CAS MESSAGE INHIBITS

CAS messages can be inhibited from displaying during certain phases of aircraft operation. These messages will be inhibited regardless of whether the CAS message would otherwise be valid or not. Not displaying these messages reduce pilot workload or prevents invalid indications during certain phases of aircraft operation. Different CAS messages are inhibited during the six phases of aircraft operation.

There are six phases of aircraft operations that inhibit various CAS messages:

- ✓ Engine start inhibit (ESI)
- ✓ Takeoff operational phase inhibit (TOPI)
- ✓ On ground/in flight (GROUND/AIR)
- ✓ Landing operational phase inhibit (LOPI)
- ✓ Engine shutdown inhibit (ESDI)
- ✓ Emergency power mode (EMER)

EXECUTIVE
FLIGHT TRAINING

Table 4-3. RED CAS MESSAGES

MESSAGE	DESCRIPTION	INHIBITS						
		ESI	TOPI	AIR	LOPI	ESDI	EMER	GND
BATTERY O'TEMP	If the temperature reaches 71°C (160°F), a red BATTERY O'TEMP message displays (NiCad only).							
CABIN ALT	Normal mode—Red above 10,000 feet cabin altitude. High altitude mode—Red above 15,000 feet cabin altitude.		✓		✓			✓
GEN OFF L-R	Dual generator failure.							
OIL PRESS LO L-R*	Indicates oil pressure is below the minimum acceptable pressure (lower red line limit on the oil pressure display). Indicates engine failure has occurred or may soon occur.	✓				✓	✓	
TAIL CONE BLD LK	Indicates tail cone temperature is higher than normal and may indicate a possible leak of bleed air into the tail cone.		✓		✓		✓	

*Only affected side displayed (L, R, or L-R) in a CAS message; applicable CAS messages listed here display L-R for example.

Table 4-4. AMBER CAS MESSAGES

MESSAGE	DESCRIPTION	INHIBITS						
		ESI	TOPI	AIR	LOPI	ESDI	EMER	GND
AFT DOOR	Tail cone baggage door is not fully secured.						✓	
AFT JBOX CB L-R*	Indicates the left or right start circuit breaker on the aft J-box has popped. Cannot be reset from the cockpit, maintenance is required.						✓	
AFT JBOX LMT L-R*	Indicates failure of a 200-amp current limiter.						✓	
ANTISKID FAIL	Indicates a fault in the antiskid system. Deactivate the system. Leaving the antiskid system on can result in unpredictable braking system performance.						✓	
BATTERY O'TEMP	Warns the pilot of abnormally high battery temperatures of 63–70°C (145–156°F) (NiCad only).							
BATT TEMP FAIL	Indicates the battery temperature sensor has failed (NiCad only).		✓		✓			

*Only affected side displayed (L, R, or L-R) in a CAS message; applicable CAS messages listed here display L-R for example.

MESSAGE	DESCRIPTION	INHIBITS						
		ESI	TOPI	AIR	LOPI	ESDI	EMER	GND
CABIN ALT	High-altitude mode only—In flight, the amber CABIN ALT Messages appears when the cabin altitude has been between approximately 10,000 and 15,000 feet for 30 minutes.		✓		✓			✓
CABIN DOOR	Indicates the cabin door is not fully secured.						✓	
CHECK DOORS	Indicates a door monitor has not been properly tested or or has failed.		✓	✓	✓		✓	
DUCT O'HEAT L-R*	Appears if either the cabin or cockpit air supply duct temperature exceeds approximately 300°F (149°C). Crew action is required. Message disappears if the temperature falls below approximately 285°F (141°C).				✓		✓	
ENG A/I COLD L-R*	Indicates that engine inlet temperature is below safe level for satisfactory ice protection.					✓	✓	
ENG CTRL SYS L-R*	Indicates that an input to the FADEC has failed, exceeded tolerances, or a FADEC channel is inoperative. Maintenance will be required prior to next flight ulnless the fault can be cleared using the FADEC RESET switch. If you can clear/reset it, no maintenance is required.							

F/W SHUTOFF L-R*	Indicates that the firewall shutoff valve is fully closed.						✓	
FLAPS FAIL	Indicates flap system failure has occurred. Message may or may not coincide with loss of all flap indication, which results in removal of the analog flap signal and a red X on the EICAS flap display.						✓	
FUEL BOOST L-R*	Indicates left and/or right low fuel pressure is detected and the boost pumps automatically turn on.						✓	
FUEL FLTR BP L-R*	Indicates fuel filter bypass is impending, or is occurring. Contamination of the engine (and possible engine damage or engine failure) is imminent or is occurring.						✓	
FUEL LVL LO L-R*	Indicates that fuel level in either tank is low—less than approximately 170 pounds/25 gal (77 kg/96 liters) in the indicated wing tank.						✓	
FUEL PRES LO L-R*	Indicates fuel pressure is abnormally low. This may indicate impending engine failure or flameout.					✓	✓	
GEN OFF L-R*	Indicates a single generator is off line.							

MESSAGE	DESCRIPTION	INHIBITS						
		ESI	TOPI	AIR	LOPI	ESDI	EMER	GND
HYD PRESS LO	Indicates low hydraulic system pressure (below 750 psi). This message also indicates the need to prepare for emergency braking and possible auxiliary extension of landing gear. This message has a 15-second delay before turning on. On the ground, MASTER CAUTION lights are not cancelable.		✓				✓	
HYD PUMP ON	Indicates the hydraulic pump has been energized too long (continuously for over 60 seconds).				✓		✓	
NOSE DOOR L-R*	One or both of the nose baggage doors are not fully secured.						✓	
OXYGEN OFF	Appears when the oxygen system pressure-sensor switch detects low pressure.		✓		✓		✓	
P/S HTR L-R*	Indicates no current is detected to the pitot-static heater.						✓	
PRESS CTRL	Indicates failure of the pressurization controller or that the pilot has selected the PRES CONT switch to STANDBY, disabling the pressurization controller.		✓		✓		✓	

STALL WARN FAIL	Indicates a failure is detected in the stall warning system.	✓	✓		✓		✓	
STALL WARN HTR	Indicates no power is being delivered to the stall warning vane heater.	✓					✓	
T2 HTR FAIL L-R*	Indicates failure of the anti-ice heating system for the T2 probe in the engine inlet. If the aircraft is in icing conditions, this failure may cause improper FADEC operation and/or engine failure. Also indicates an increased risk of ice ingestion into the engine because ice may form on the T2 probe, then break off and enter the engine.		✓		✓		✓	
TAIL DE-ICE FAIL	Indicates the tail deice system is not operating normally.						✓	
W/S A/I FAIL L-R*	Indicates the windshield heater has failed.						✓	
W/S O'HEAT L-R*	Indicates the windshield temperature is too high.						✓	
WING DE-ICE FAIL	Indicates the wing deice system is not operating normally.						✓	
WOW MISCOMPARE	Indicates the left and right squat switches have different WOW signal indications for longer than 2 seconds. Any aircraft systems relying on WOW signals may be inoperative or operate incorrectly.		✓		✓		✓	

WHITE CAS MESSAGES

MESSAGE	DESCRIPTION	INHIBITS						
		ESI	TOPI	AIR	LOPI	ESDI	EMER	GND
CABIN ALT	High-altitude mode only—In flight, the white CABIN ALT message appears any time the cabin altitude is between 10,000 and 15,000 feet for less than 30 minutes.		✓		✓			✓
ENG A/I COLD L-R	Indicates that the engine inlet temperature is below safe level for satisfactory ice protection. This message will post in white for up to two minutes after engine anti-ice is turned on while the inlet warms up to the normal operating temperature.					✓	✓	
FUEL BOOST L-R*	Appears when the pilot commands the fuel boost pump on (by selecting the FUEL TRANSFER knob to L TANK or R TANK, or by selecting a FUEL BOOST L-R switch to ON, or during an engine start.						✓	
FUEL LO INOP L-R*	Indicates the amber FUEL LVL LO L-R message is not operational and cannot provide reliable indication of fuel level.		✓		✓			
FUEL TRANSFER	Indicates the fuel transfer valve is open.						✓	
NO TIRE SPINDOWN	Indicates the antiskid control spindown function is not working				✓		✓	

PRESS CTRL	Indicates failure of the ARINC 429 data link from the G1000 system, indicating that the controller may no longer have valid data on outside air pressure, actual aircraft altitude, or destination elevation.		✓		✓		✓	
PRESS OFF	Appears when the crew selects the AIR SOURCE SELECT knob to either OFF or FRESH AIR. This alerts the crew there is no bleed-air inflow to pressurize the cockpit or cabin. All pressurization leaks out of the pressure vessel, which causes it to depressurize.				✓		✓	
SPD BRK EXTEND	Indicates the speedbrakes are extended on either side.						✓	
STALL WARN HI	Indicates the stall warning system is operating on the ice-contaminated schedule.	✓					✓	
SURFACE DE-ICE	AUTO mode—Indicates when all pressure switches for the inflation sequence (lower wing/left tail or upper wing/right and vertical tail) are indicating deice boot inflation. The pilot must verify the appearance of the white SURFACE DE-ICE message following activation of the surface deice system to protect against failures of the WING/STAB switch. MANUAL mode—Displays if all pressure switches indicate deice boot inflation.						✓	

MESSAGE	DESCRIPTION	INHIBITS						
		ESI	TOPI	AIR	LOPI	ESDI	EMER	GND
W/S A/I FAIL L-R*	Normal indication after windshield heat is turned on. Turns amber if condition exists for more than 5 seconds.						✓	
W/S O'HEAT L-R*	Normal indication after windshield heat is turned on. Turns amber if condition exists for more than 5 seconds.						✓	

Fuel System

FUEL SYSTEM

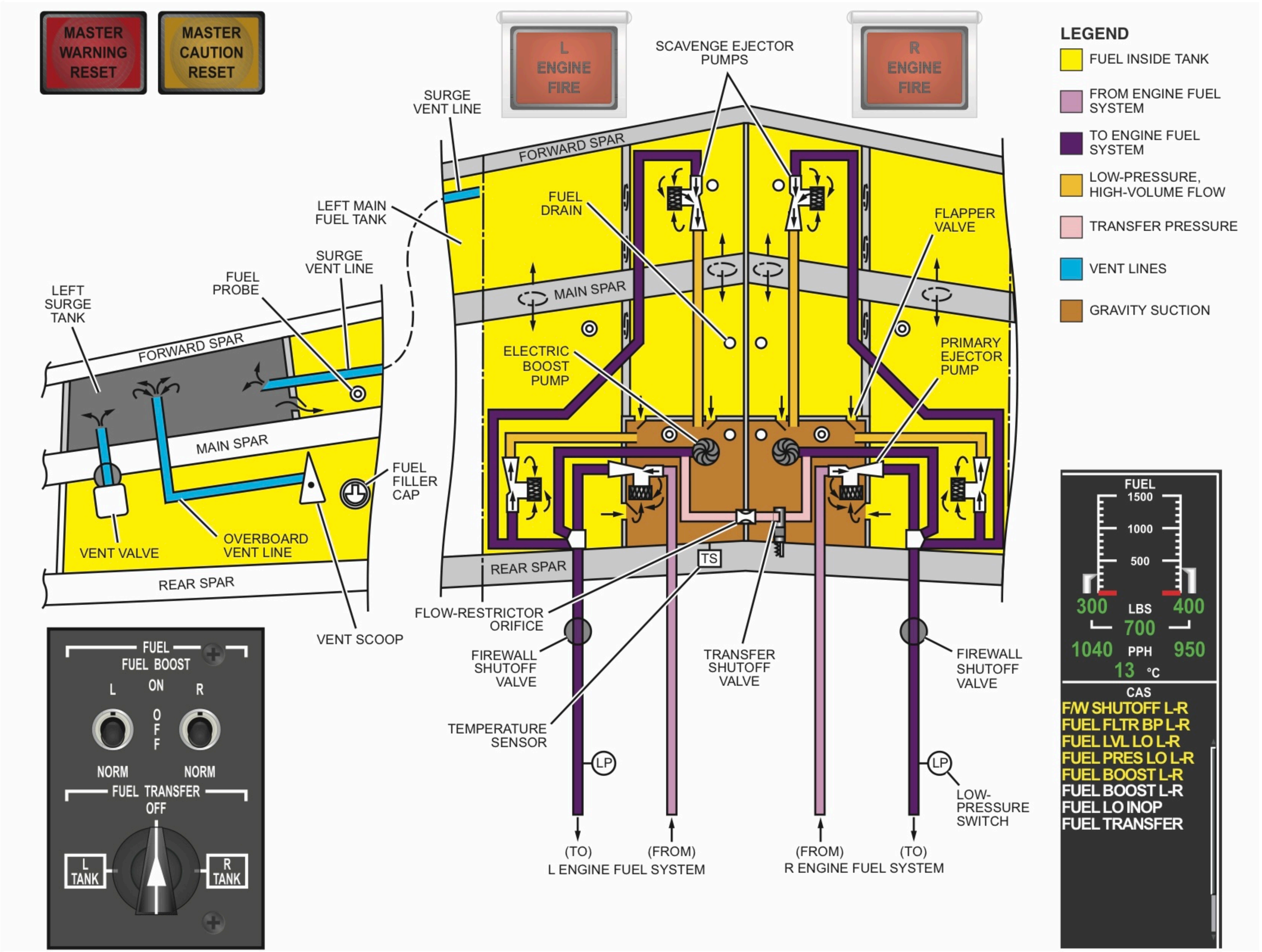
- Integral Fuel tanks in the left and right wing provide storage for fuel.
- The fuel distribution system provides fuel to each engine from the corresponding wing tank.
- The fuel transfer system allows fuel to be transferred from one tank to the other tank.
- The crew alerting system (CAS) messages alert pilot to fuel system emergency or abnormal situations.
- There are five fuel probes in each wing tank

FUEL STORAGE

Each wing tank contains:

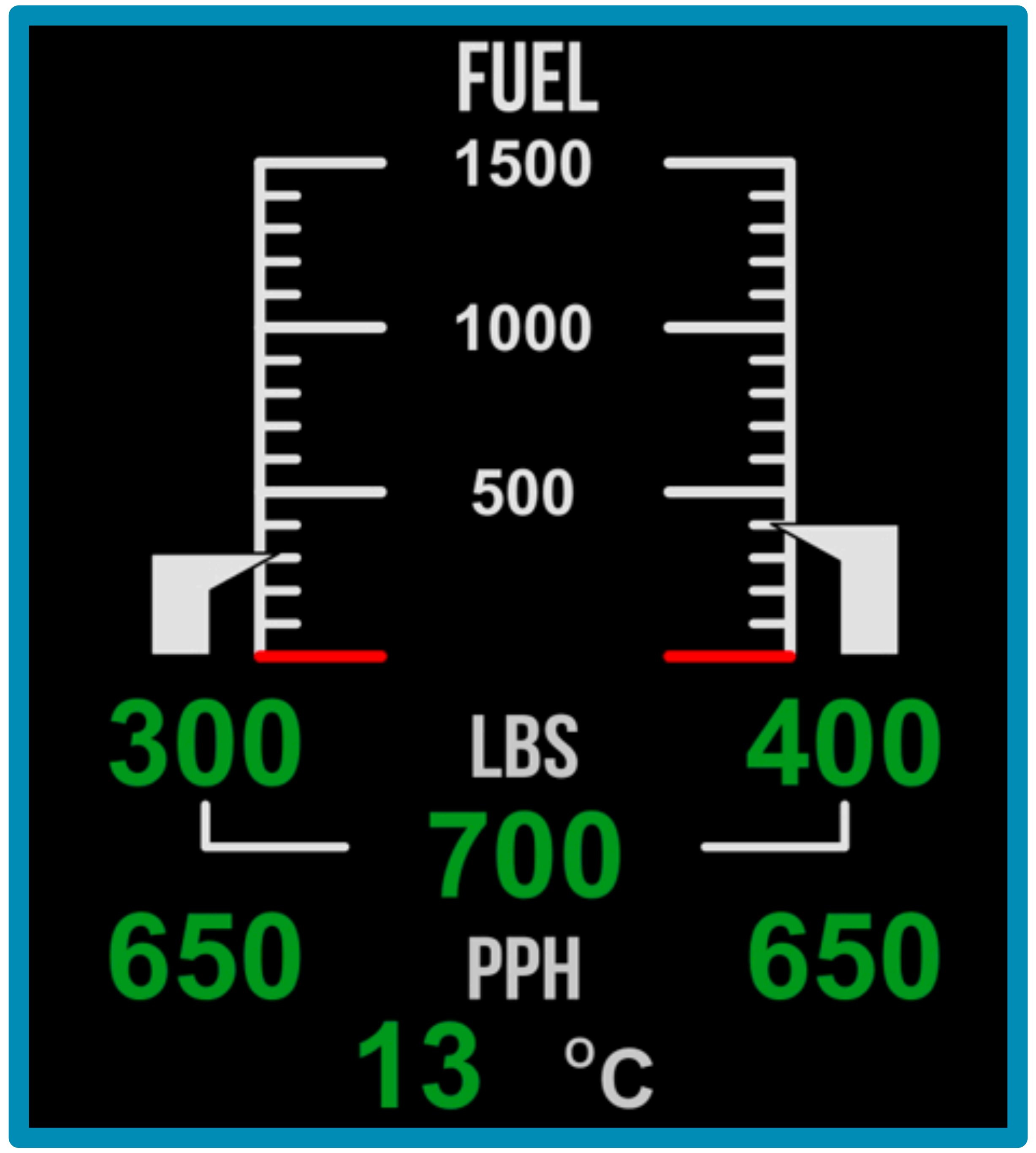
- ✓ Main tank cavity
- ✓ Engine feed bay
- ✓ Venting system
- ✓ Tank filler
- ✓ Sump drain valve
- ✓ Scavenge pumps
- ✓ Fuel probes Flapper valves

	STANDARD (U.S.)	
Total Capacity	**Weight**	**Volume**
Each Tank	1,290 pounds	192.5 gallons
Both Tank	2,580 pounds	385.0 gallons


MASTER WARNING RESET
MASTER CAUTION RESET
L ENGINE FIRE
R ENGINE FIRE
SCAVENGE EJECTOR PUMPS
LEGEND
FUEL INSIDE TANK
FROM ENGINE FUEL SYSTEM
TO ENGINE FUEL SYSTEM
LOW-PRESSURE, HIGH-VOLUME FLOW
TRANSFER PRESSURE
VENT LINES
GRAVITY SUCTION
SURGE VENT LINE
FORWARD SPAR
FUEL DRAIN
FLAPPER VALVE
LEFT MAIN FUEL TANK
SURGE VENT LINE
FUEL PROBE
LEFT SURGE TANK
MAIN SPAR
ELECTRIC BOOST PUMP
PRIMARY EJECTOR PUMP
FORWARD SPAR
MAIN SPAR
FUEL FILLER CAP
VENT VALVE
OVERBOARD VENT LINE
REAR SPAR
REAR SPAR
TS
FLOW-RESTRICTOR ORIFICE
VENT SCOOP
FIREWALL SHUTOFF VALVE
TRANSFER SHUTOFF VALVE
FIREWALL SHUTOFF VALVE
TEMPERATURE SENSOR
LP
LP
LOW-PRESSURE SWITCH
(TO)
(FROM)
L ENGINE FUEL SYSTEM
(FROM)
(TO)
R ENGINE FUEL SYSTEM
FUEL
FUEL BOOST
L
ON
R
OFF
NORM
NORM
FUEL TRANSFER
OFF
L TANK
R TANK
FUEL
1500
1000
500
300
LBS
400
700
1040
PPH
950
13 °C
CAS
F/W SHUTOFF L-R
FUEL FLTR BP L-R
FUEL LVL LO L-R
FUEL PRES LO L-R
FUEL BOOST L-R
FUEL BOOST L-R
FUEL LO INOP
FUEL TRANSFER

FUEL QUANTITY

- The fuel system has a capacitance probe quantity indication system.
- The system compensates for changes in fuel density caused by temperature changes.
- Each fuel tank has five fuel quantity probes and the total fuel quantity is displayed on EICAS.



EXECUTIVE
FLIGHT TRAINING

VENTING SYSTEM

The fuel vent source is the NACA scoop under the wings.

The surge tank regulates fuel movement and expansion.

If the surge tank becomes full, fuel will vent overboard through the NACA scoop.

FUEL SUMP VALVES

- **LOCATED**:
- Outboard of the landing gear.
- In the engine feed bay.
- Between feed bay and main spar.
- Between forward and main spars.

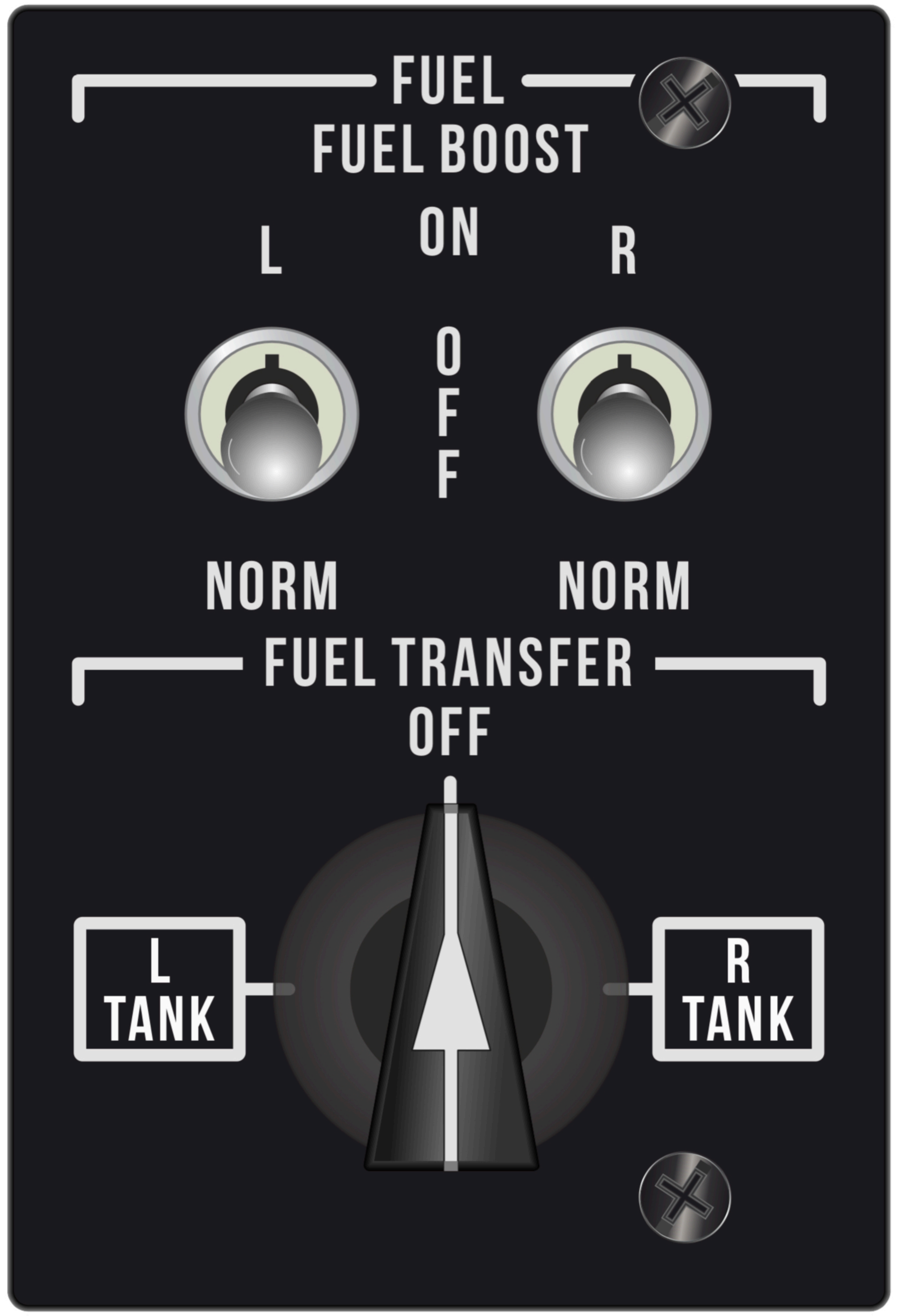
ENGINE FEED BAY

- The engine feed bay is the lowest point in the fuel system and is where the fuel is picked up for distribution to the engine.
- Each feed bay holds 8 gallons and has four vent openings ensuring the boost pump and primary ejector pumps remain submerged even under low fuel conditions.

ELECTRIC BOOST PUMPS

There is one 28 VDC boost pump in each engine feed bay.
The boost pumps energize automatically for:

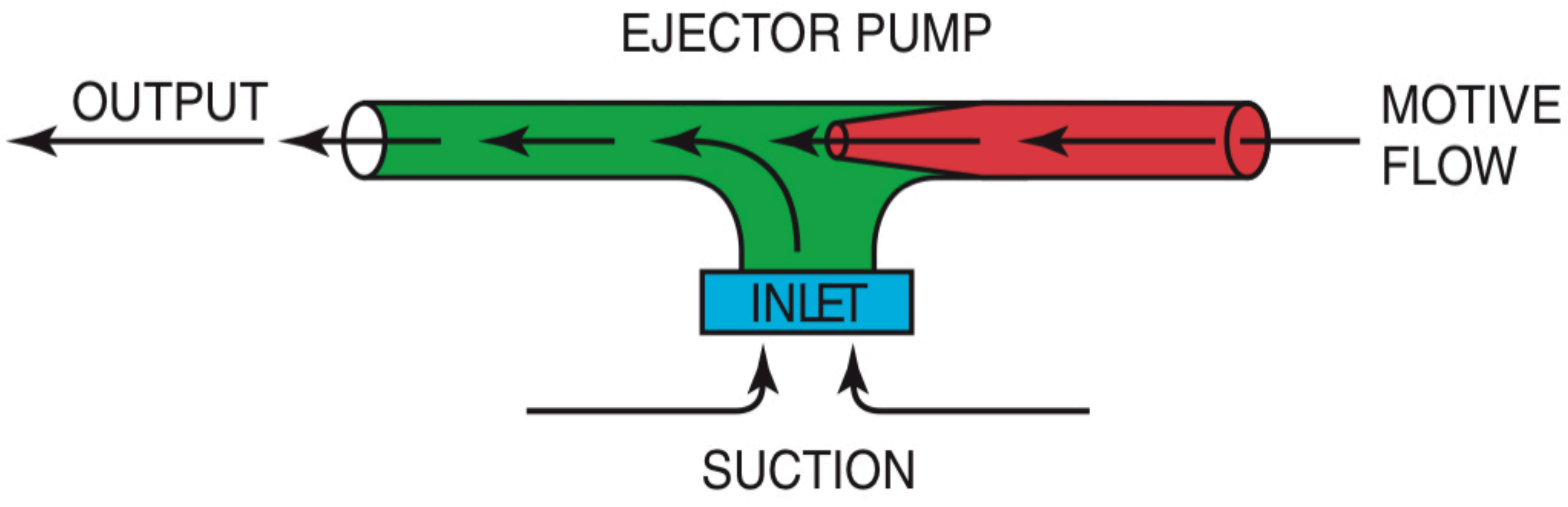
1. Engine starting
2. Low fuel pressure
3. During fuel transfer



EXECUTIVE
FLIGHT TRAINING

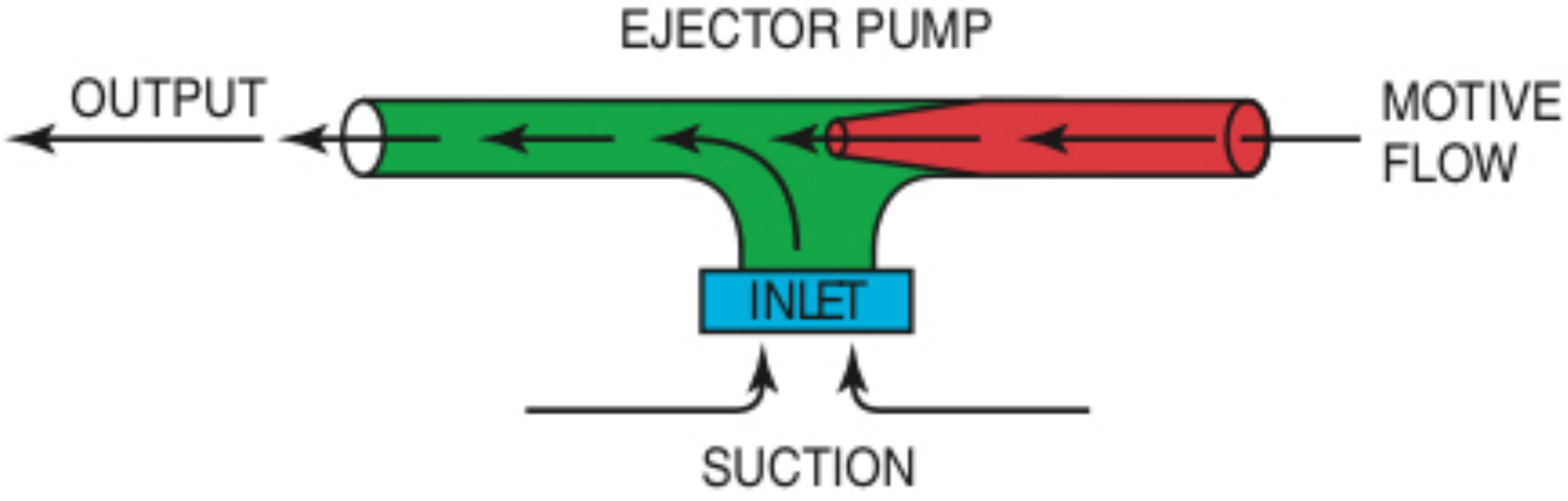
PRIMARY EJECTOR PUMPS

- The primary ejector pump is submerged in fuel in each feed bay.
- The pump utilizes a small jet of high pressure “motive flow” fuel from the respective engine. It has no moving parts.
- The motive flow passes through a venturi to create low-pressure in the ejector pump.
- This low-pressure allows ejector pump to suction feed a large amount of fuel from the feed bay and pump it to the engine.



SCAVENGE EJECTOR PUMPS

- Two scavenge ejector pumps are constantly transferring fuel from the forward and outboard areas of the fuel tank to the feed bay.
- These pumps ensure that the engine feed bay is constantly full.



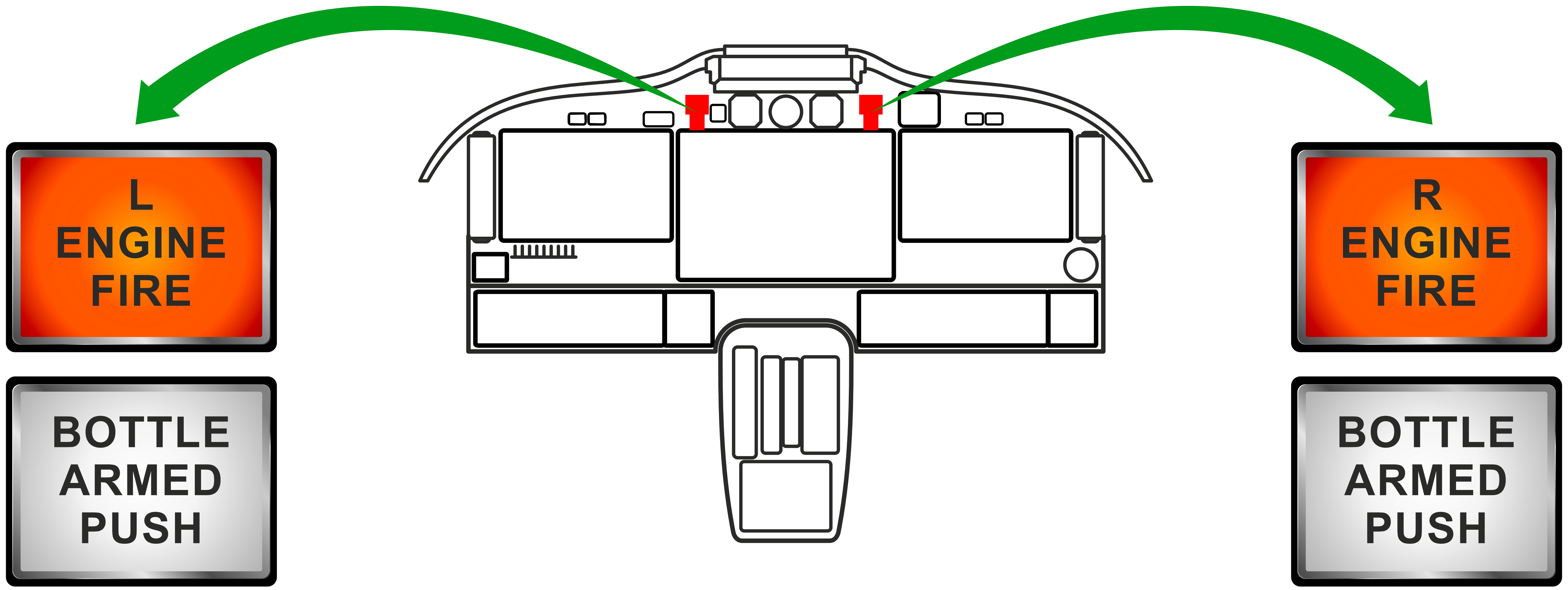
EXECUTIVE
FLIGHT TRAINING

FUEL TRANSFER VALVE

- ✓ The fuel transfer valve is located in the right engine feed bay.
- ✓ The valve requires normal DC power to open, and will fail to the closed position.
- ✓ Fuel transfer is not available with the loss of both generators and the BATT switch placed in the EMER position.

FIREWALL SHUTOFF VALVES

In the event of a fire, pushing the illuminated engine fire light switch will close the firewall fuel shut off valve stopping the fuel flow to that engine.



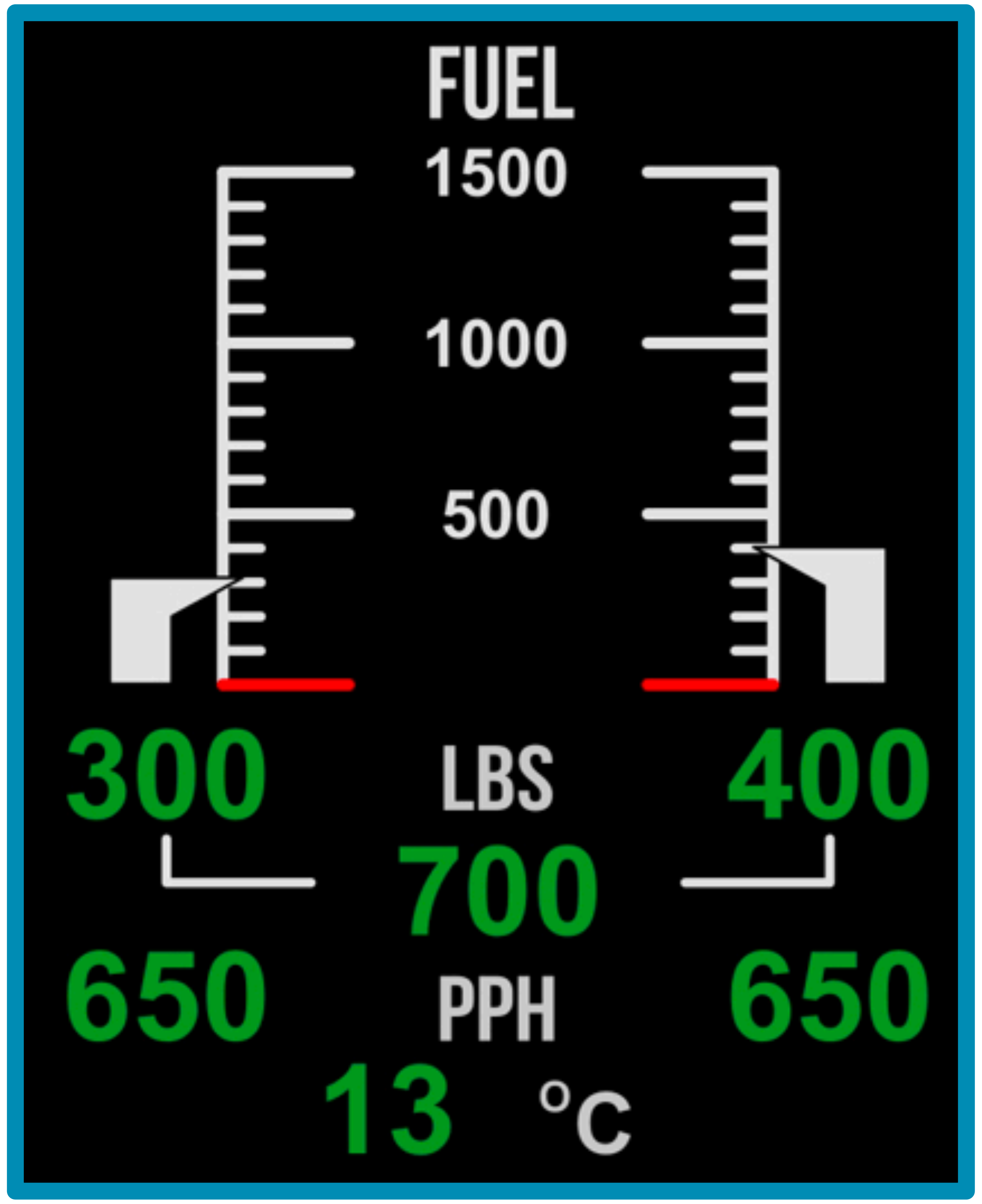
LOW FUEL PRESSURE SWITCHES

- The pressure switches are in engine fuel supply lines adjacent to each engine.
- The switch monitors fuel pressure between the engine feed bay and the high-pressure engine-driven fuel pump.
- They automatically activate the electric boost pumps if the boost pump switches are in the NORM position and the fuel pressure drops below 5-7 psi.

FUEL QUANTITY INDICATION

The fuel quantity is displayed on the G1000 “AUX” page and in the left EICAS column on the MFD.

- Quantity can be displayed in either pounds or kilograms.
- The fuel levels are displayed by a white pointer and by the green digits below the scale.
- Total aircraft fuel is displayed below the individual quantities in green digits.



FUEL FLOW INDICATION

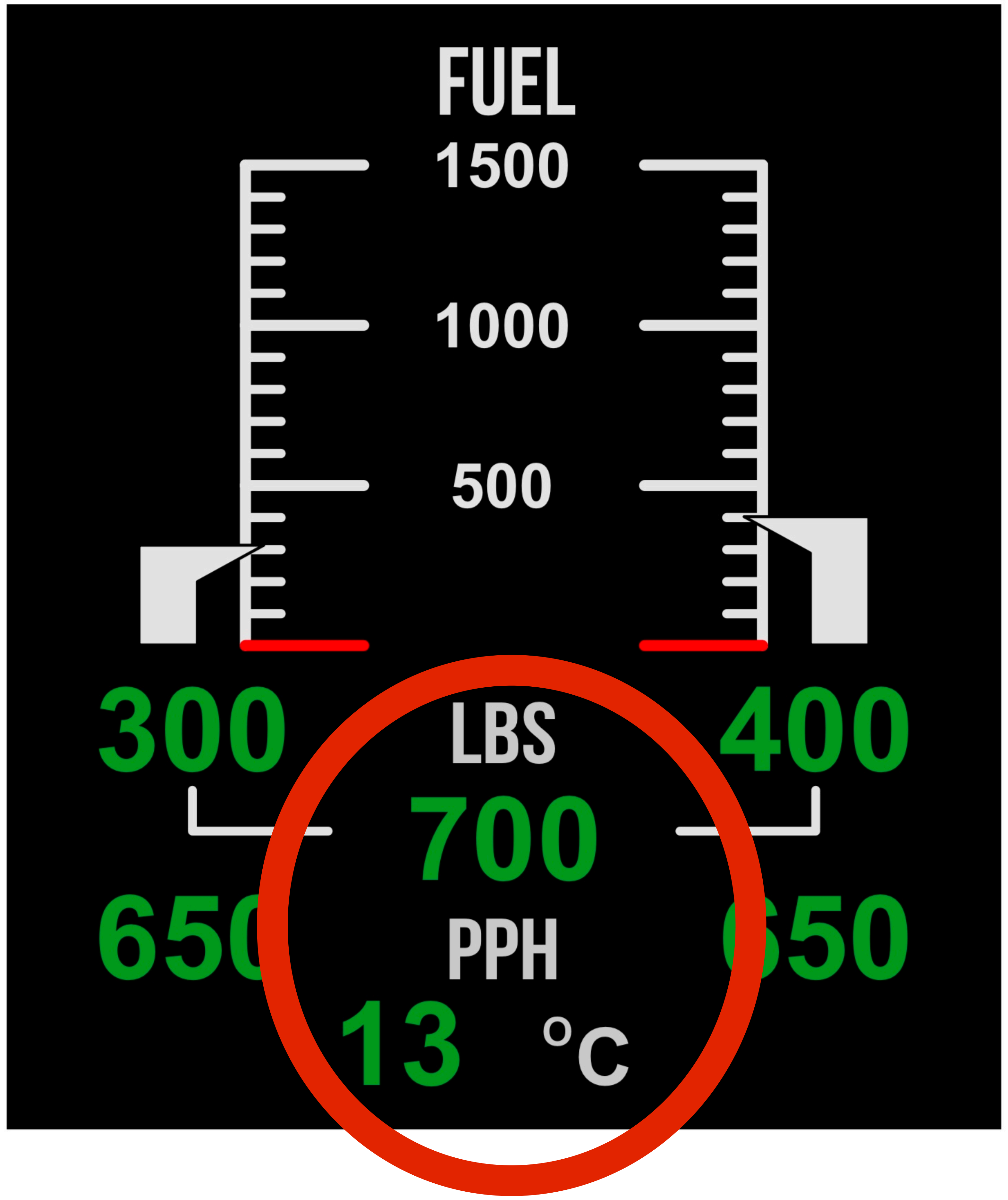
The fuel flow is displayed digitally below the total fuel display.

The fuel flow digits are green and displayed in pounds per hour (PPH).

Fuel Temperature Indication

The fuel temperature probe is located inside the left engine feed bay.

Fuel temperature appears at the bottom of the fuel display window as green digits in Celsius degrees,



EXECUTIVE
FLIGHT TRAINING

FUEL BOOST SWITCHES

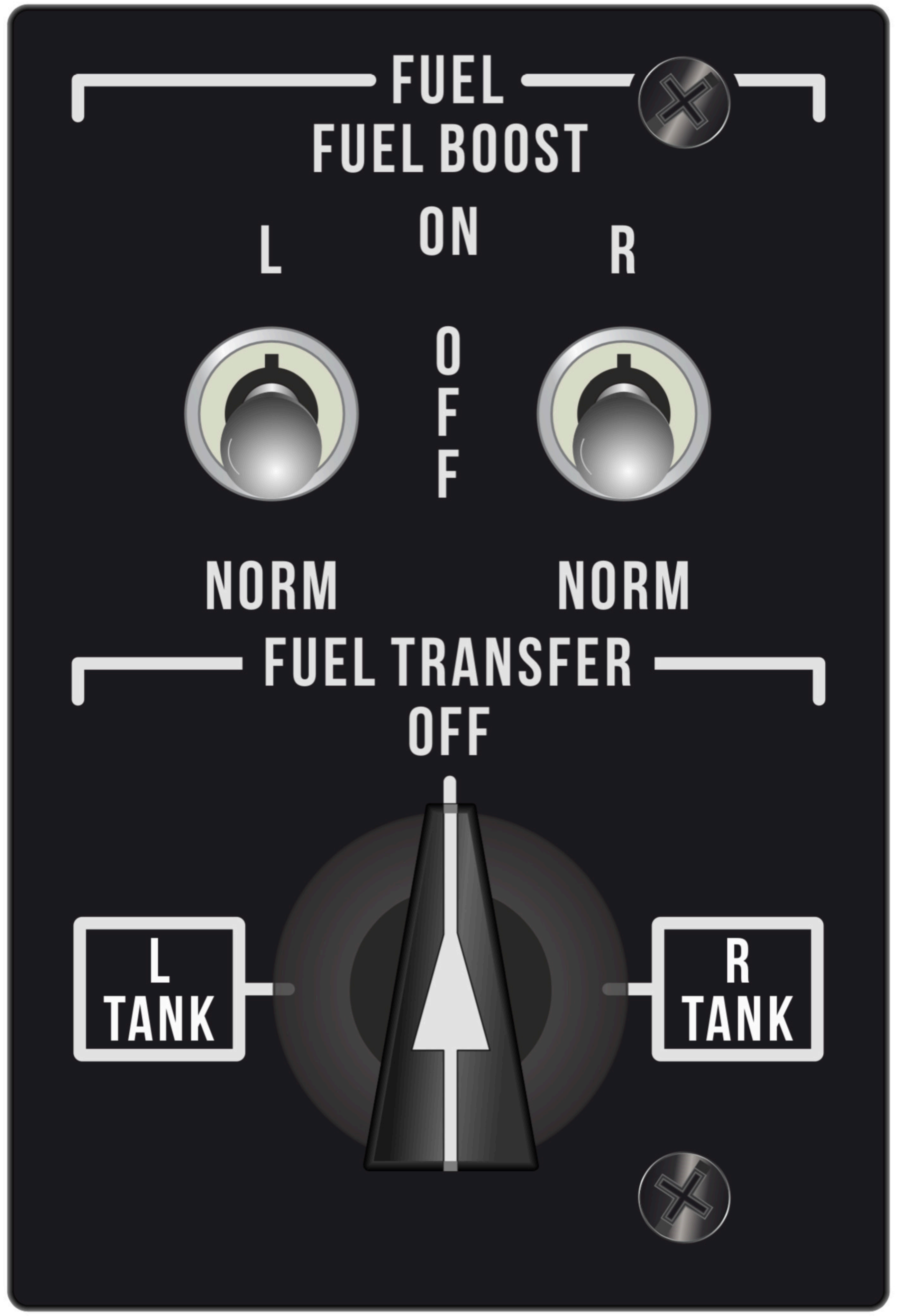
- The FUEL BOOST switches are located on the lower instrument tilt panel.
- In the NORM position, boost pump operation is automatically controlled or they can be commanded ON or OFF manually.

During normal operation, L and R FUEL BOOST pump switches are operated in the NORM position, which automatically operates:

- During engine start
- During fuel transfer operation
- When low fuel pressure is sensed

FUEL TRANSFER KNOB

- With the FUEL BOOST switches in NORM, the FUEL TRANSFER knob energizes the pumps ON or OFF.
- When the selector is placed in L TANK or R TANK, the fuel transfer valve opens and activates the fuel boost pump on the supply side.
- The fuel is transferred at approximately 10 ppm.
- The fuel transfer valve is not powered when the battery switch is in the EMER position.



EXECUTIVE
FLIGHT TRAINING

FUEL TRANSFER OPERATION

The arrow on FUEL TRANSFER selector knob points to the wing where transfer fuel is being directed.

EXAMPLE

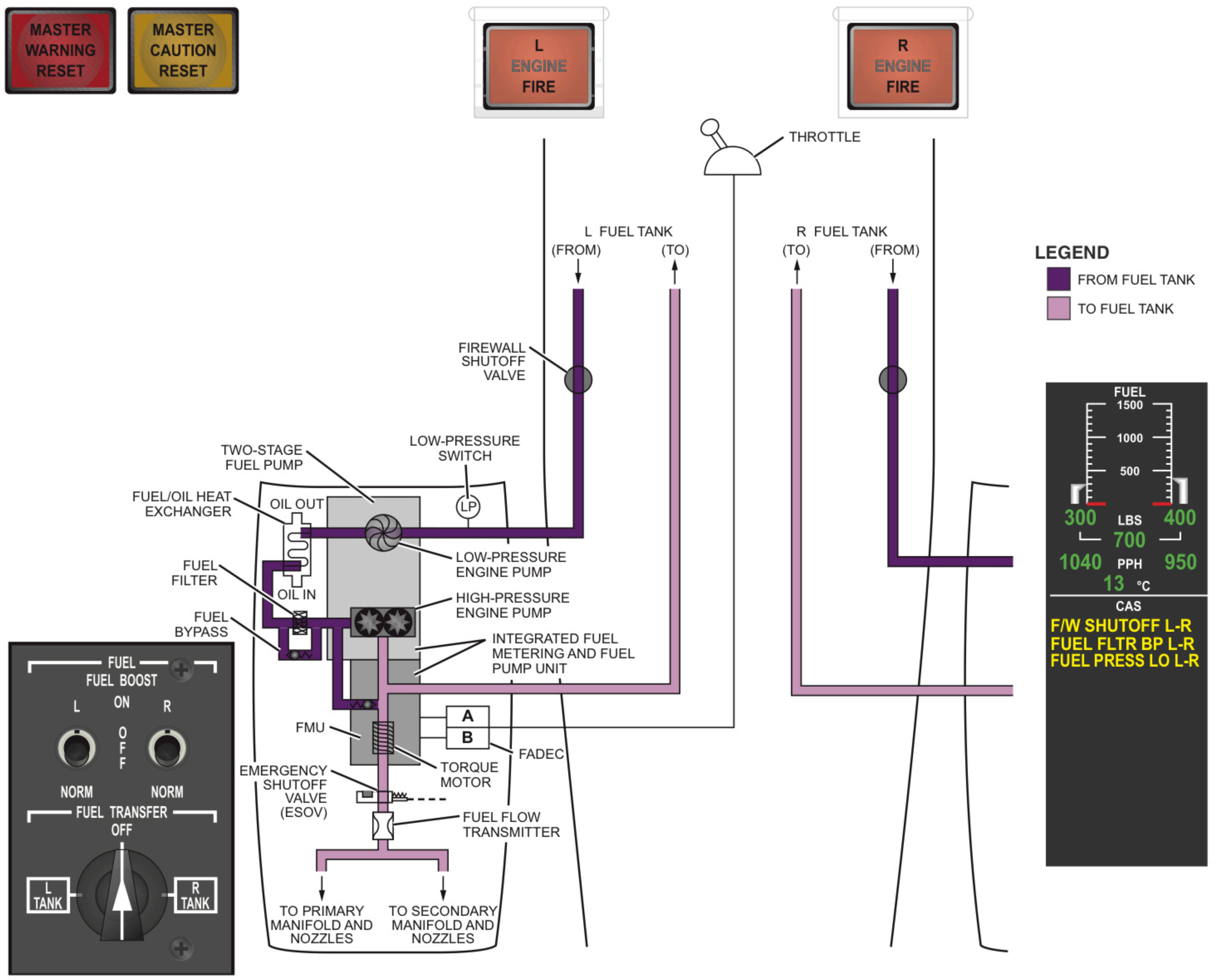
The rotating selector knob to R TANK

- Energizes left tank boost pump if BOOST switch is in NORM position
- Energizes transfer valve open
- Left tank boost pump supplies fuel from left tank to right tank

EXECUTIVE FLIGHT TRAINING

FUEL FLTR BP L-R

- If a fuel filter becomes clogged, the bypass valve will allow unfiltered fuel to enter the engine.
- Before the bypass valve is opened, a signal is sent to EICAS to indicate the impending bypass which displays an amber FUEL FLTR BP L-R message.



EXECUTIVE FLIGHT TRAINING

REFUELING

- Refuel to the bottom of the standpipe to achieves maximum range for flight planning.

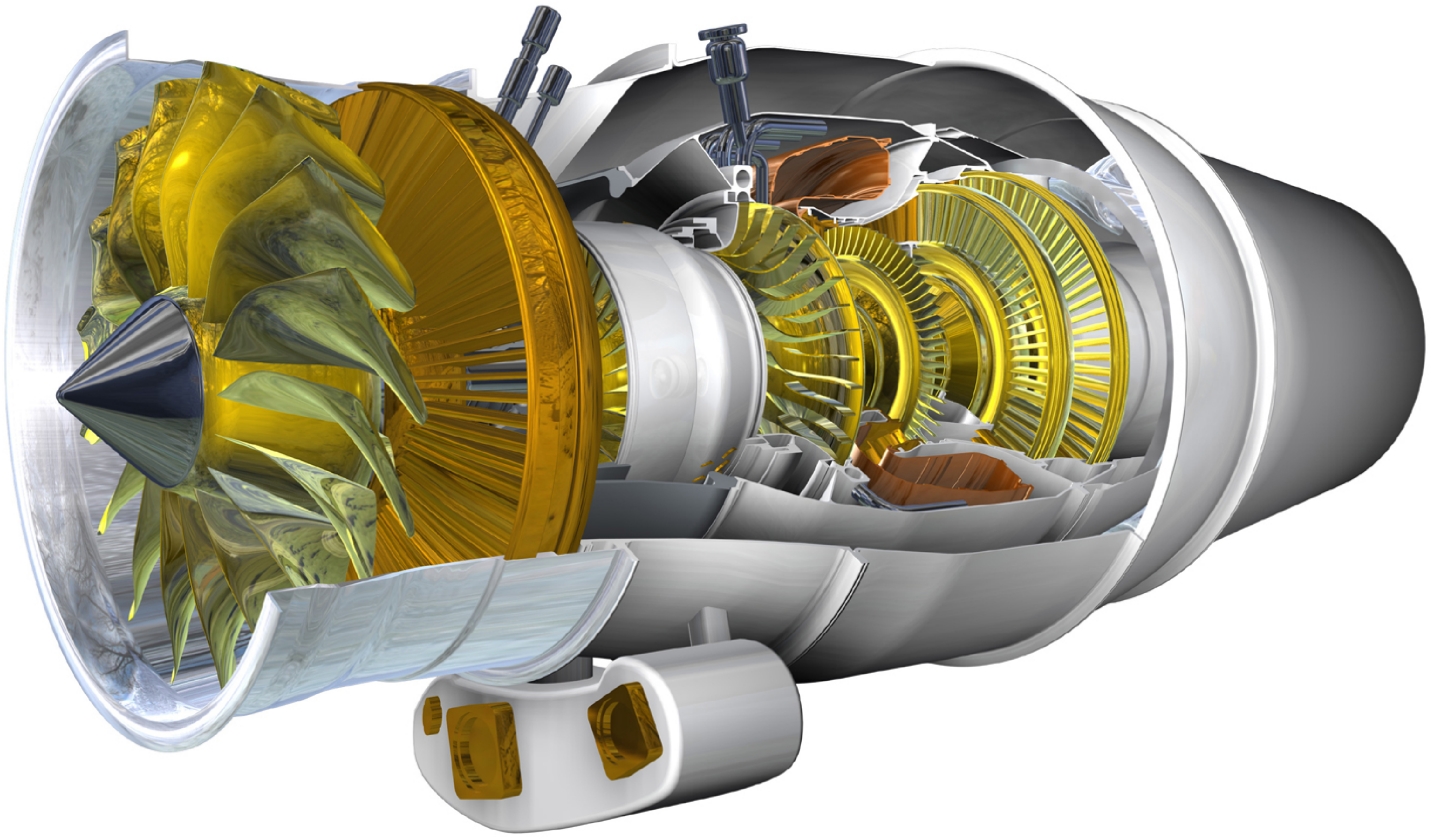
- If fuel tank is filled above the bottom of the standpipe, expansion, may result in fuel spillage through the fuel vent.

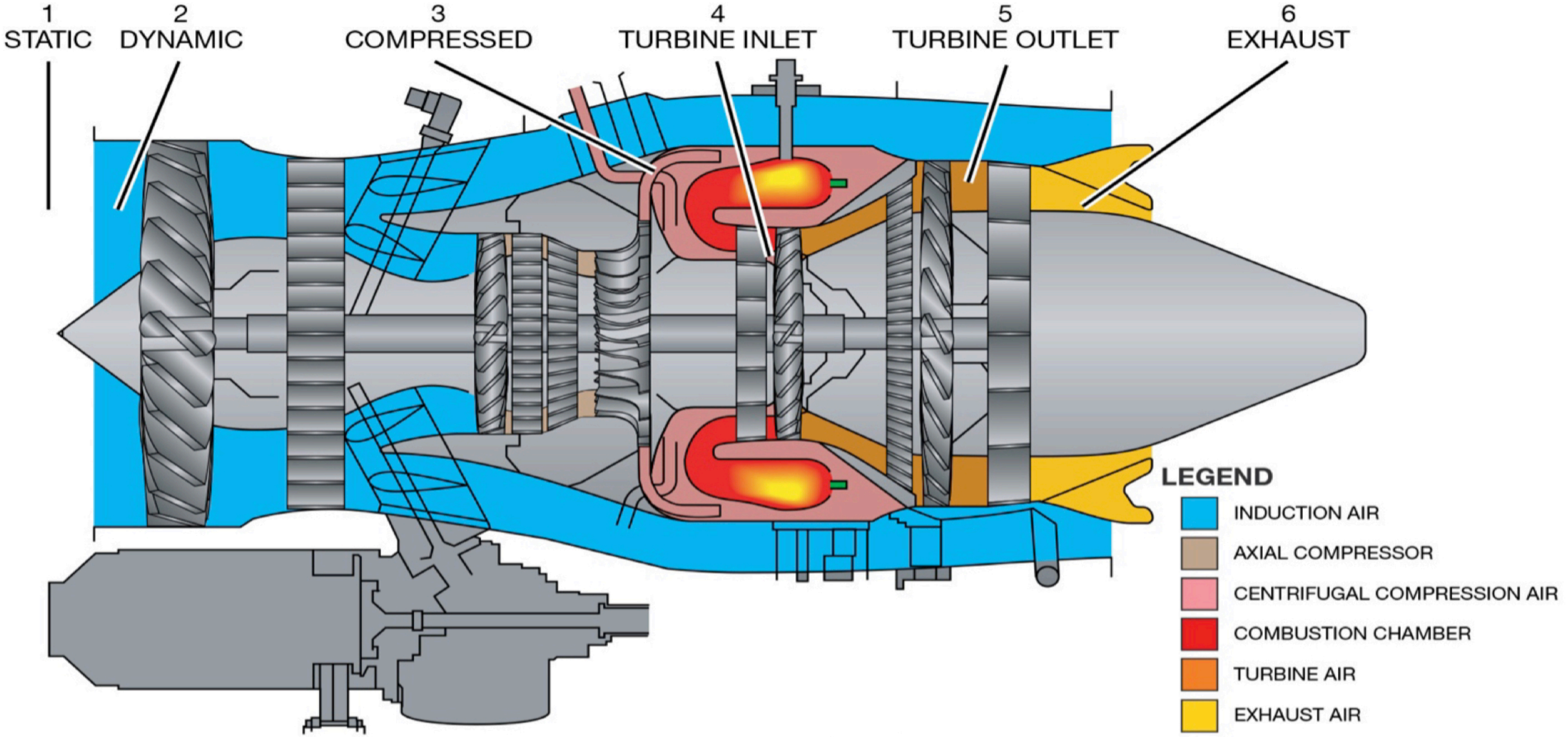
Powerplant

POWERPLANT

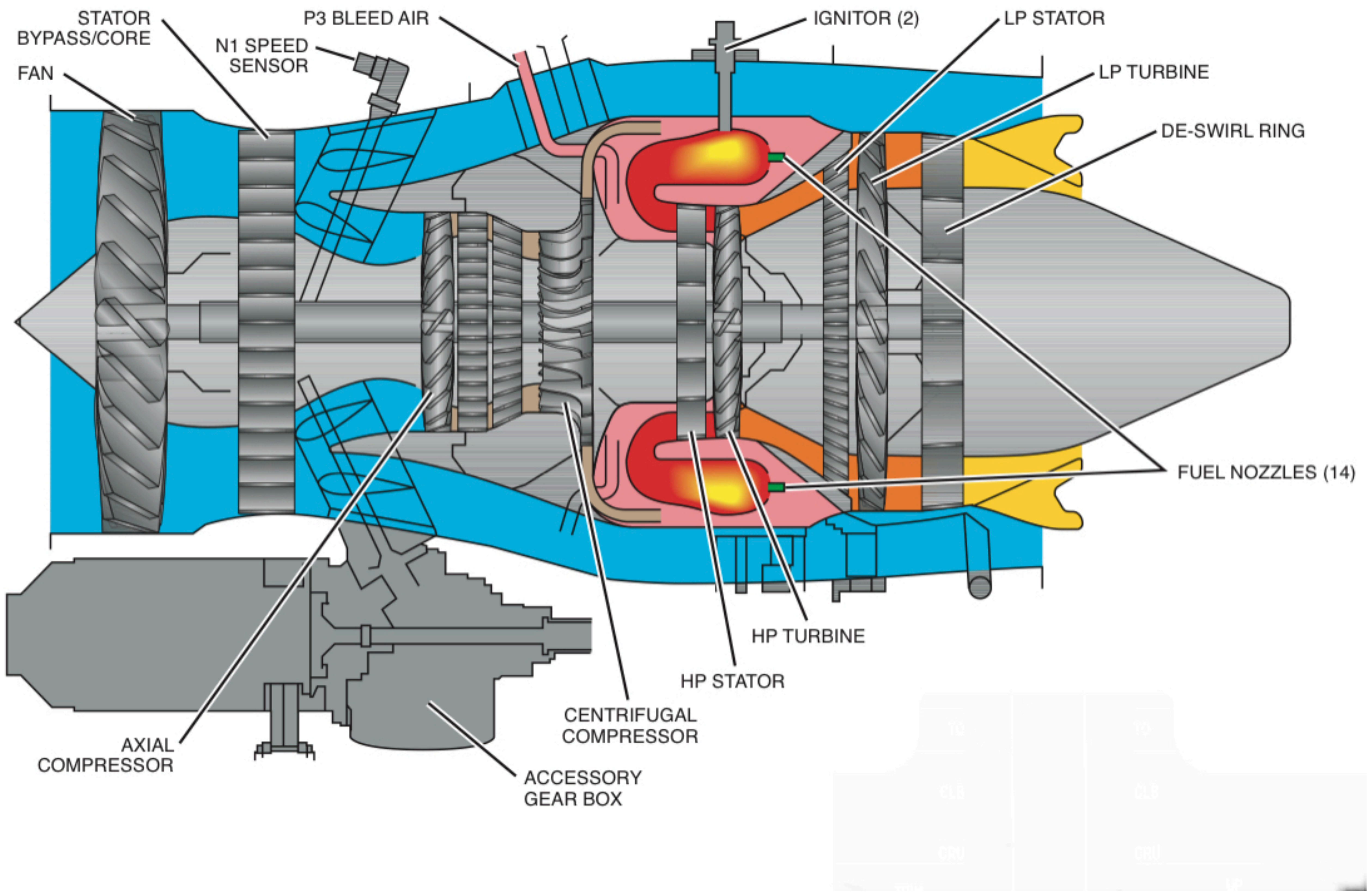
- Two Pratt & Whitney PW615F turbofan engines rated at 1,460 pounds of maximum continuous provide power. Each powerplant has a fuel metering unit (FMU), an accessory gear box, and ports to provide bleed air for the environmental control system (ECS) and ice-protection systems.

- A remotely located dual-channel full-authority digital engine control (FADEC) monitors and controls both engines. FADECs adjust engine settings in response to throttle settings, ambient air conditions, as well as engine conditions resulting in optimum engine performance. A dual-coil, permanent-magnet alternator (integral to the FMU) powers each engine FADEC when normal DC power is unavailable.




1
STATIC
2
DYNAMIC
3
COMPRESSED
4
TURBINE INLET
5
TURBINE OUTLET
6
EXHAUST
LEGEND
INDUCTION AIR
AXIAL COMPRESSOR
CENTRIFUGAL COMPRESSION AIR
COMBUSTION CHAMBER
TURBINE AIR
EXHAUST AIR

PW615F TURBOFAN ENGINES



The PW615F is a twin-spool, counter-rotating turbofan engine (the N1 spool and N2 spool rotate in opposite directions). It has a single-stage, low-pressure axial turbine that directly drives a single-stage, high-efficiency fan. A single-stage, high-pressure axial turbine drives a single-stage, mixed flow compressor and a single-stage centrifugal compressor.

INTAKE AND COMPRESSION

The spinning fan pulls ambient air into the engine inlet and sends it through the fan bypass duct for direct thrust. The fan then pushes air into the compressor section. The axial-flow and centrifugal flow compress the incoming air to a very high pressure and temperature.

Combustion

Air enters the combustion chamber where it is mixed with fuel and ignited. After engine start, the flame in the combustion chamber continues burning and creates hot, high-pressure exhaust gases, which expands rapidly and moves aft through the engine.

EXHAUST

- As the hot, high-pressure exhaust moves aft through the engine, it turns the high-pressure turbine. The high-pressure turbine is connected to the compressors through a short, hollow shaft. The high-pressure rotors (turbine, shaft, and compressors) are referred to as the “high-pressure (HP) spool.” Its rate of rotation is referred to as “N2 rpm” or simply “N2.” N2 rotation keeps the airflow entering the engine and maintains the intake/compression/combustion/exhaust cycle.

- A thermocouple harness at engine Station 6 measures exhaust stream temperature. This information is processed by the FADEC and converted to an equivalent interstage turbine temperature (ITT) for use by the pilot.

OIL SYSTEM

- Approved Oils
  - Check the list of engine oils in the “Limitations” section of the Airplane Flight Manual (AFM). Mixing approved oils is permissible if they are from the same brand but is not recommended except for emergencies. Refer to the AFM for specific procedures.
- NOTE
  - Maximum oil consumption is 1 U.S. quart every 13.5-hour period.

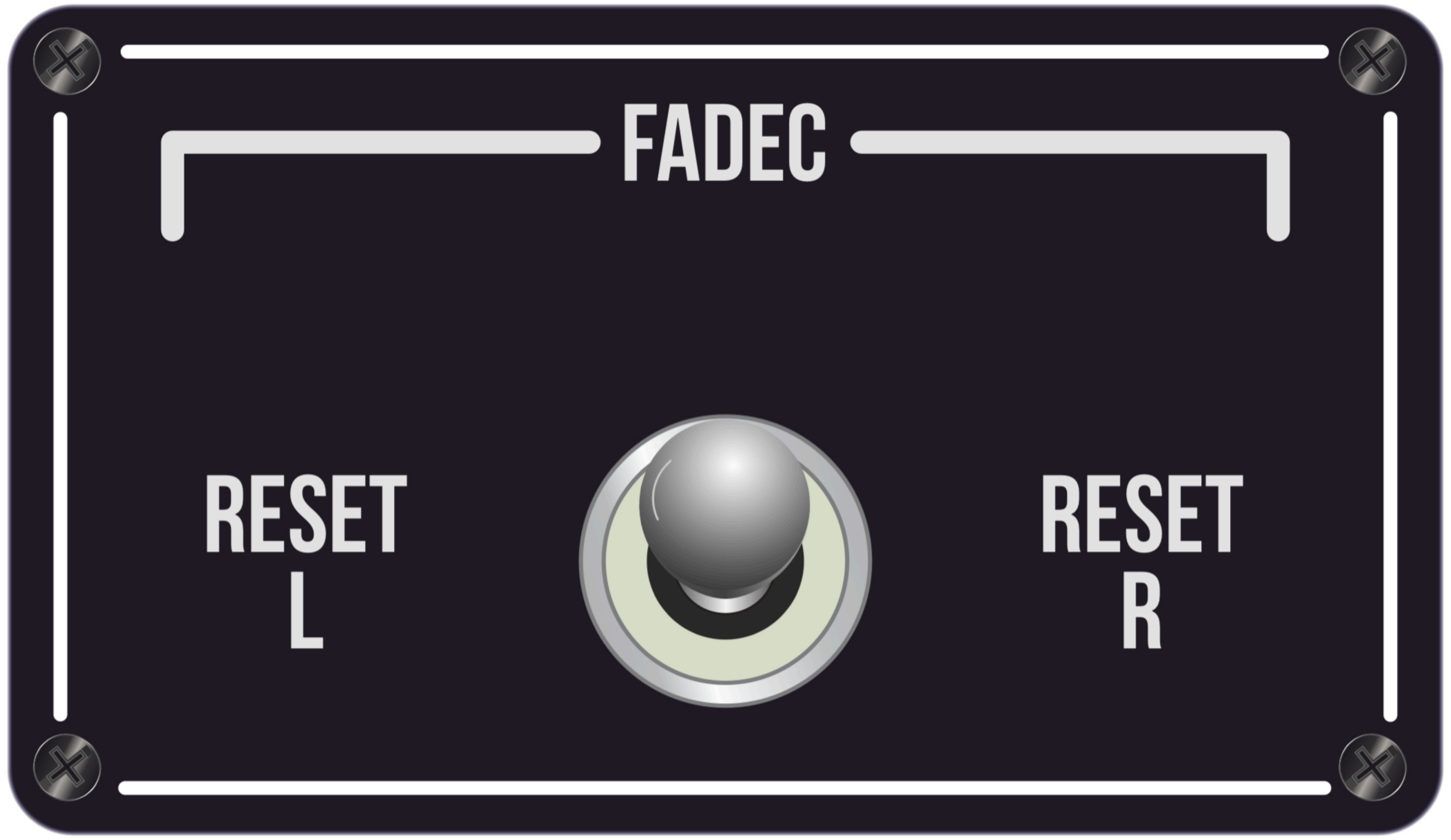
EXECUTIVE FLIGHT TRAINING

STARTER-GENERATORS

- ✓ On each engine, there is a 28-VDC starter-generator located on the front of engine accessory gearbox.
- ✓ To start the engines, the starter will use power from a ground power unit, the aircraft battery, or the opposite side generator.
- ✓ After the ENGINE START switches are pressed and the engine exceeds approximately 40% N_2, the starter-generator transitions to a generator.

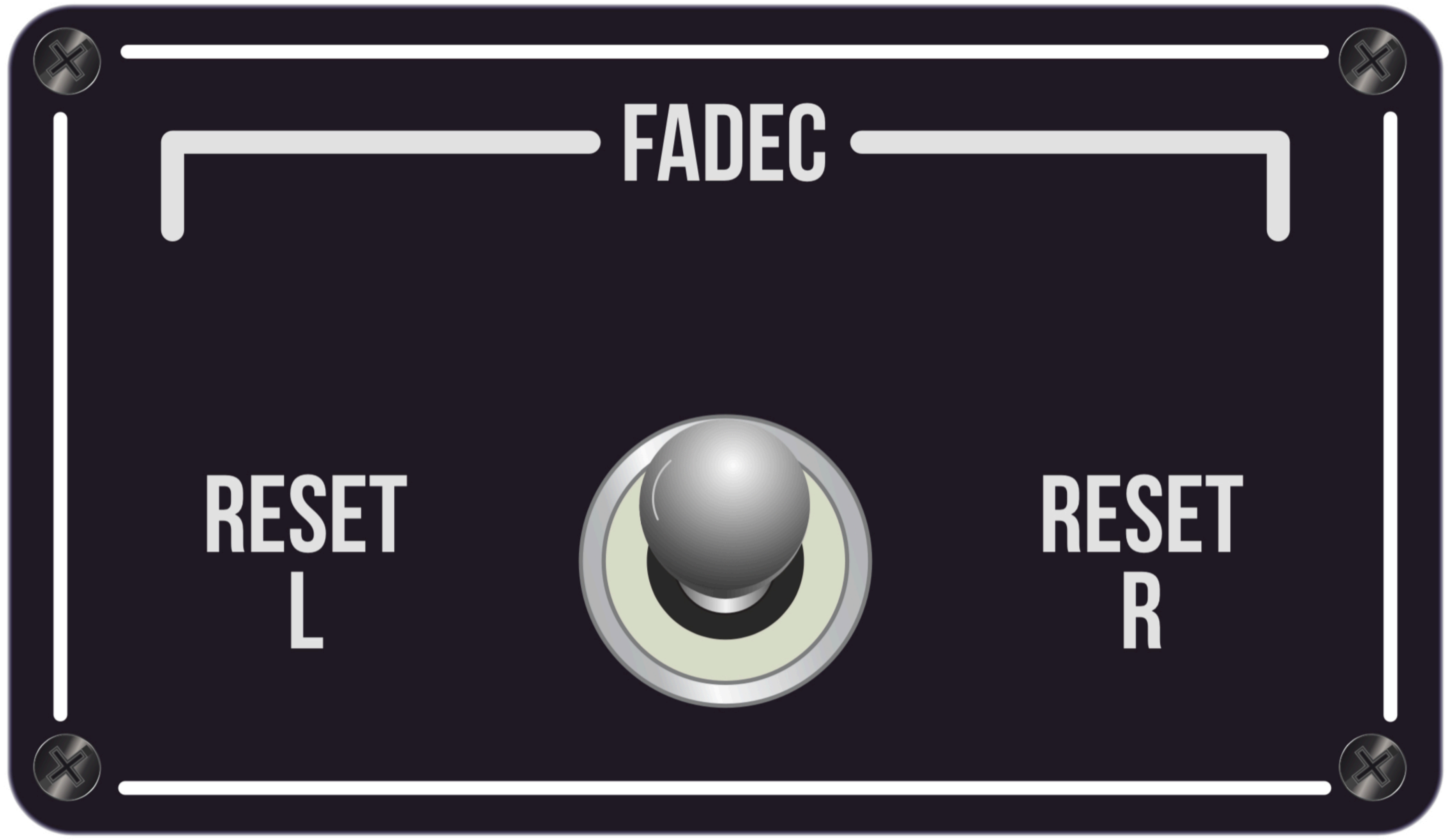
FADEC

Full authority digital engine controls (FADEC) is the interface between the engines and the throttles. FADEC receives multiple inputs of the current flight condition including air density, throttle lever position, engine temperatures, engine pressures, and many other parameters. There is no manual override available, instead full authority over the operating parameters of the engine is the computer. ***If a total FADEC failure occurs, the engine fails.*** Redundancy is provided in the form of two separate but identical digital channels. Each channel can independently provide all engine functions without restriction.



FADEC (CONT)

The Garmin interface adapter (GIA) 1 receives the output from FADEC channel A and GIA 2 from FADEC channel B. The FADEC controls the igniters by cycling them during every engine start. For example, during the first engine start, igniter 1 will be used, but on the next engine start, igniter 2 would be used. At temperatures below 0°C, both ignitors are used for engine start. This prolongs igniter life.

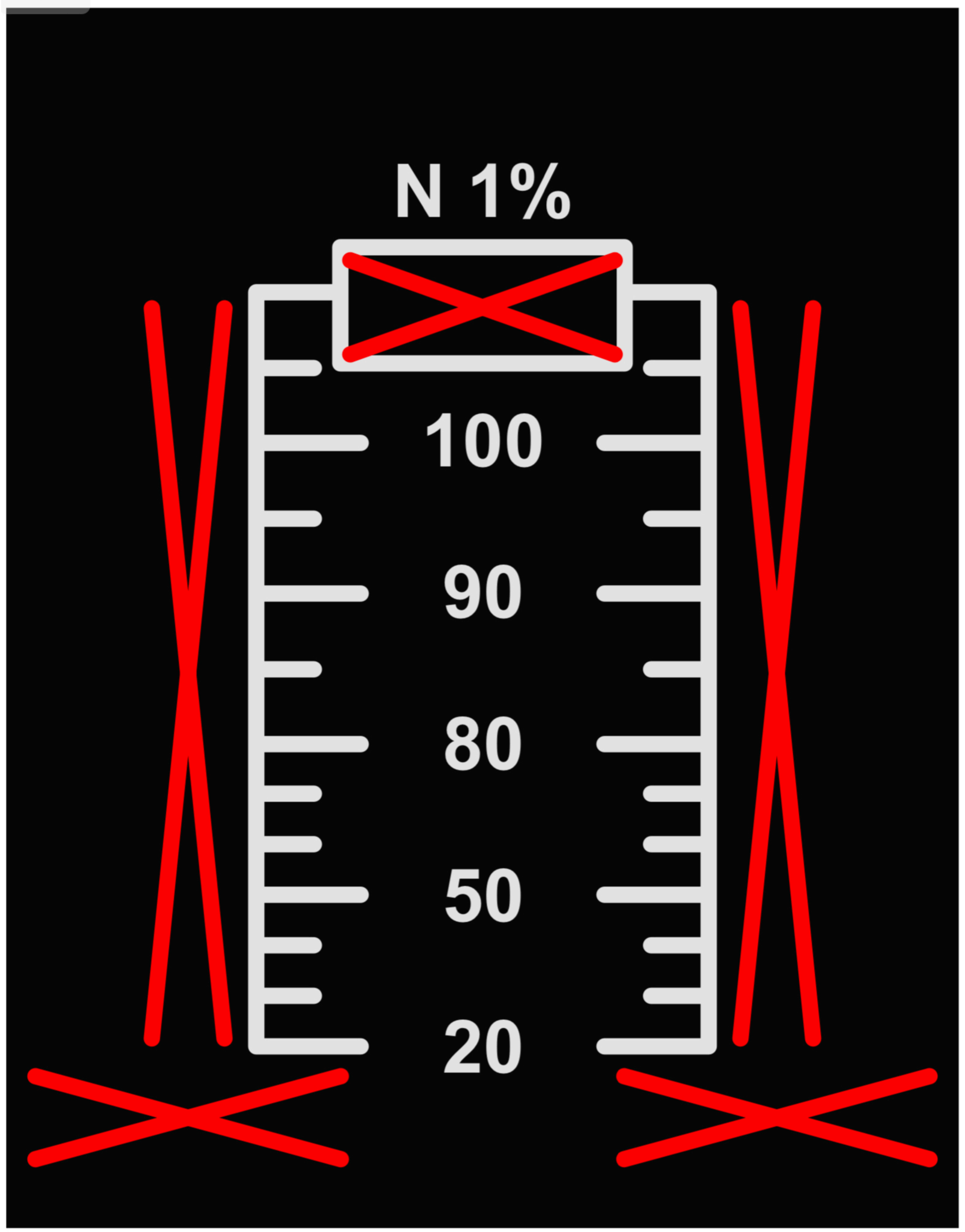


The FADECs send information to and from the Garmin Interface Adapter. The GIAs then deliver updated engine performance and fault information to the EICAS display. The FADEC provides engine data to the EICAS for:

- N1 % rpm, N2%rpm, and ITT.

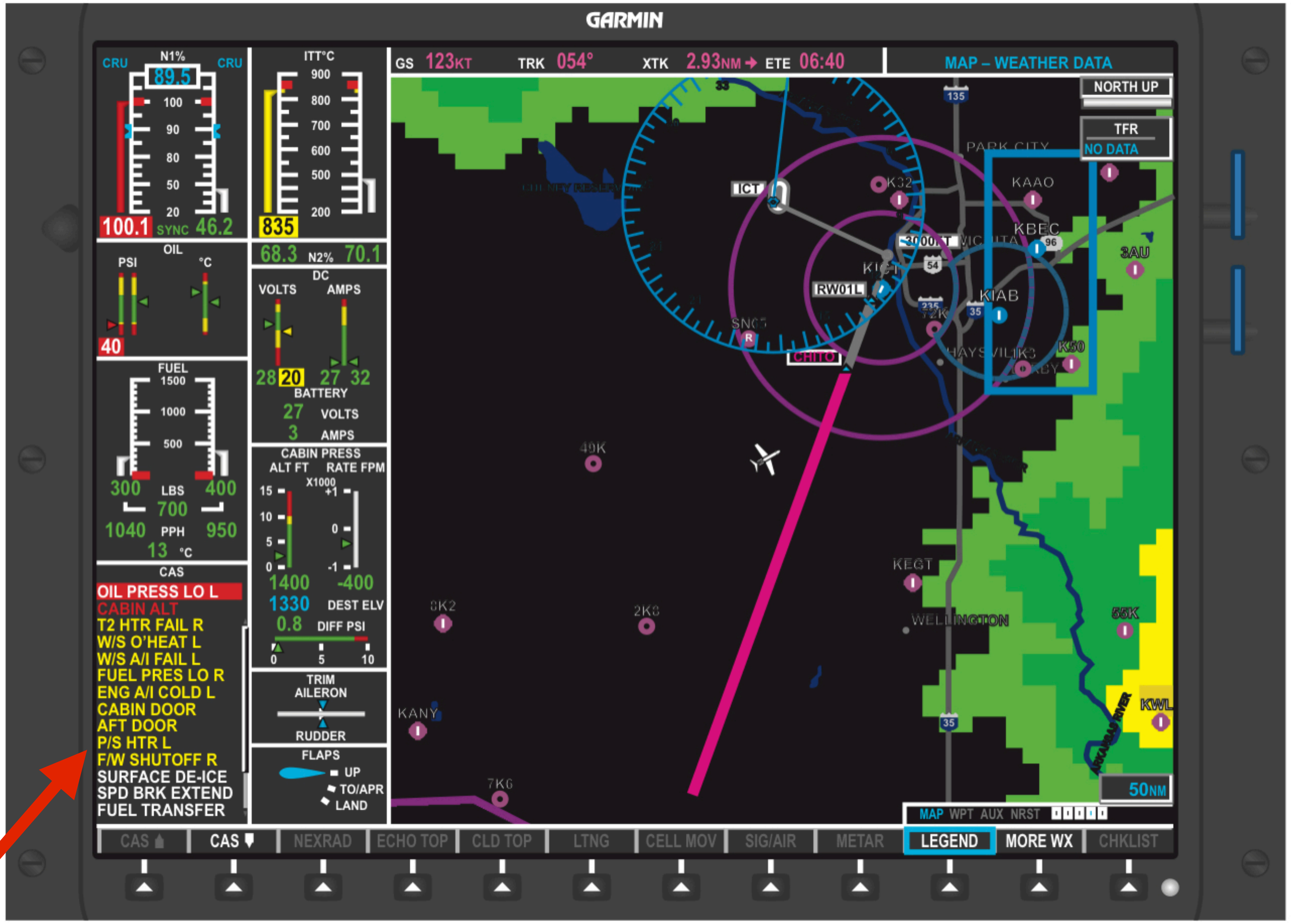
NOTE: A red "X" on an EICAS indication does not mean that the value is zero or is exceeding normal levels. It only indicates that the EICAS is unable to determine the correct value to display, and that its indication is inoperative.

Red lines on some scales that indicate maximum allowable limits may not appear. This means the EICAS cannot determine the appropriate red line limit.



ENGINE INDICATING AND CREW ALERTING SYSTEM

✓ The **ENGINE INDICATION AND CREW ALERTING SYSTEM** (EICAS) contains all the indications for the powerplant, as well as its systems, including continuous engine indications and crew alerts as necessary. In normal EICAS display mode, these indications are found in two columns on the left side of the G1000 multifunction display (MFD)



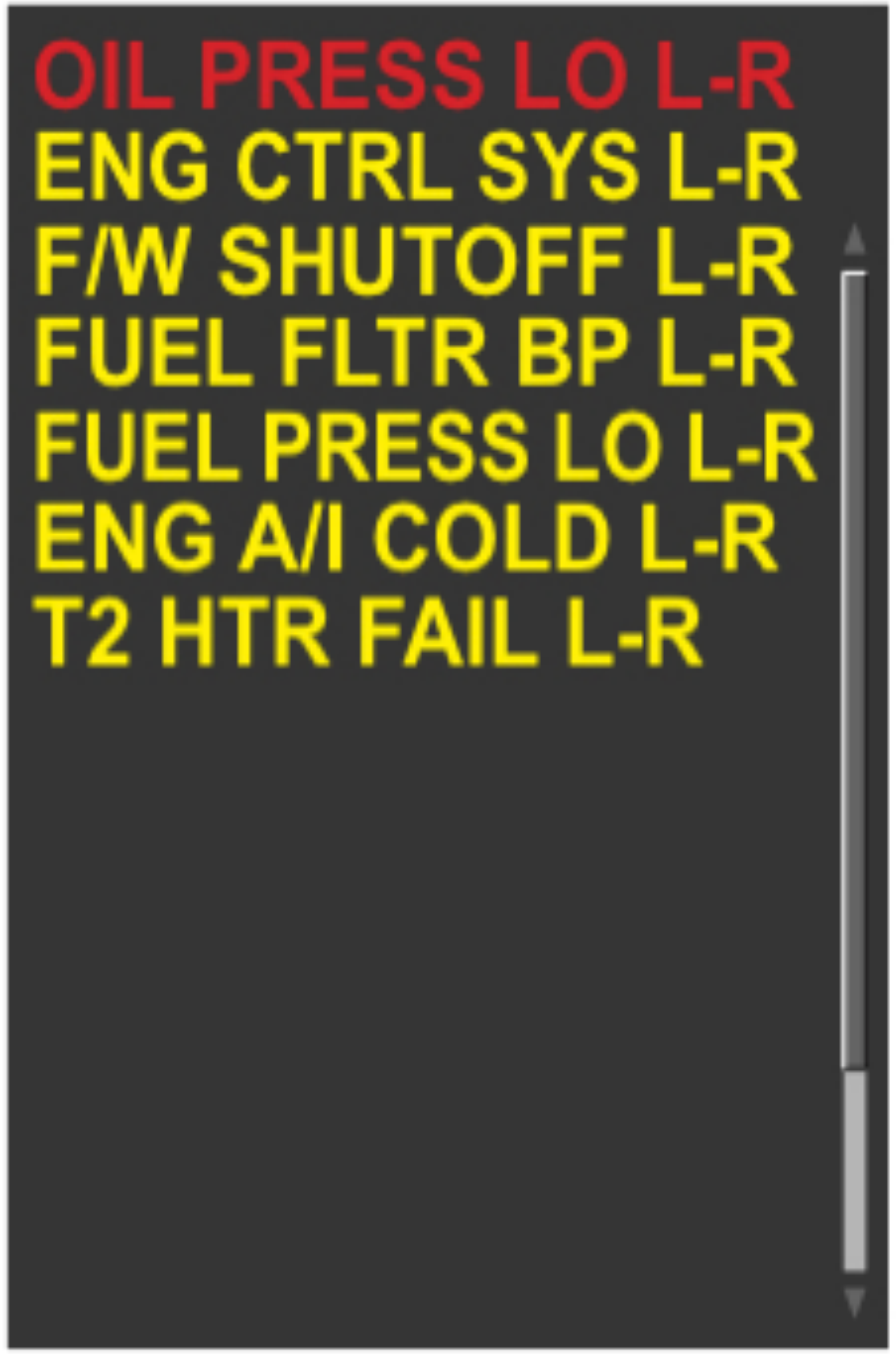
EXECUTIVE
FLIGHT TRAINING

CAS MESSAGES

CAS messages about powerplant conditions are followed by the letters “L” or “R” (left or right powerplant).

When the same message applies to both the left and right powerplants, the message is followed by “L–R.”

Powerplant CAS messages include:
- Red OIL PRESS LO L–R message
- Amber ENG CTRL SYS L–R message
- Amber F/W SHUTOFF L–R message
- Amber FUEL FLTR BP L–R message
- Amber FUEL PRESS LO L–R message
- Amber or white ENG A/I COLD L–R message
- Amber T2 HTR FAIL L–R message

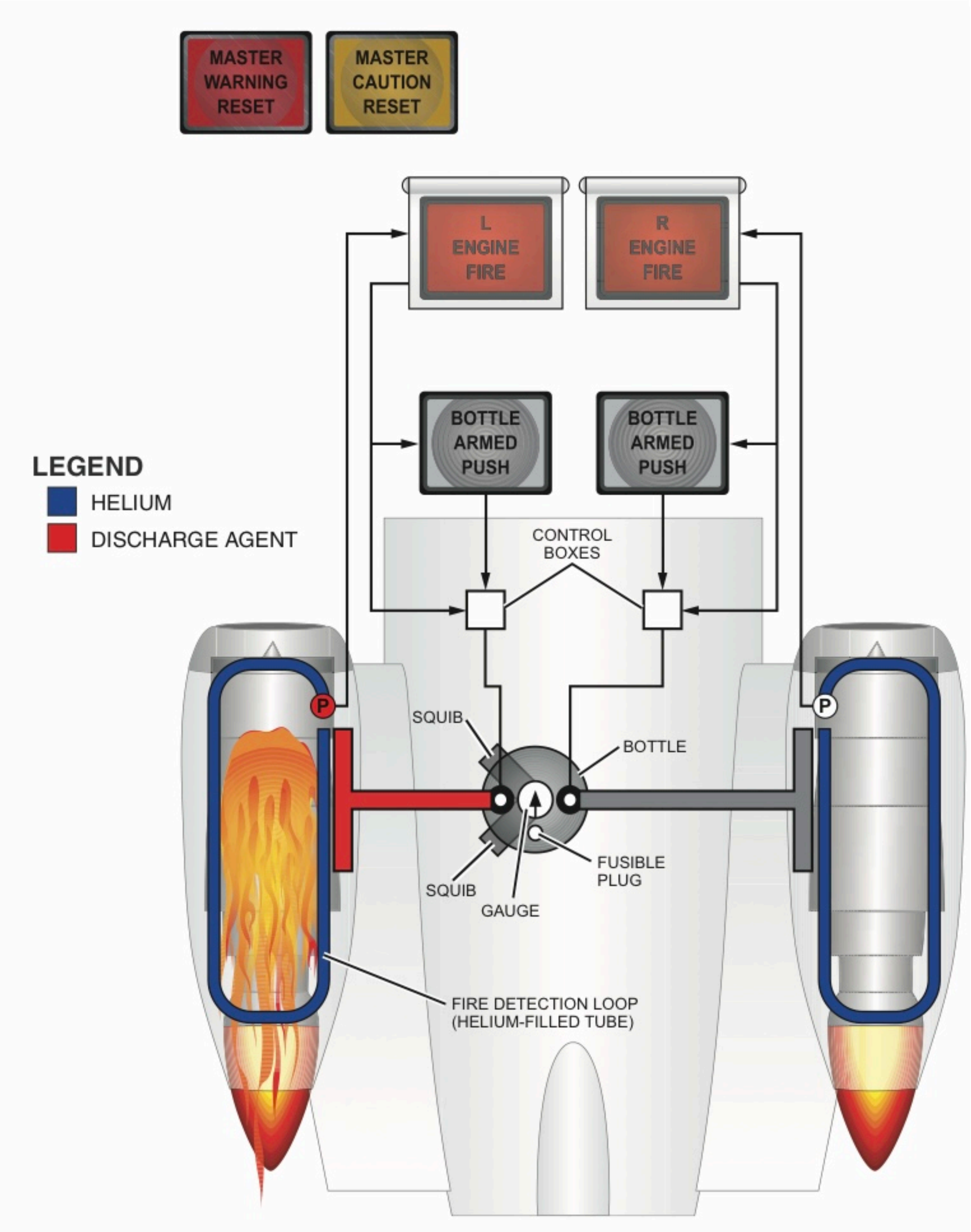


EXECUTIVE
FLIGHT TRAINING

FIRE PROTECTION

The engine fire-detection system contains a detection system on each engine which provides visual warnings.The engine fire-detection system consists of:

- ✓ Fire-detection loop
- ✓ Pressure sensor
- ✓ Red L and R ENGINE FIRE lights



ENGINE FIRE-EXTINGUISHING SYSTEM

The single bottle extinguishing system can suppress a fire in the left or right engine compartment, and can only be used once.

The system consists of:

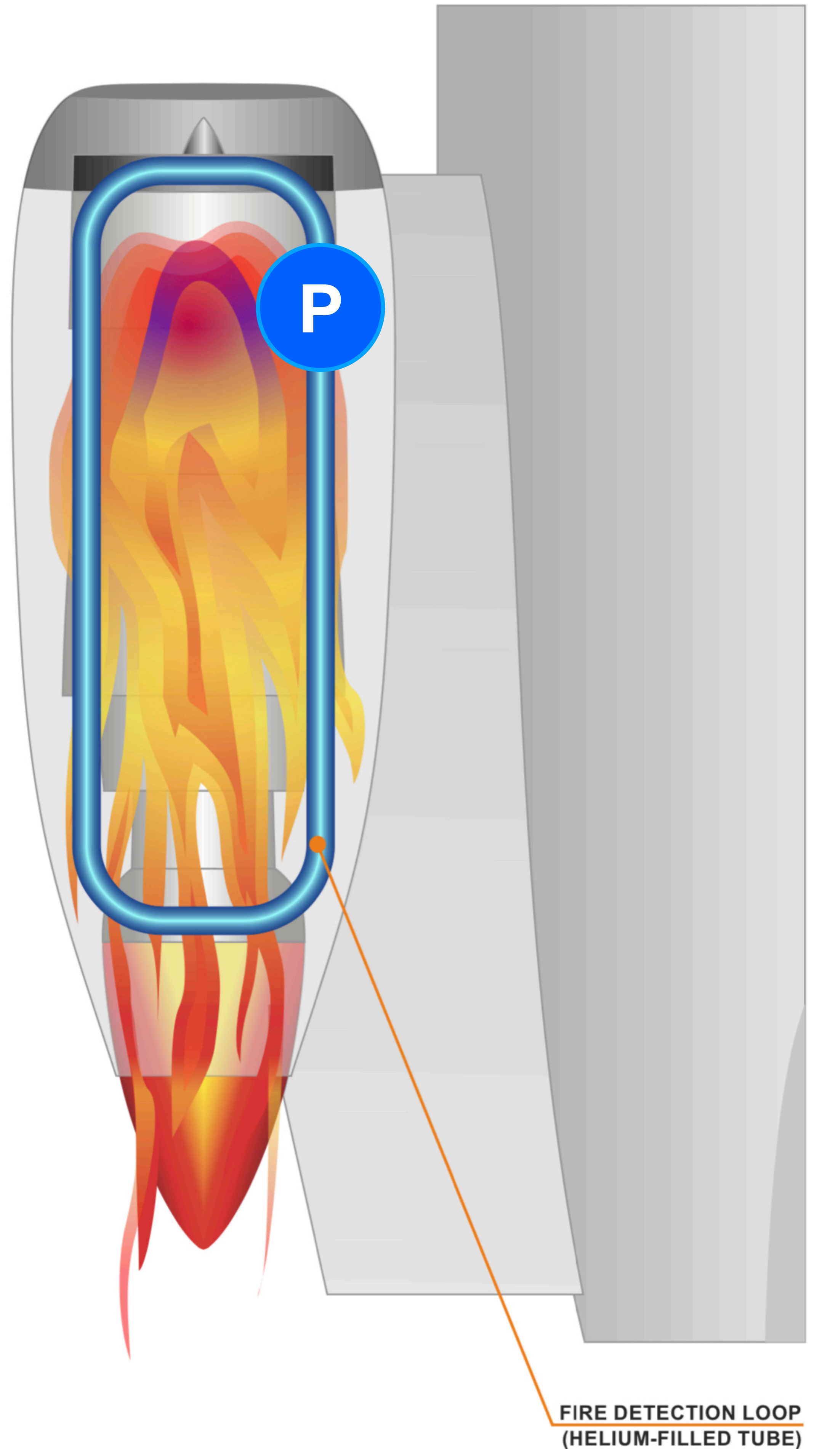
1. Engine fire bottle assembly
2. Distribution tubes
3. Nozzles in each engine nacelle
4. BOTTLE ARMED lights
5. Fuel shutoff valve and generator disconnect

ENGINE FIRE BOTTLE ASSEMBLY

- ✓ The fire bottle protects against one engine fire by utilizing .85 pound of Halon 1301.
- ✓ The fire bottle has two squibs routing the Halon 1301 to either the left or right engine compartments.
- ✓ The bottle contains a safety relief valve that discharges into the tail cone if the internal bottle temperature rises above 210°F.

FIRE DETECTION LOOP

- The fire detection loop detects a fire or overheat condition in the respective engine nacelle.
- An increase in temperature anywhere on the tube will increase the pressure of the helium gas in the tube and activate the pressure sensor.

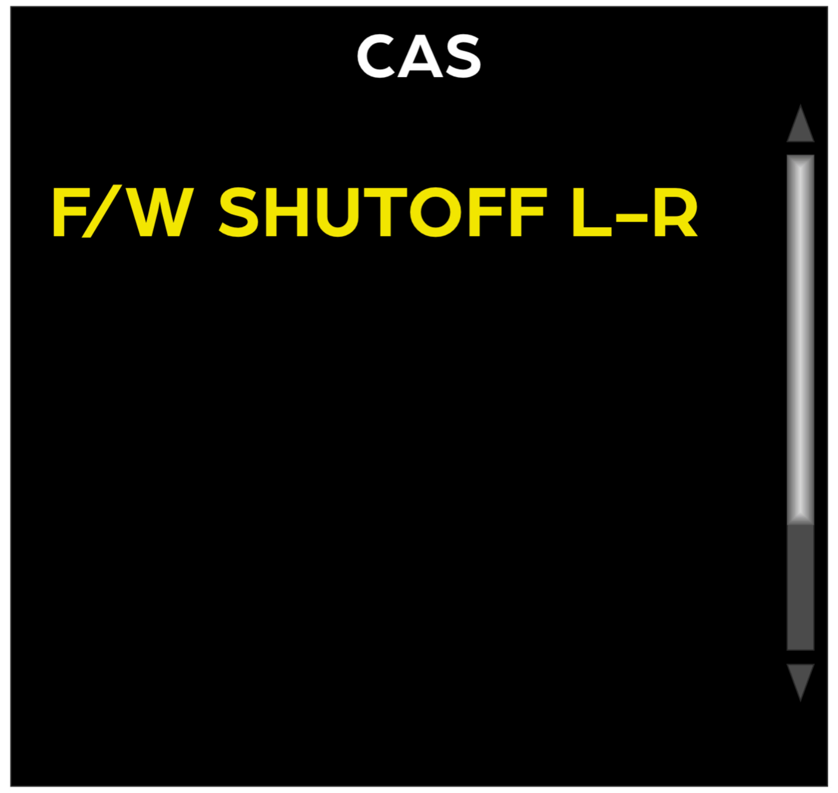


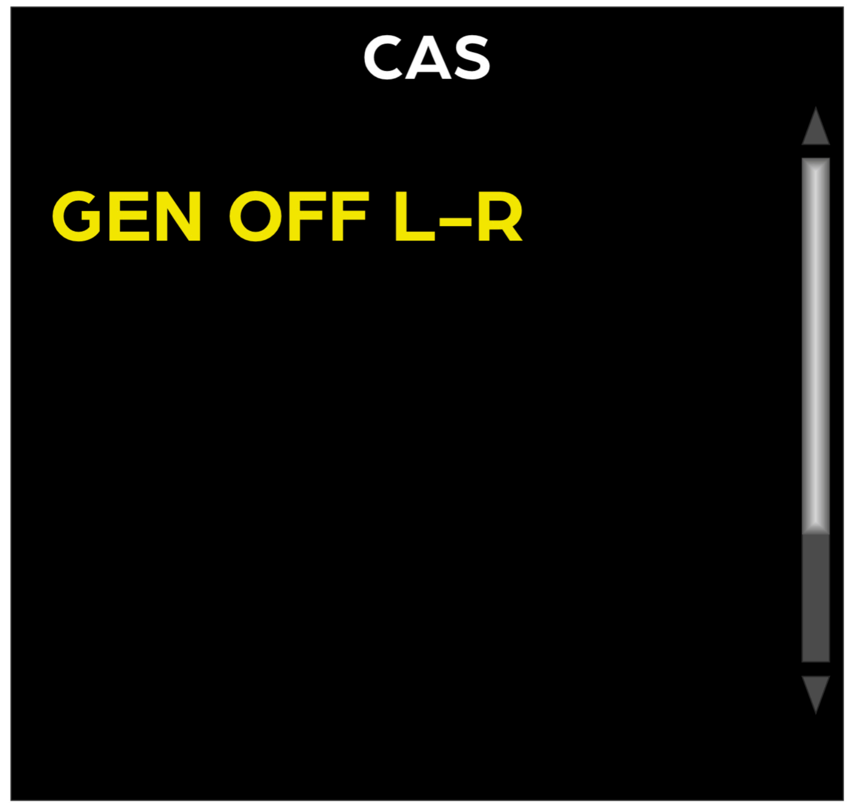
FUEL SHUTOFF VALVE

The firewall shutoff valve blocks electrical flow from the generator when the illuminated ENGINE FIRE light is pushed.

An amber F/W SHUTOFF L-R CAS message indicates the shutoff valve is fully closed.

Once the generator is disconnected, the respective L-R GEN OFF message appears.





PORTABLE FIRE EXTINGUISHER

- A handheld fire extinguisher is located in a drawer in the cabinet behind the pilot.
- The Halon 1301 extinguishing agent discharges as a vapor with useable distance of approximately 9–15 feet, with a duration of 10 seconds.
- To use the portable fire extinguisher, hold the extinguisher upright and aim the extinguisher at the base of the fire. Then pull the pin from the extinguisher, squeeze the handles, and spray using a side-to-side motion.

EXECUTIVE
FLIGHT TRAINING

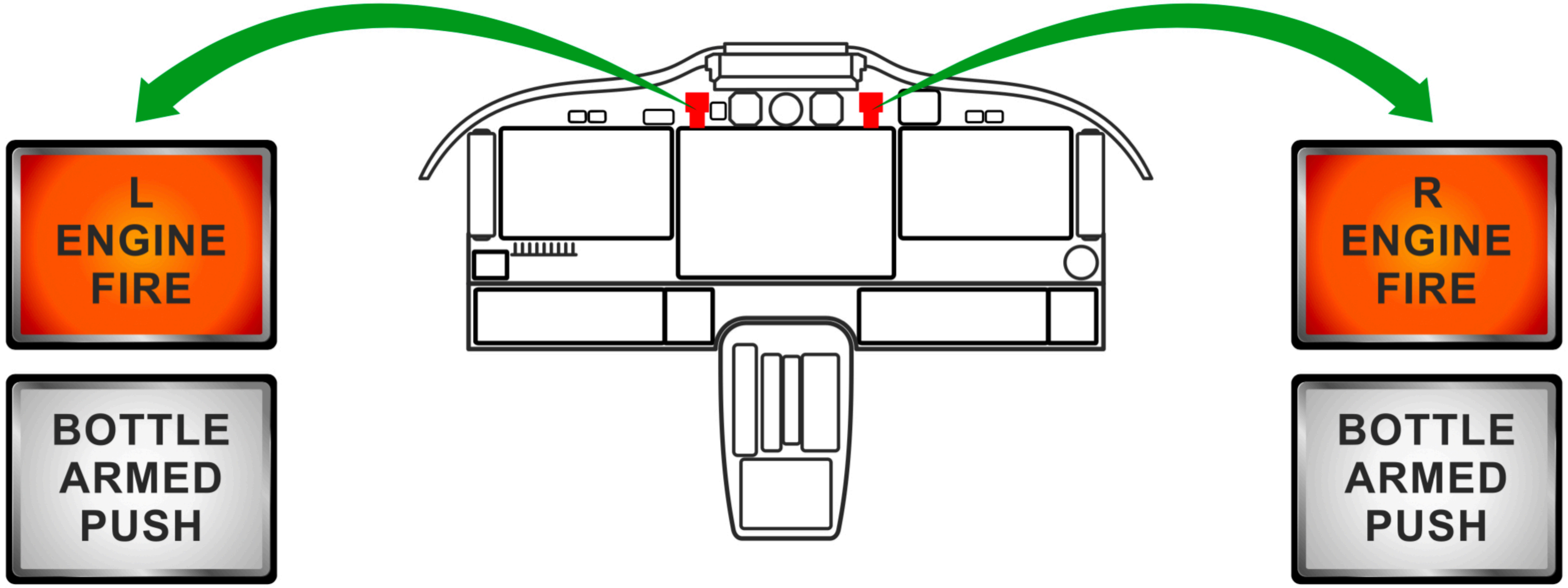
ENGINE FIRE LIGHTS

Red L and R ENGINE FIRE lights are located on the upper part of the center instrument panel.

If the red L and/or R ENGINE FIRE light illuminates, it is an indication of a fire or overheat condition.

A white BOTTLE ARMED light, with an integral pushbutton switch, will indicate when the bottle is armed.

Once the agent is released, the white light will extinguish, indicating that the bottle is empty.



MASTER WARNING LIGHTS

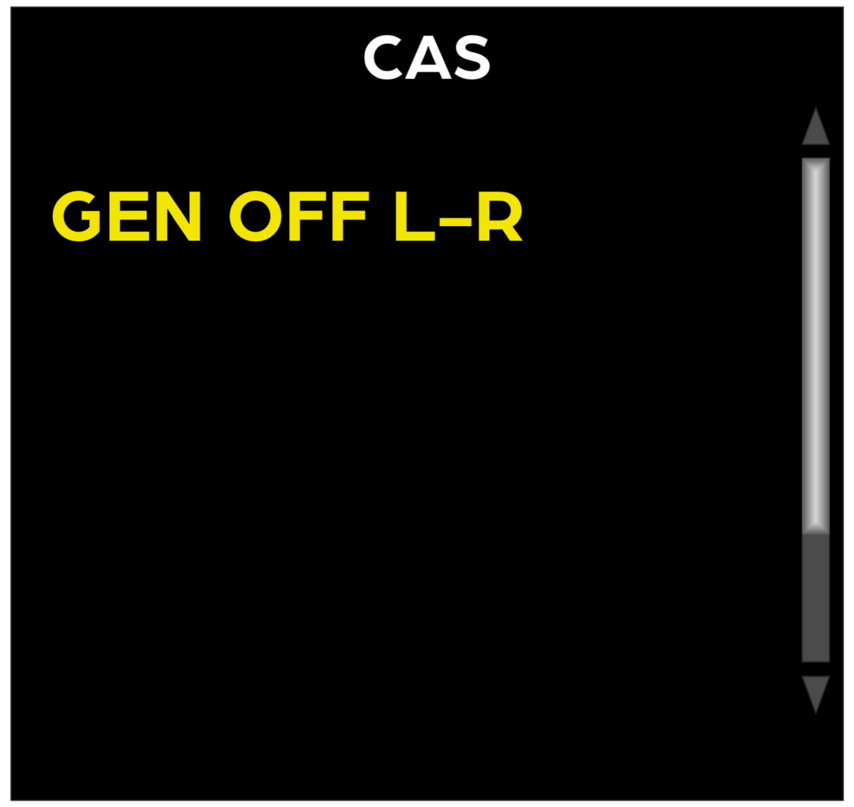
The MASTER WARNING lights flash when the L or R ENGINE FIRE lights illuminate.

Pilots pressing one of the MASTER WARNING lights will extinguish both lights.

CAS MESSAGES

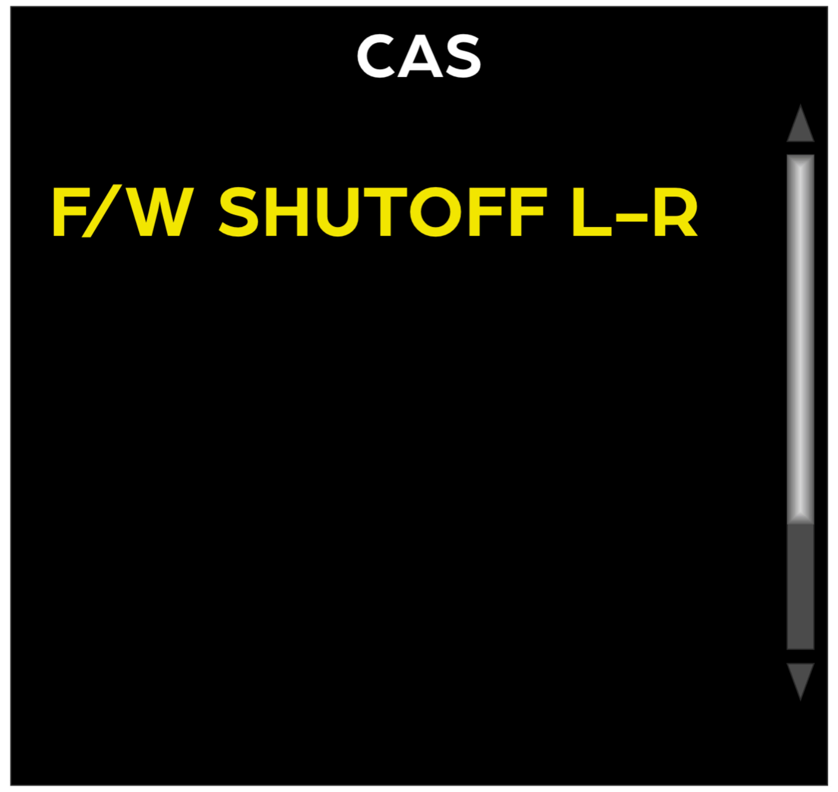
GEN OFF L-R

When either ENGINE FIRE lights are pushed, the respective amber GEN OFF message will appear.



F/W Shutoff L-R

When either ENGINE FIRE lights are pushed, the amber F/W SHUTOFF message will display.



EXECUTIVE
FLIGHT TRAINING

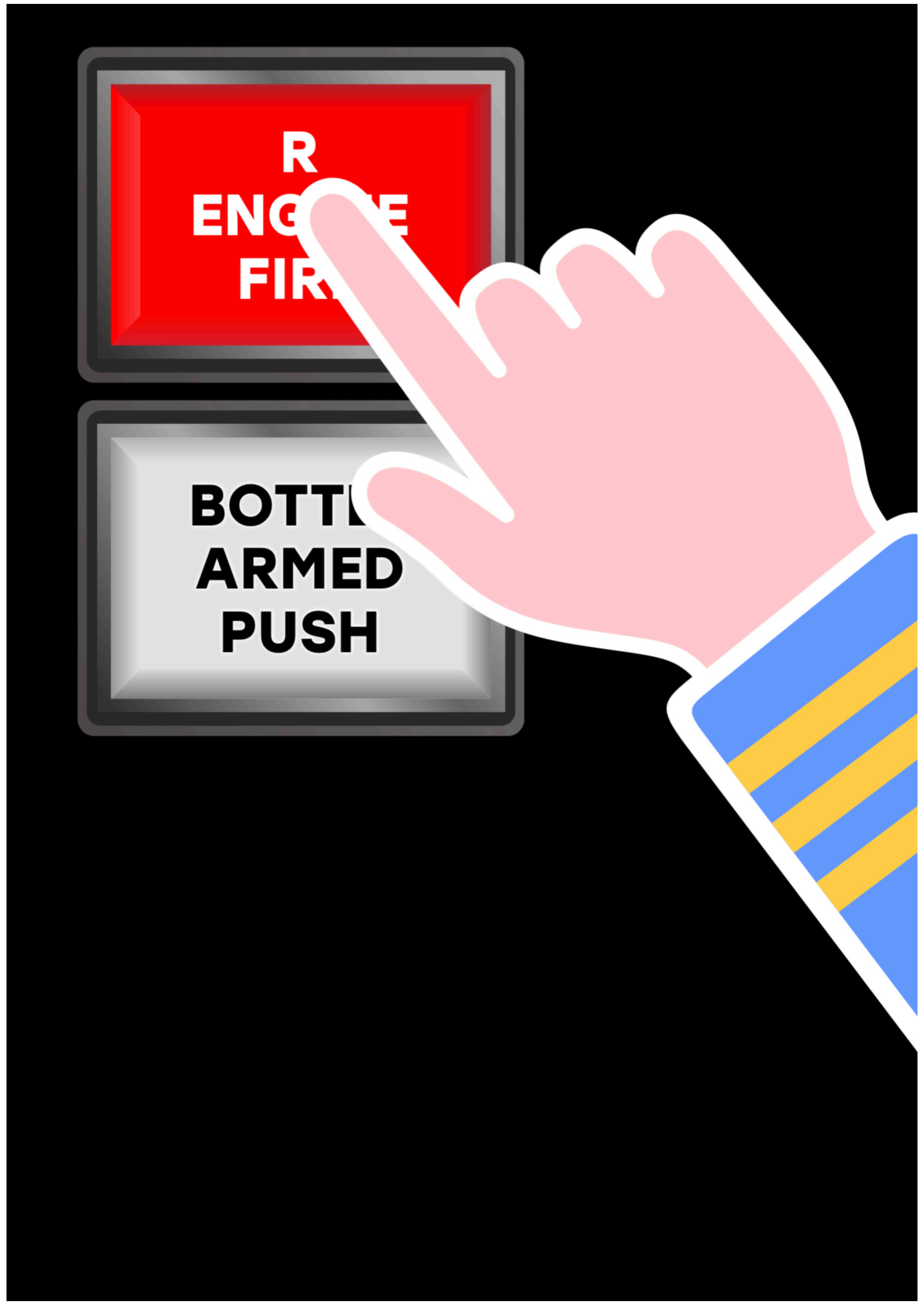
ROTARY Test KNOB

- The rotary TEST knob tests the engine fire-detection.
- This test verifies continuity to the fire bottles and warning system.

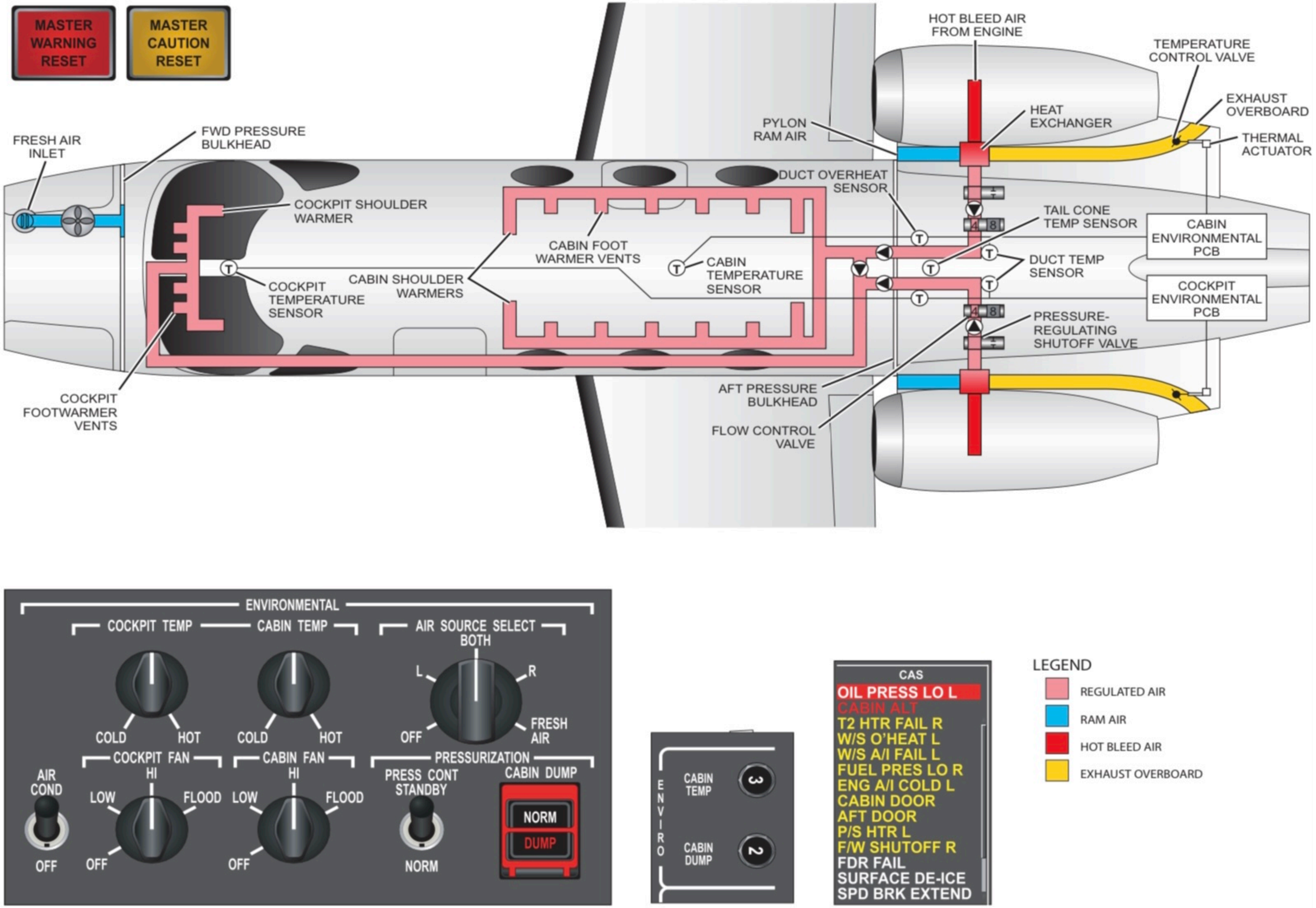
IN FLIGHT

Pushing the L/R ENGINE FIRE light:

1. Closes fuel shutoff valve
2. Disconnects the starter-generator
3. Arms the engine fire bottle squib



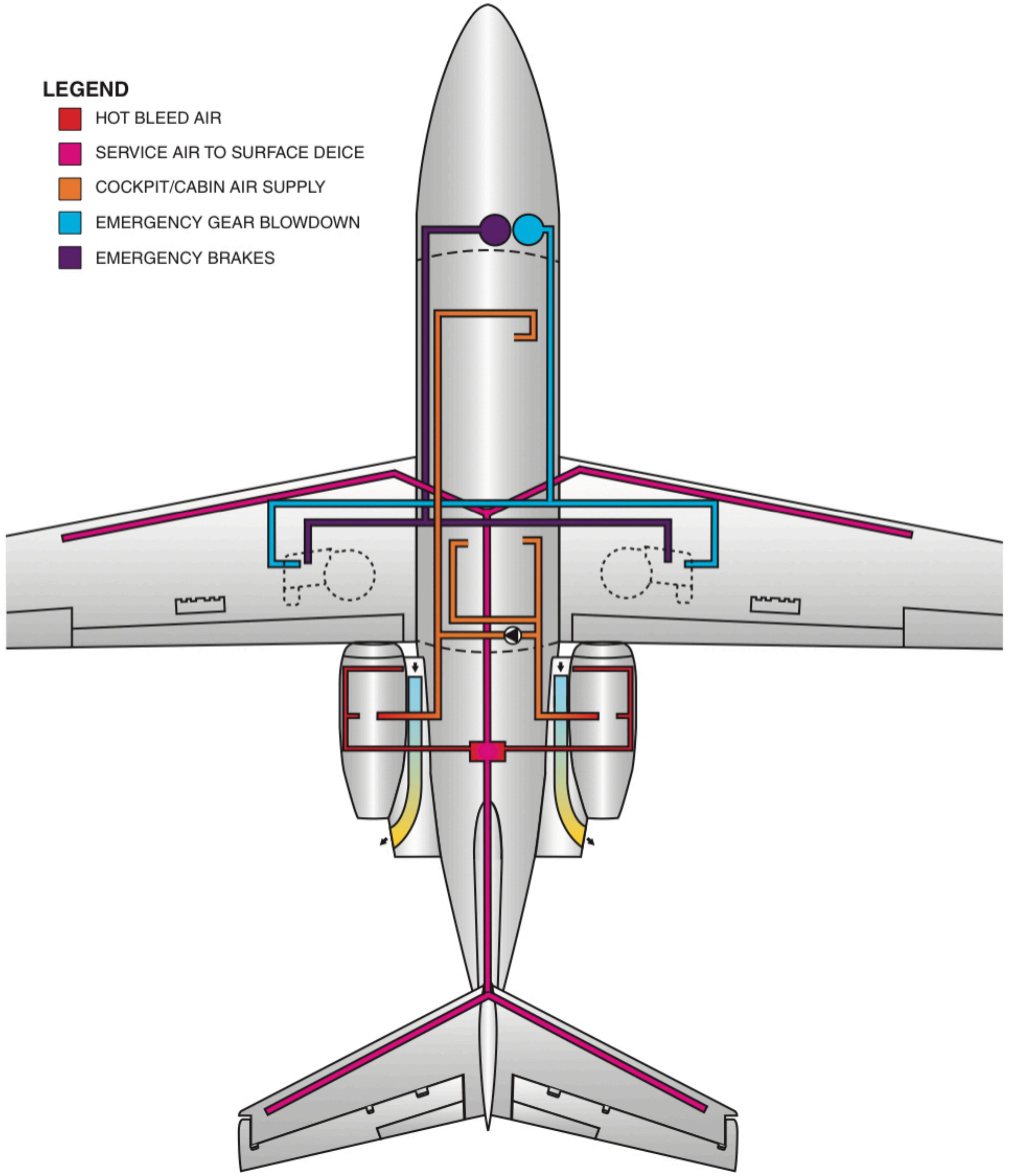
Pneumatic System



MASTER WARNING RESET
MASTER CAUTION RESET
FRESH AIR INLET
FWD PRESSURE BULKHEAD
COCKPIT SHOULDER WARMER
COCKPIT TEMPERATURE SENSOR
COCKPIT FOOTWARMER VENTS
CABIN SHOULDER WARMERS
CABIN FOOT WARMER VENTS
CABIN TEMPERATURE SENSOR
DUCT OVERHEAT SENSOR
PYLON RAM AIR
HOT BLEED AIR FROM ENGINE
HEAT EXCHANGER
TEMPERATURE CONTROL VALVE
EXHAUST OVERBOARD
THERMAL ACTUATOR
TAIL CONE TEMP SENSOR
CABIN ENVIRONMENTAL PCB
DUCT TEMP SENSOR
COCKPIT ENVIRONMENTAL PCB
PRESSURE-REGULATING SHUTOFF VALVE
AFT PRESSURE BULKHEAD
FLOW CONTROL VALVE
ENVIRONMENTAL
COCKPIT TEMP
CABIN TEMP
COLD
HOT
COLD
HOT
AIR SOURCE SELECT
BOTH
L
R
OFF
FRESH AIR
AIR COND
OFF
COCKPIT FAN
HI
LOW
FLOOD
OFF
CABIN FAN
HI
LOW
FLOOD
OFF
PRESSURIZATION
PRESS CONT STANDBY
NORM
CABIN DUMP
NORM
DUMP
ENVIRO
CABIN TEMP
3
CABIN DUMP
2
CAS
OIL PRESS LO L
CABIN ALT
T2 HTR FAIL R
W/S O'HEAT L
W/S A/I FAIL L
FUEL PRES LO R
ENG A/I COLD L
CABIN DOOR
AFT DOOR
P/S HTR L
F/W SHUTOFF R
FDR FAIL
SURFACE DE-ICE
SPD BRK EXTEND
LEGEND
REGULATED AIR
RAM AIR
HOT BLEED AIR
EXHAUST OVERBOARD

PNEUMATIC SYSTEM

The pneumatic system uses bleed air for heating, cooling, pressurization, the landing gear, and brakes.



GENERAL

The pneumatic systems include:

- Bleed air for pneumatic ice-protection systems.
- Bleed air for temperature-controlled pressurization.
- Compressed nitrogen for emergency landing gear extension (blow-down bottle).
- Compressed nitrogen for emergency brakes (emergency braking bottle).

BLEED-AIR DISTRIBUTION

High-temperature engine bleed air is extracted from both engines and routed through separate ports.

- The outboard port provides bleed air for ice protection.
- The inboard port provides bleed air for temperature-controlled pressure vessel air supply.

ICE PROTECTION

An outboard bleed air port from each engine provides bleed air for ice protection. It supplies bleed air:

- Directly to the respective engine anti-ice system.
- Through a service air regulator to the pneumatic deice boot system.

ENGINE ANTI-ICE SYSTEM

Bleed air for both engine anti-ice systems is routed to the leading edge of the engine inlet. Once the hot bleed air warms the leading edge, it will then exit overboard through an opening in the bottom of the engine nacelle.

SURFACE DEICE (AND SERVICE AIR)

The bleed air for the surface deice system is routed to the service air regulator for operation of pneumatic deice boots.

EXECUTIVE
FLIGHT TRAINING

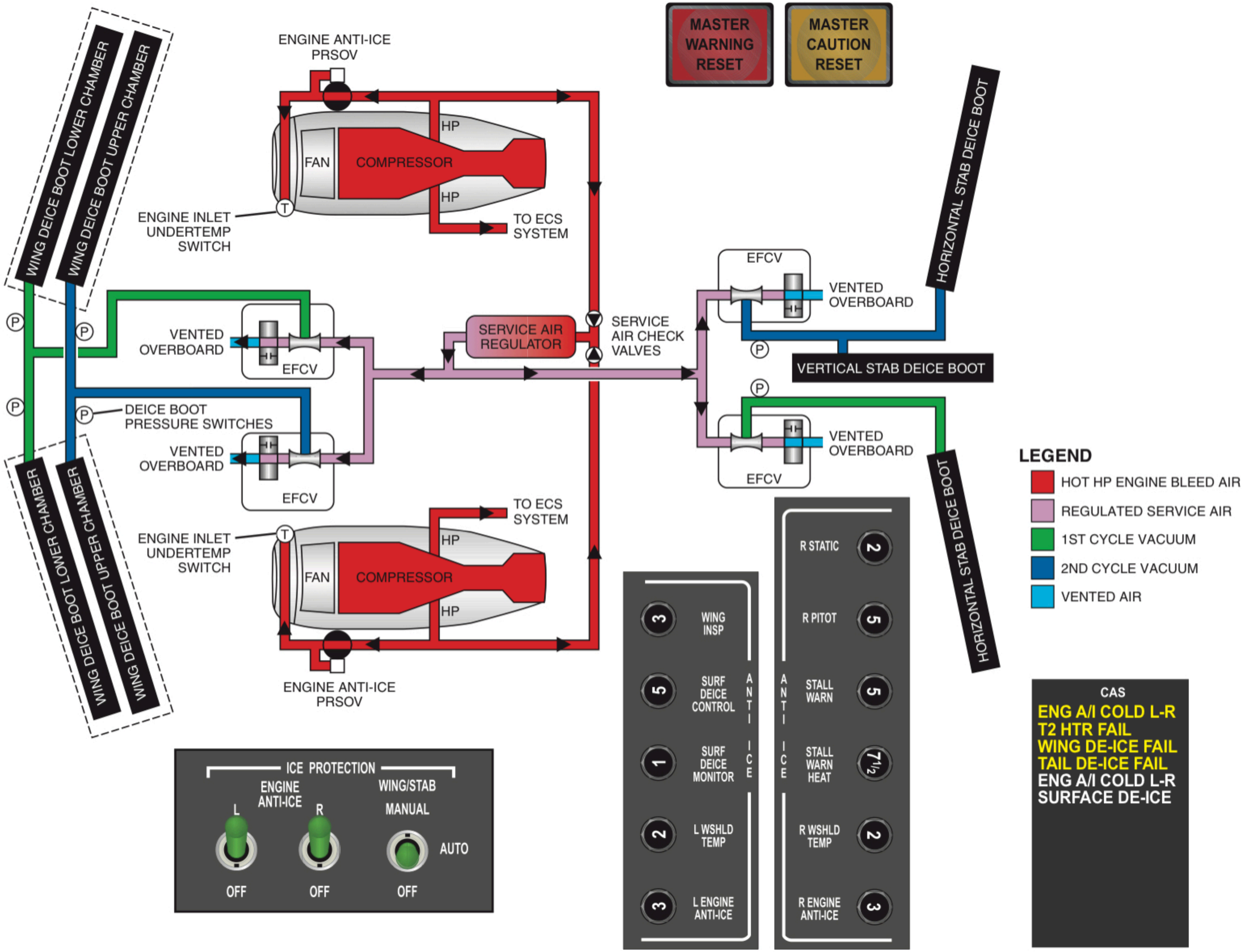
PRESSURE VESSEL AIR SUPPLY

- ✓ The inboard bleed air port from each engine supplies air for temperature control and pressurization.
- ✓ The pressure regulating shutoff valves (PRSOVs) ensure that a constant bleed-air pressure is maintained regardless of engine power settings.
- ✓ Outflow valves are controlled by the pressurization system to maintain adequate cabin pressure at all altitudes.

NITROGEN BOTTLE

- An independent emergency pneumatic system uses pressurized nitrogen to blow down the landing gear and/or activate the emergency brakes.
- The emergency gear extension is activated with the AUXILIARY GEAR CONTROL handle.
- The nitrogen bottle is attached to the right forward bulkhead.
- The emergency braking is pilot-activated with the EMERGENCY BRAKE handle.
- The nitrogen bottle is attached to the right forward bulkhead.

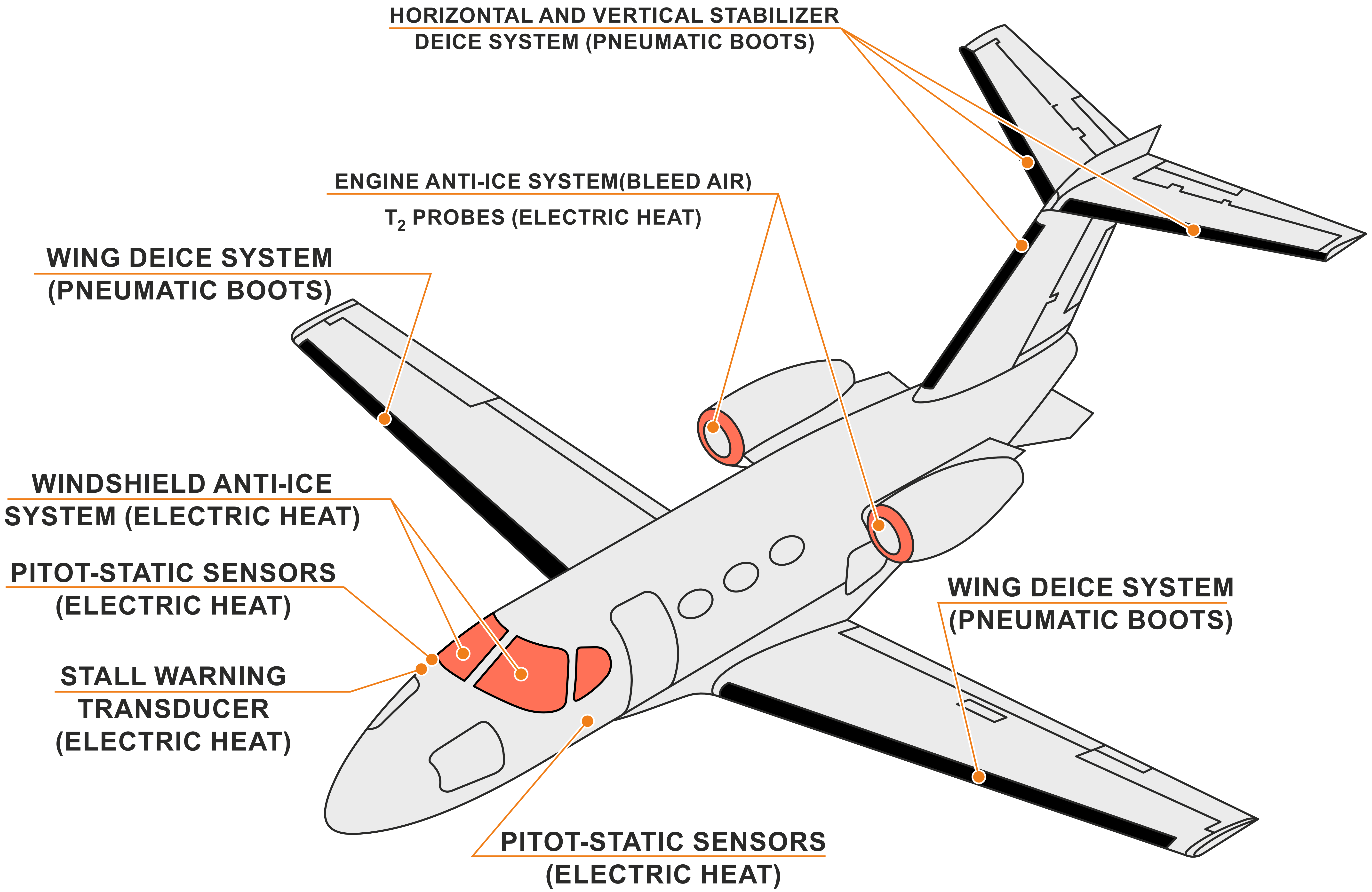
Ice Protection



MASTER WARNING RESET
MASTER CAUTION RESET
WING DEICE BOOT LOWER CHAMBER
WING DEICE BOOT UPPER CHAMBER
ENGINE ANTI-ICE PRSOV
HP
FAN
COMPRESSOR
HP
ENGINE INLET UNDERTEMP SWITCH
TO ECS SYSTEM
VENTED OVERBOARD
EFCV
SERVICE AIR REGULATOR
SERVICE AIR CHECK VALVES
DEICE BOOT PRESSURE SWITCHES
VENTED OVERBOARD
EFCV
ENGINE INLET UNDERTEMP SWITCH
TO ECS SYSTEM
HP
FAN
COMPRESSOR
HP
ENGINE ANTI-ICE PRSOV
WING DEICE BOOT LOWER CHAMBER
WING DEICE BOOT UPPER CHAMBER
EFCV
VENTED OVERBOARD
HORIZONTAL STAB DEICE BOOT
VERTICAL STAB DEICE BOOT
VENTED OVERBOARD
EFCV
HORIZONTAL STAB DEICE BOOT
LEGEND
HOT HP ENGINE BLEED AIR
REGULATED SERVICE AIR
1ST CYCLE VACUUM
2ND CYCLE VACUUM
VENTED AIR
ICE PROTECTION
ENGINE ANTI-ICE
L
R
OFF
OFF
WING/STAB
MANUAL
AUTO
OFF
3 WING INSP
5 SURF DEICE CONTROL
1 SURF DEICE MONITOR
2 L WSHLD TEMP
3 L ENGINE ANTI-ICE
ANTI ICE
2 R STATIC
5 R PITOT
5 STALL WARN
7½ STALL WARN HEAT
2 R WSHLD TEMP
3 R ENGINE ANTI-ICE
ANTI ICE
CAS
ENG A/I COLD L-R
T2 HTR FAIL
WING DE-ICE FAIL
TAIL DE-ICE FAIL
ENG A/I COLD L-R
SURFACE DE-ICE
EXECUTIVE FLIGHT TRAINING

ICE & RAIN PROTECTION

Anti-icing is provided for the engine inlets, instrument external sensors, and the windshields.
Deicing is provided for the wings as well as the horizontal and vertical stabilizers.
Rain protection is also provided for the windshield.



EXECUTIVE FLIGHT TRAINING

GENERAL

- Icing conditions may exist any time the indicated ram air temperature (RAT) is +10°C or below, and visible moisture is present. (Fog,Rain,Mist,Snow etc.)

- WING/STAB DEICE should be selected once ice is observed.

- If ice remains on the airplane during approach and landing, max flap extension is limited to TO/APR.

ENGINE INLETS

Each engine inlet as well as the inlet of the generator-cooling scoop is heated by bleed air.

Temperature of the bleed air is directly related to the throttle position.

DC power is provided through an L or R anti-ice circuit breaker.

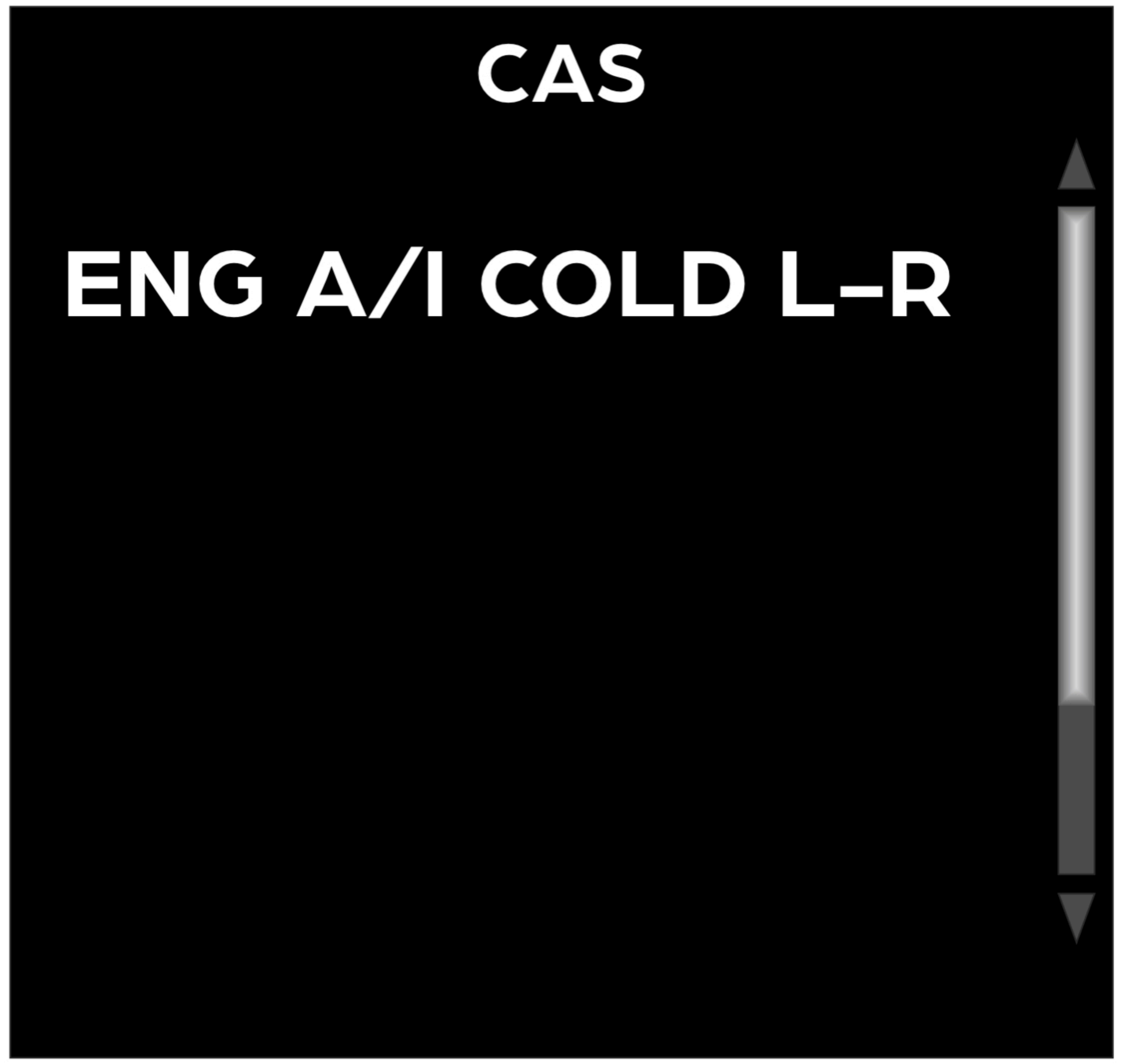
If power fails, the anti-ice valves fail in the open position, allowing hot air into nacelle leading edges.

ENGINE ANTI-ICE SHUTOFF VALVES

- The hot bleed air flows into each engine inlet through the engine anti-ice pressure regulating shutoff valve (PRSOV).
- When valve is energized closed, the inlet is not anti-iced.
- Inlet PRSOVs are operated by the ENGINE ANTI-ICE switches and are electrically actuated.
- In absence of power, valves are pushed open by the bleed-air pressure.
- When power is applied, a solenoid powers the PRSOV closed.

ENGINE INLET UNDERTEMP SWITCH

- Engine inlet under temperature switches are located inside the nacelle leading edge.
- The switches provide information to illuminate the white and amber ENG A/I COLD L or R messages.



EXECUTIVE
FLIGHT TRAINING

ENGINE INLET ANTI-ICE ASSEMBLY

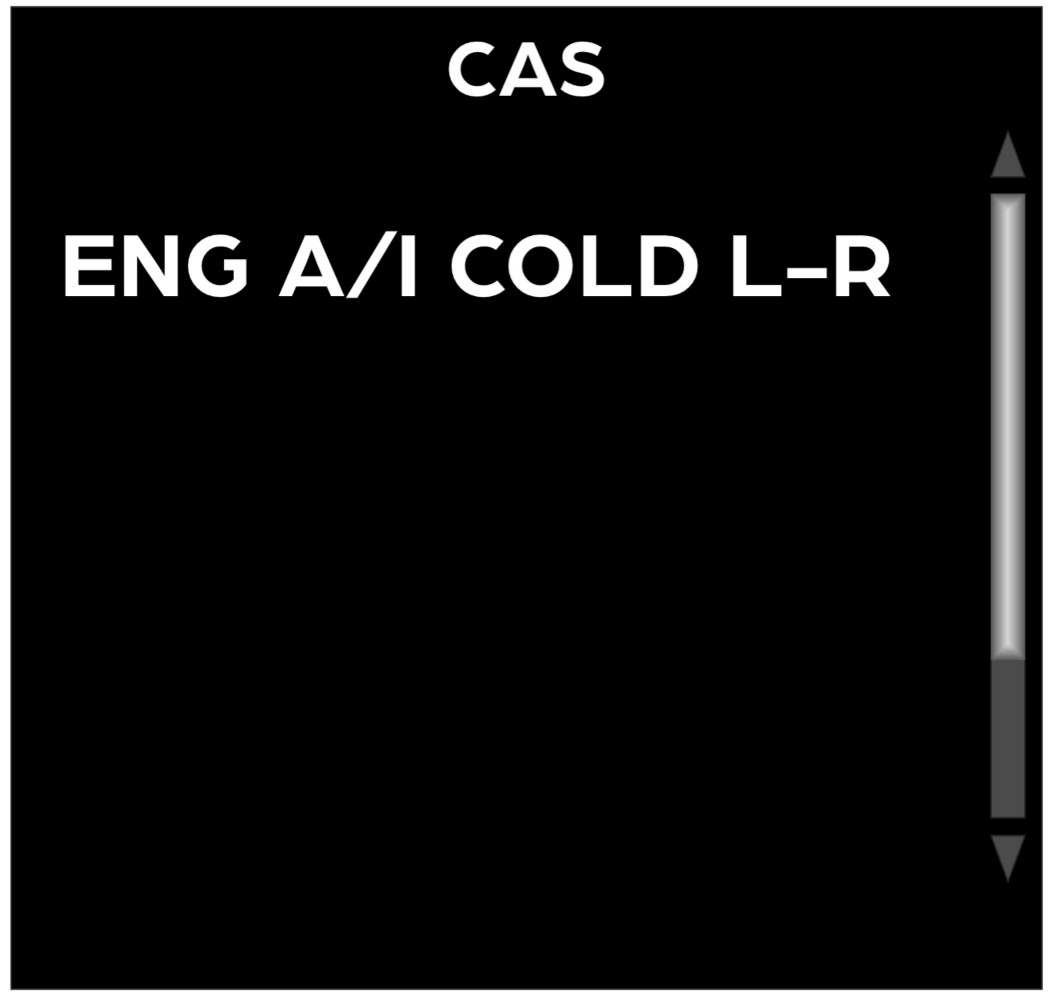
- The engine inlet leading edge is a hollow structure.
- Inside the leading edge, a circular piccolo tube is installed behind the forward surface of the engine inlet.
- Hot bleed air enters the piccolo tube and is expelled out of holes in the tube to heat the inlet leading edge. The air then exhausts overboard through the bottom of each inlet assembly.

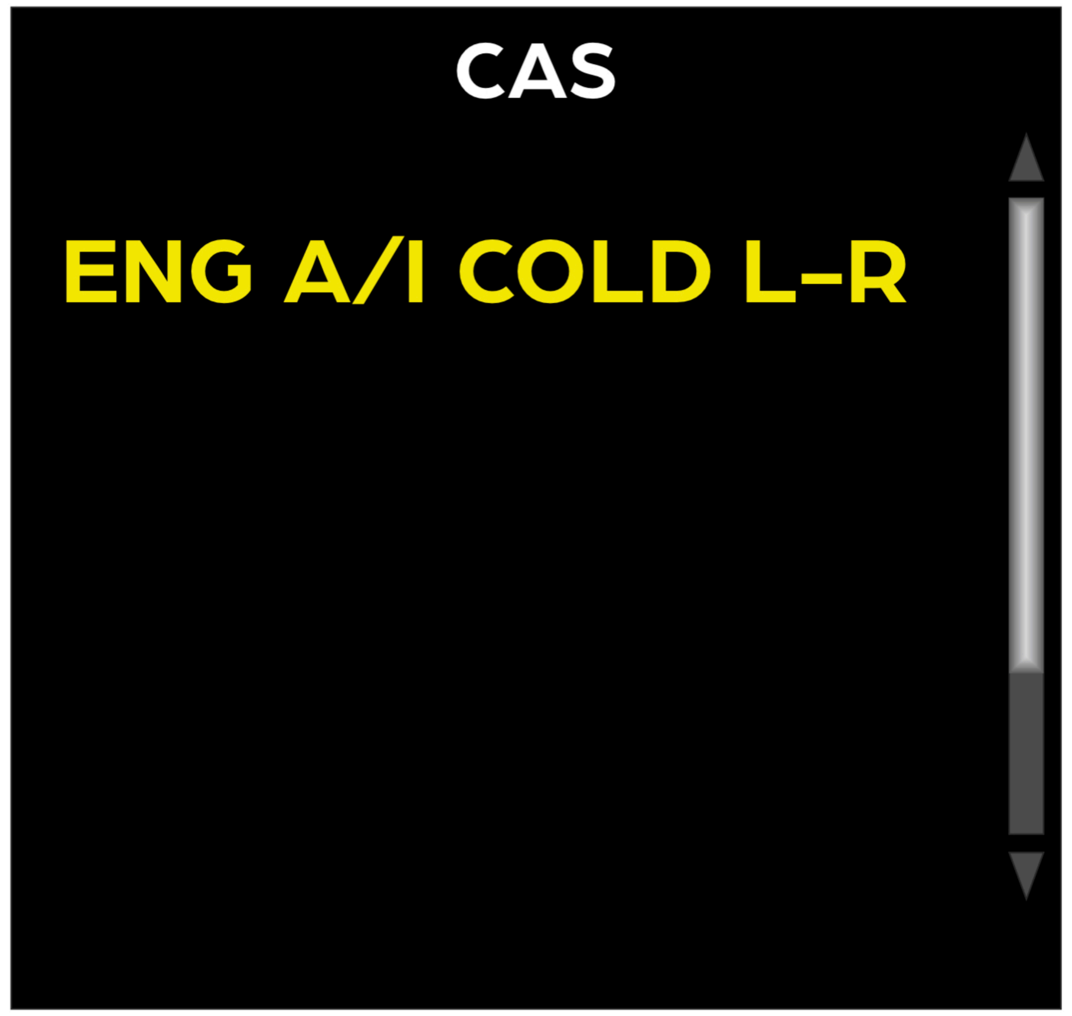
L AND R ENGINE ANTI-ICE SWITCHES

The L and R ENGINE ANTI-ICE switches control the flow of hot bleed air to the engine inlet leading edges.
Each switch has two positions: L (or R) and OFF.
With switches in the UP position, the PRSOV opens and bleed air is directed to the respective engine inlet.
With the switch in the OFF position, bleed air is blocked at the engine anti-ice PRSOV.

ENG A/I COLD L OR R MESSAGE

- The ENG A/I COLD L or R is displayed in white or amber.
- If the outside air temperature is below approximately 10°C, the white ENG A/I COLD L/R message will display for up to 2 minutes while inlets warm up.
- After activation, if the inlet temperature does not warm within 2 minutes, the amber ENGINE ANTI-ICE L or R message will illuminate.
- The ENGINE ANTI-ICE will also display during operation when the inlet temperature falls below normal operating temperatures.





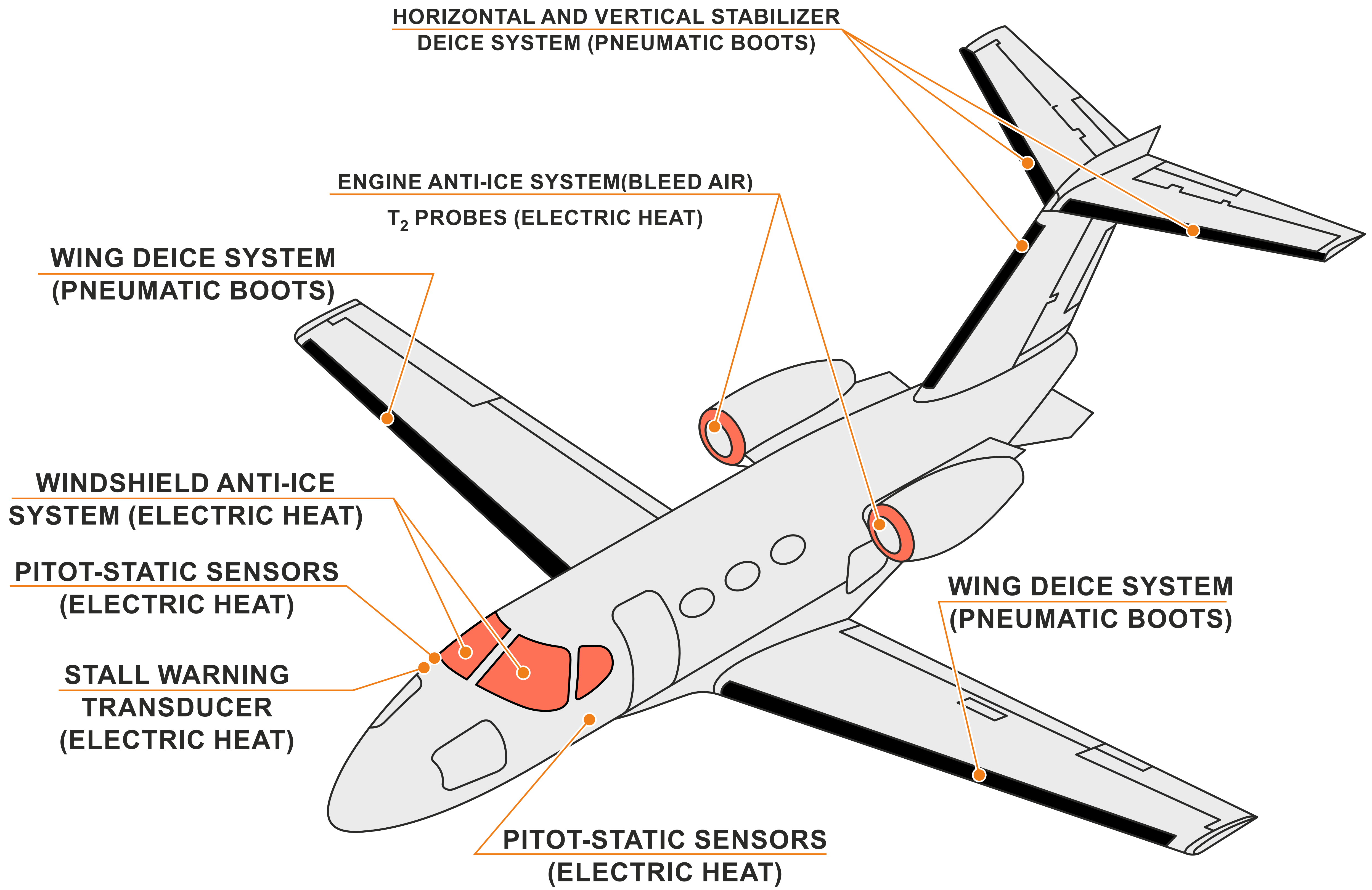
EXECUTIVE
FLIGHT TRAINING

OPERATION

When anticipating ice or in icing conditions, place the ENGINE ANTI-ICE switches to the L and R (up) position. This opens the shutoff valves, allowing bleed air to flow through to heat the engines. When not anticipating ice, the switches can be turned to OFF. This stops the flow of bleed air and increases engine efficiency and available power.

SURFACE DEICE

- ✓ The pressure-regulated engine bleed air operates conventional pneumatic deicing boots.
- ✓ Deicing boots protect the wing, vertical, and horizontal stabilizer leading edges



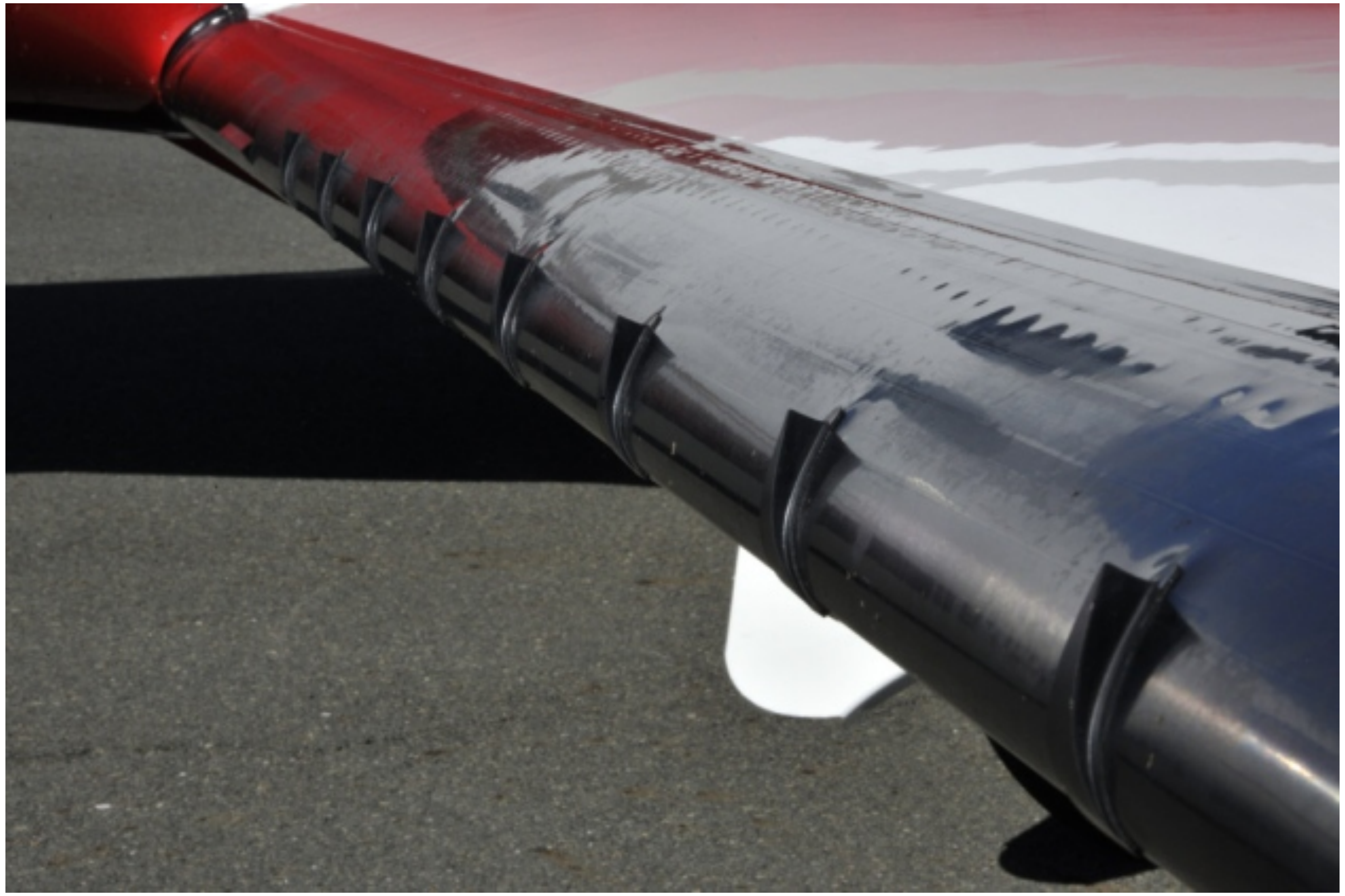
SERVICE AIR SYSTEM

The pressurized air for inflating the pneumatic boots is supplied by the service air system.

The service air system is always active during operation of the aircraft

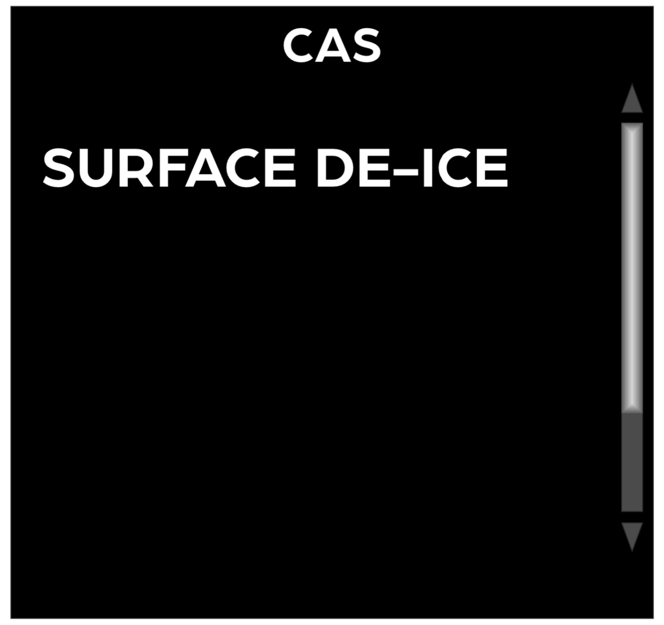
The system supplies regulated bleed air to the deice boot system.

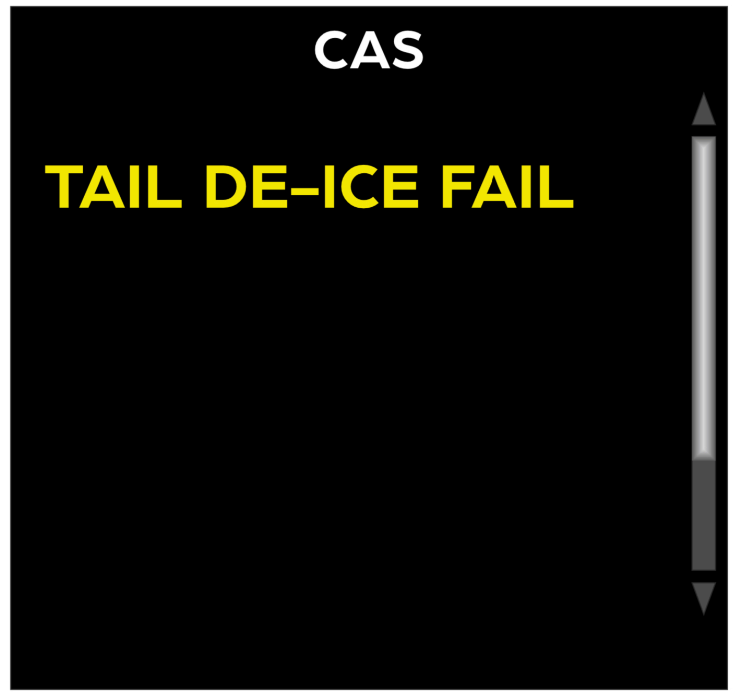
If one engine fails, the operating engine supplies enough bleed air to operate the deice boots.

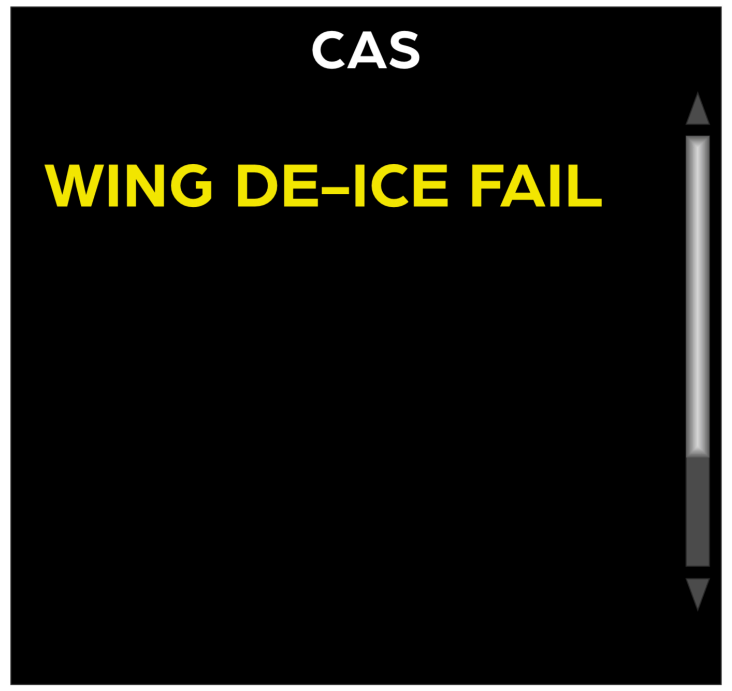


SURFACE DEICE SYSTEMS

- During normal operation, adequate pressure supplied to the boots is annunciated by the white SURFACE DEICE message.
- The amber WING or TAIL DE-ICE FAIL message appears in the CAS window if the boot pressure is inadequate or the inflation cycle is not normal





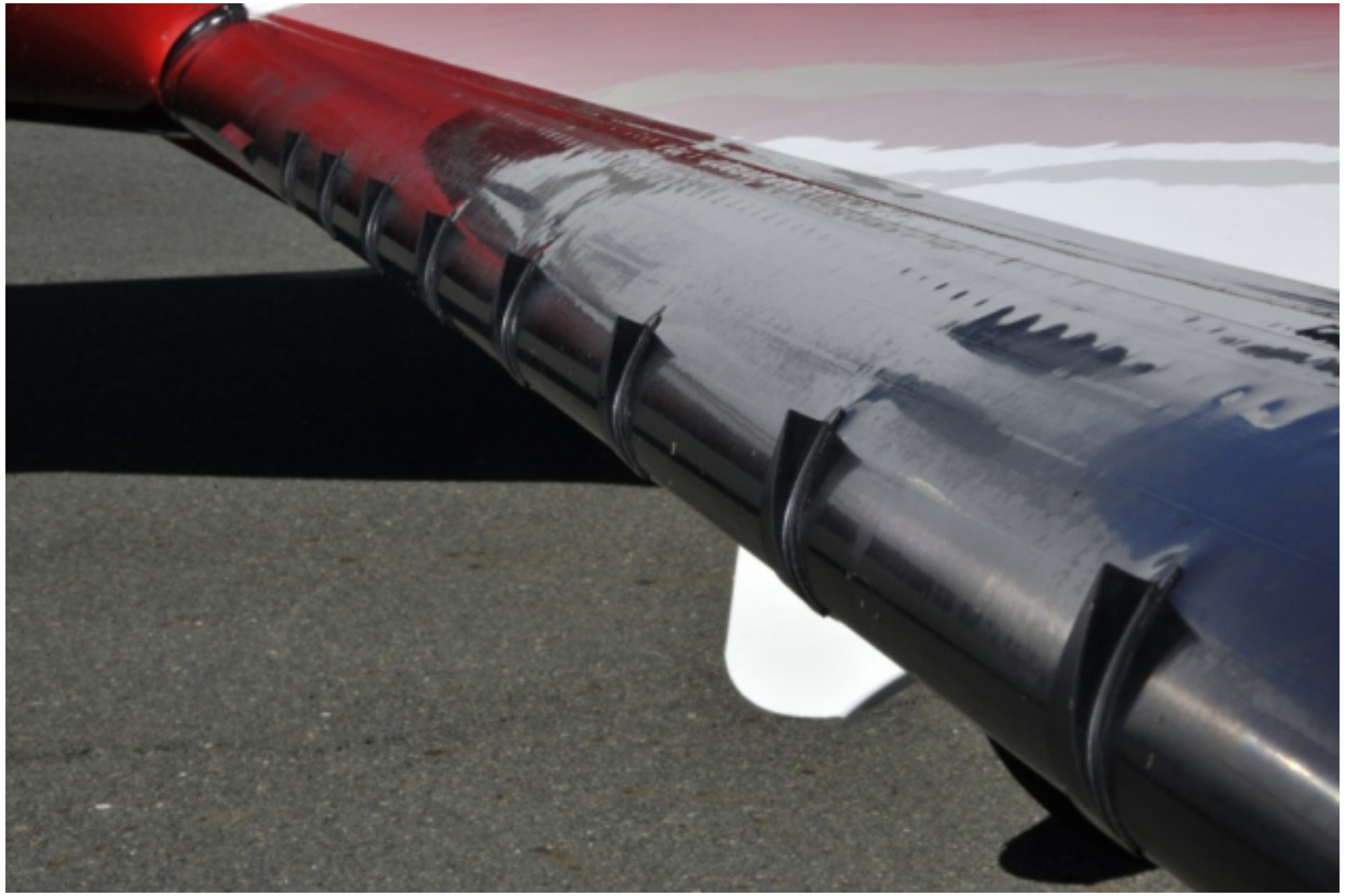


EXECUTIVE
FLIGHT TRAINING

SURFACE DEICE BOOTS

The wing, horizontal stabilizer, and vertical tail are deiced by boots that are controlled by the WING/STAB switch.

The wing boots are separated into an upper chamber and a lower chamber.



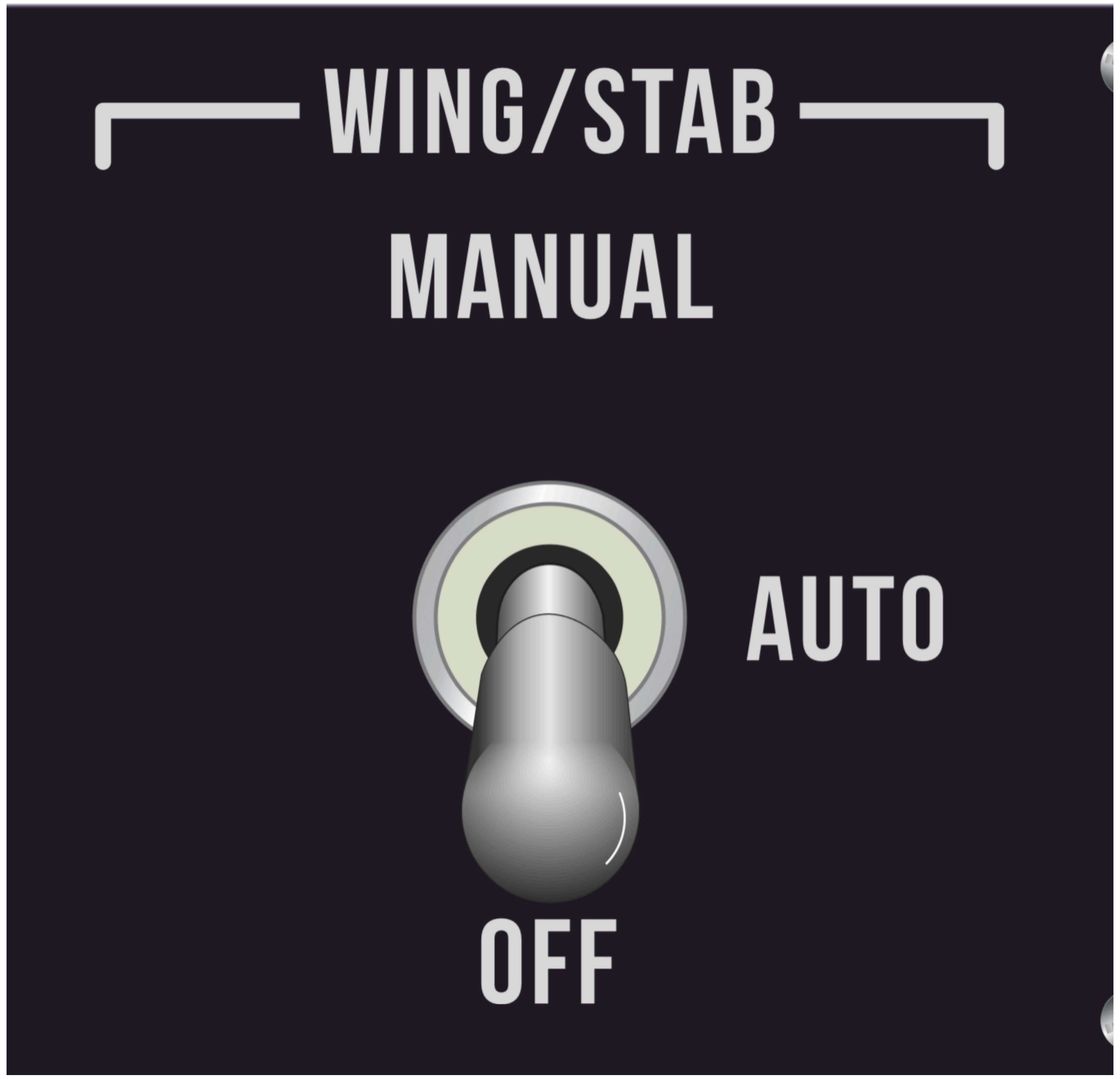
WING/STAB SWITCH

The WING/STAB switch has three positions:

OFF – no power is supplied and air flows through valves to create the vacuum that holds the boots deflated.

AUTO – activates 2-minute boot cycle.

MANUAL – spring-loaded and inflates boots while held in the Manual position.



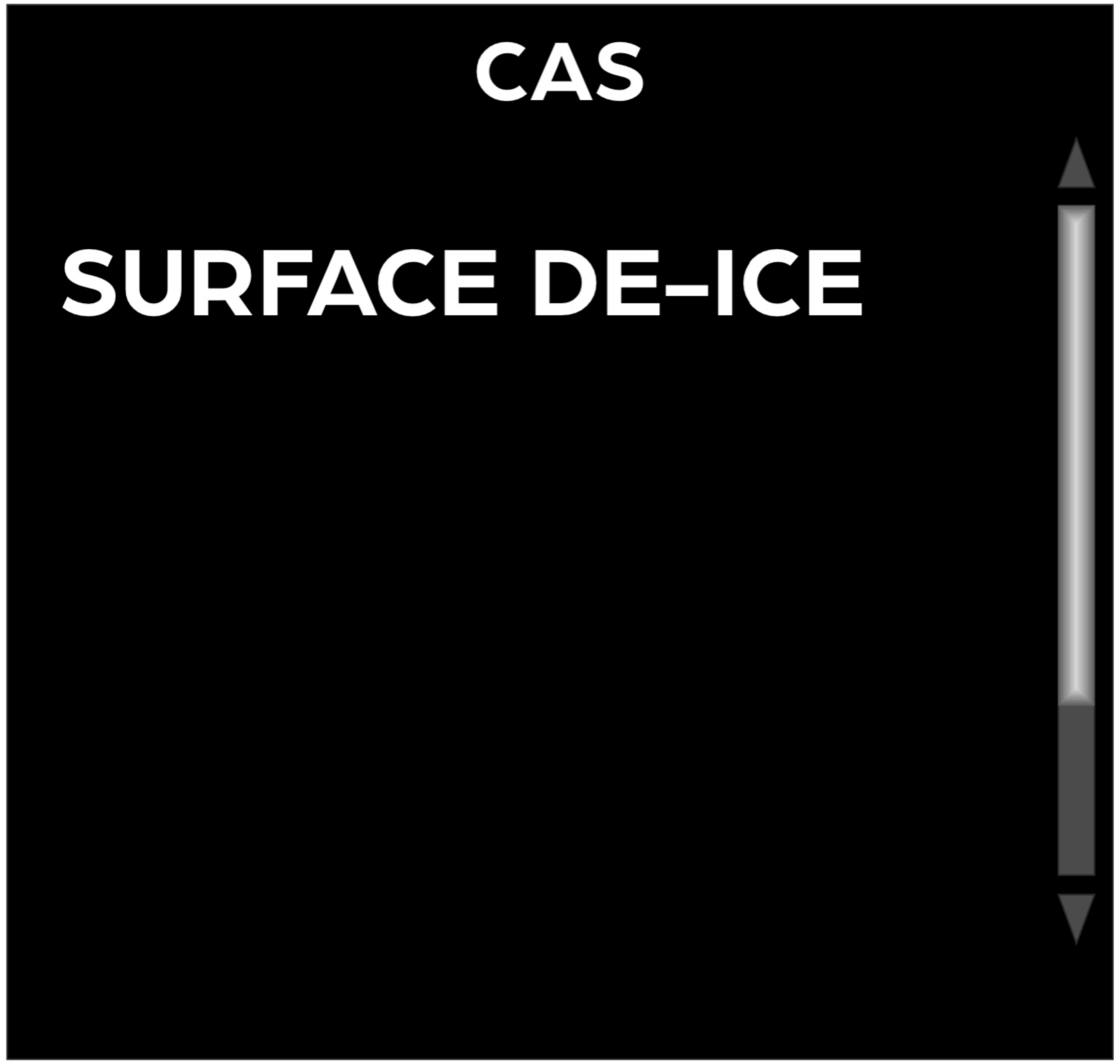
EXECUTIVE
FLIGHT TRAINING

SURFACE DE-ICE

In AUTO mode, the white SURFACE DEICE CAS message indicates boot inflation.

In MANUAL mode, the white message CAS illuminates if all pressure switches receive adequate pressure.

Verify the white SURFACE DEICE CAS message has illuminated following activation to detect a failure of the WING/STAB switch.

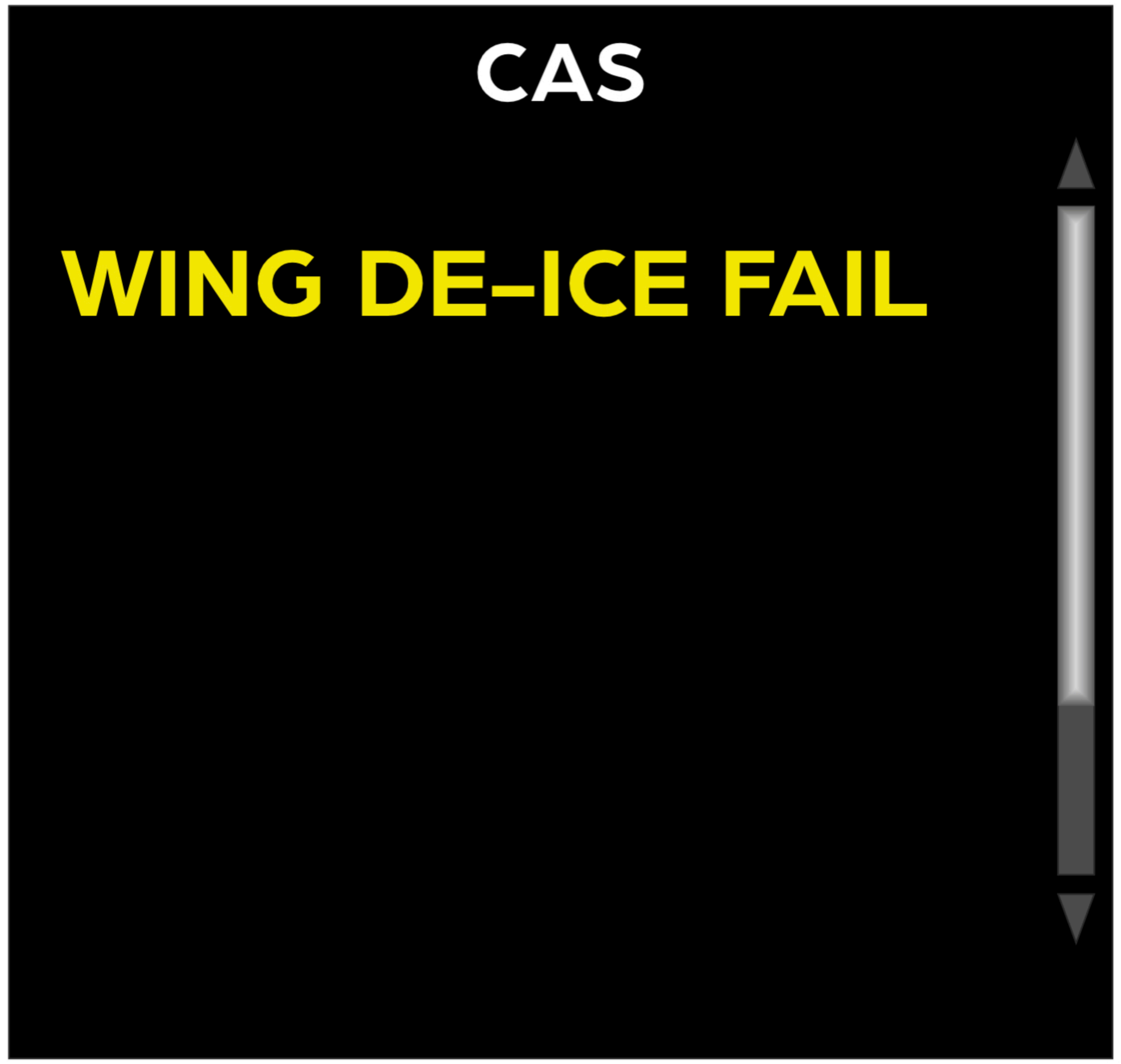


EXECUTIVE
FLIGHT TRAINING

WING DE-ICE FAIL

An amber WING DE-ICE FAIL CAS message will appear if one or more of the pressure switches do not receive adequate pressure.

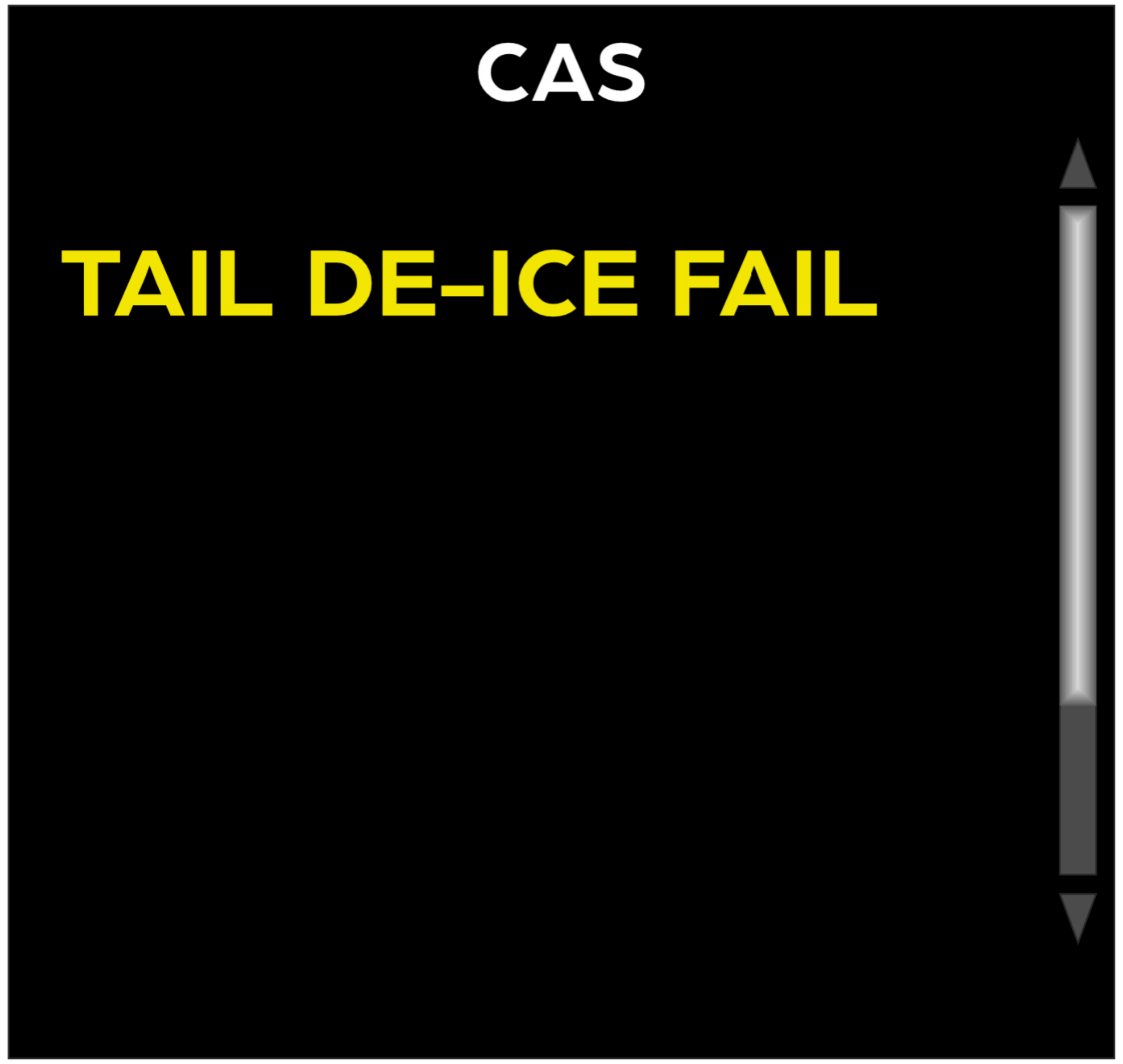
The message will also appear if pressure is sensed in the de-ice boot with the switch in the OFF position.



TAIL DE-ICE FAIL

The amber TAIL DE-ICE appears when one or more pressure switches in the tail system does not receive adequate pressure.

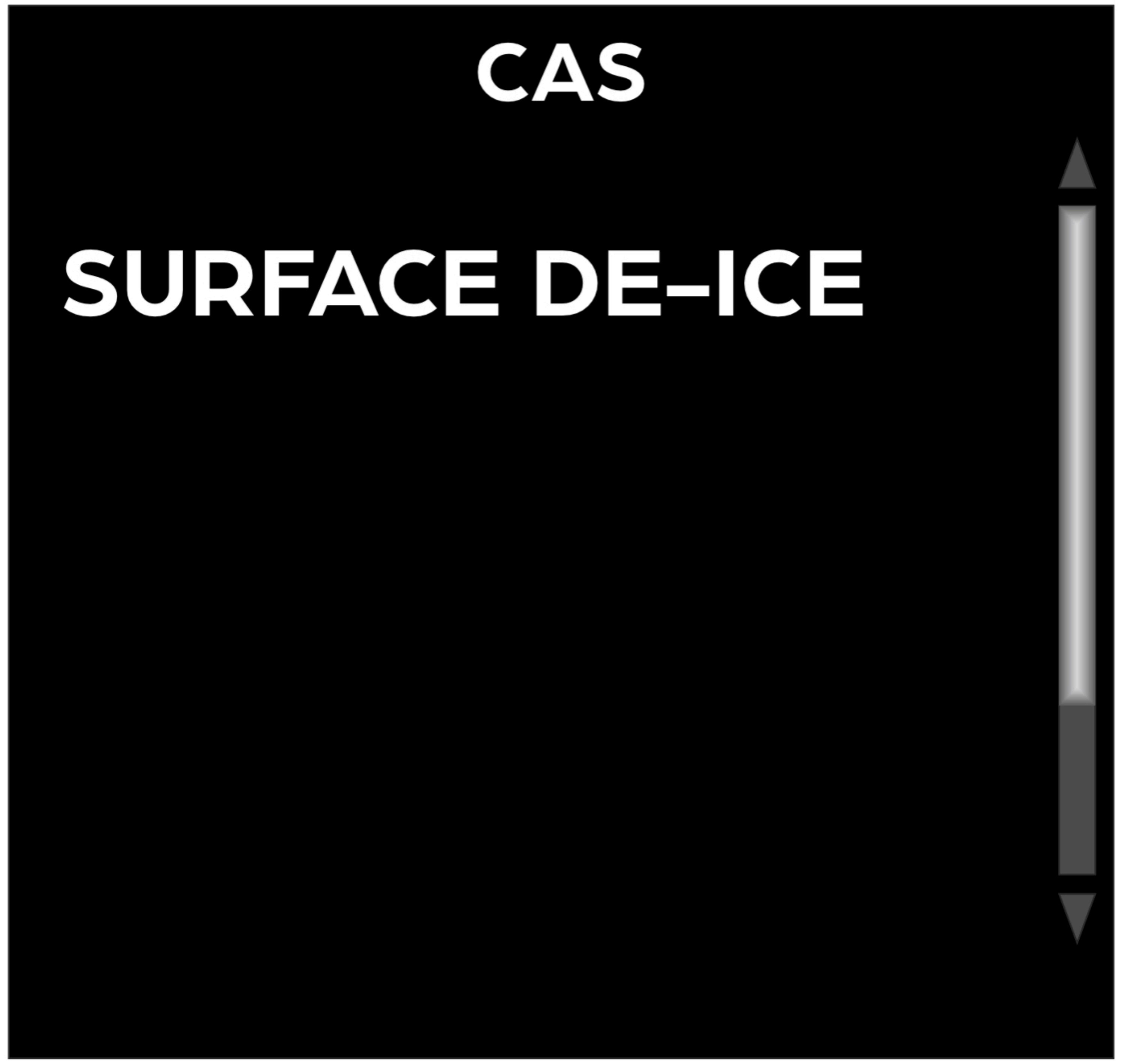
The message will also appear if pressure is sensed in the tail boot with the switch in the OFF position.



MANUAL MODE

Holding the WING/STAB switch in the MANUAL position will inflate all of the deice boots.

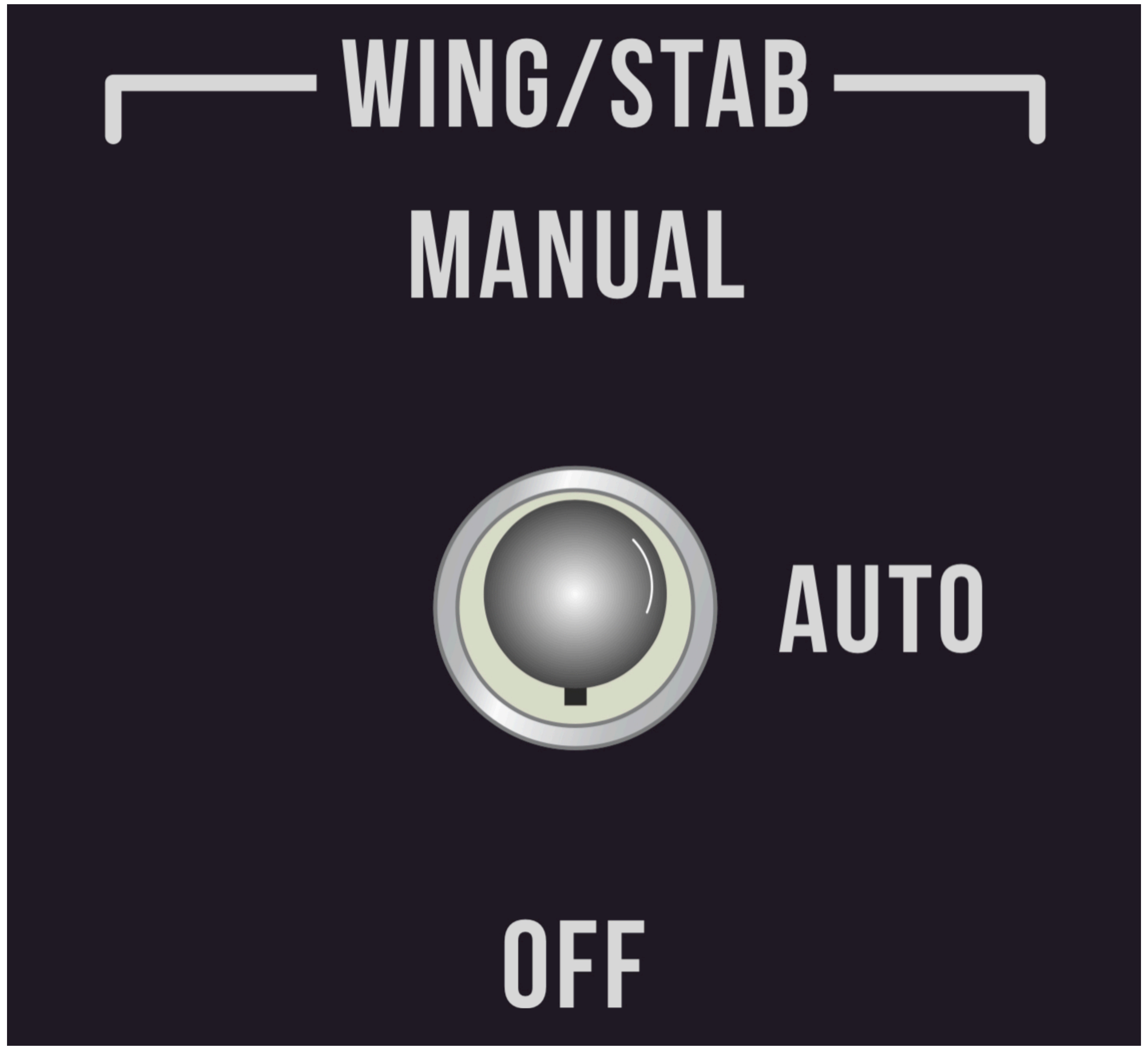
While the switch is held in manual, the deice boots will all remain inflated, and a white SURFACE DEICE CAS message will appear.



AUTOMATIC MODE

While operating in automatic mode, a sequential timer will inflate and deflate the deice boots every 2 minutes.

The sequence repeats continuously until the OFF or MANUAL position is selected.



WINDSHIELD ICE & RAIN PROTECTION

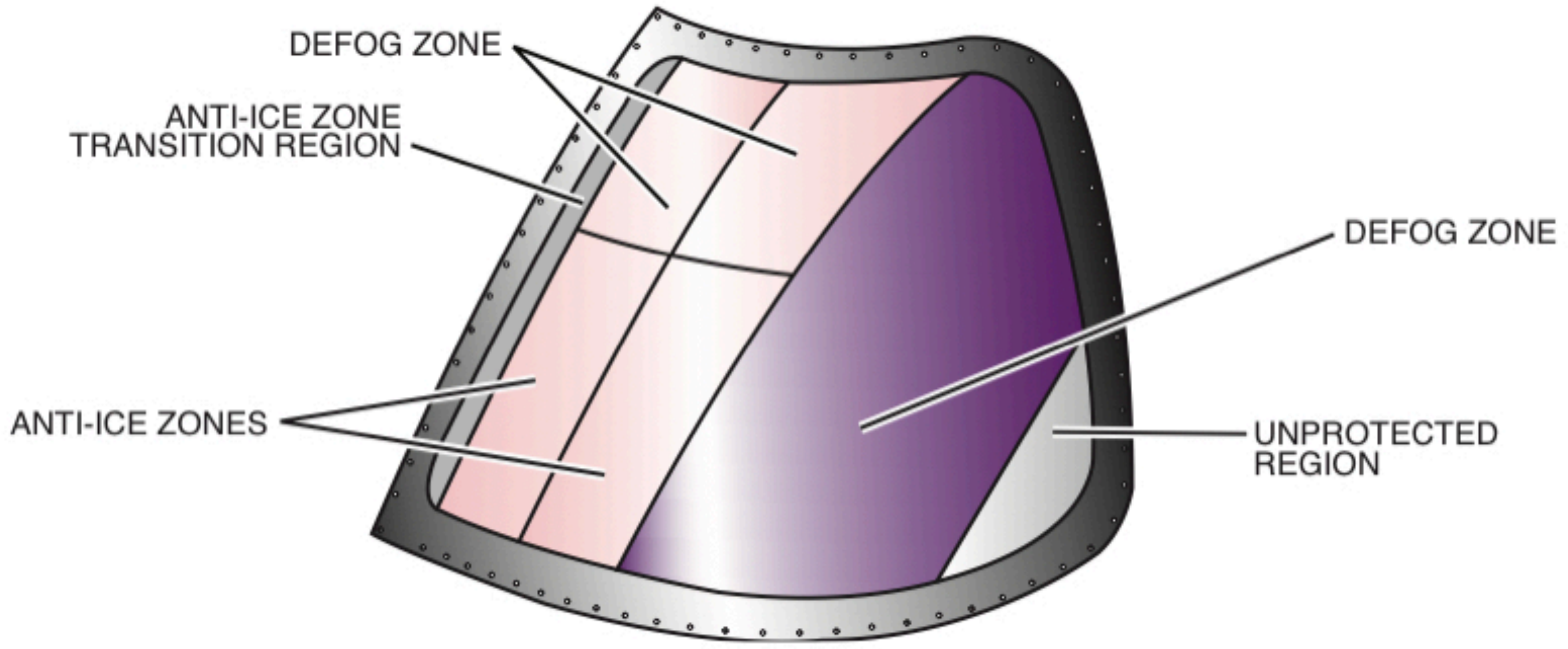
Windshields include electric anti-icing/defogging and have a rain repellent coating applie

Individual sections of each windshield have different levels of protection.

28-VDC electric power provides windshield anti-ice and defog capability.

Each windshield incorporates filament heaters in three separate zones:

- ✓ Inner zone – both anti-ice & defog.
- ✓ Middle zone – both anti-ice and defog.
- ✓ Defog zone – defog capability only.



EXECUTIVE
FLIGHT TRAINING

LOSS OF L OR R GENERATOR POWER

AG aircraft **510-0001** through **0040:**

With loss of L or R generator power, the operating windshield controller only provides power to one panel on the pilots side windshield.

AF aircraft **510-0041** and **subsequent:**

With loss of L or R generator, the operating windshield controller provides power to one panel on pilots side and one panel on copilots side

If both generators are operating and just one of the windshield controllers fail, then only the portions of the windshield powered by the failed controller are inoperative.

EXECUTIVE
FLIGHT TRAINING

RAIN REPELLENT

- A rain repellent coating has been applied to the windshield's external surface to provide rain protection.
- The rain repellent coating requires inspection and occasional refurbishment.
- The windshield should only be cleaned with a soft rag and water to prevent damaging the coating.

EXECUTIVE
FLIGHT TRAINING

WINDSHIELD ANTI-ICE SWITCHES

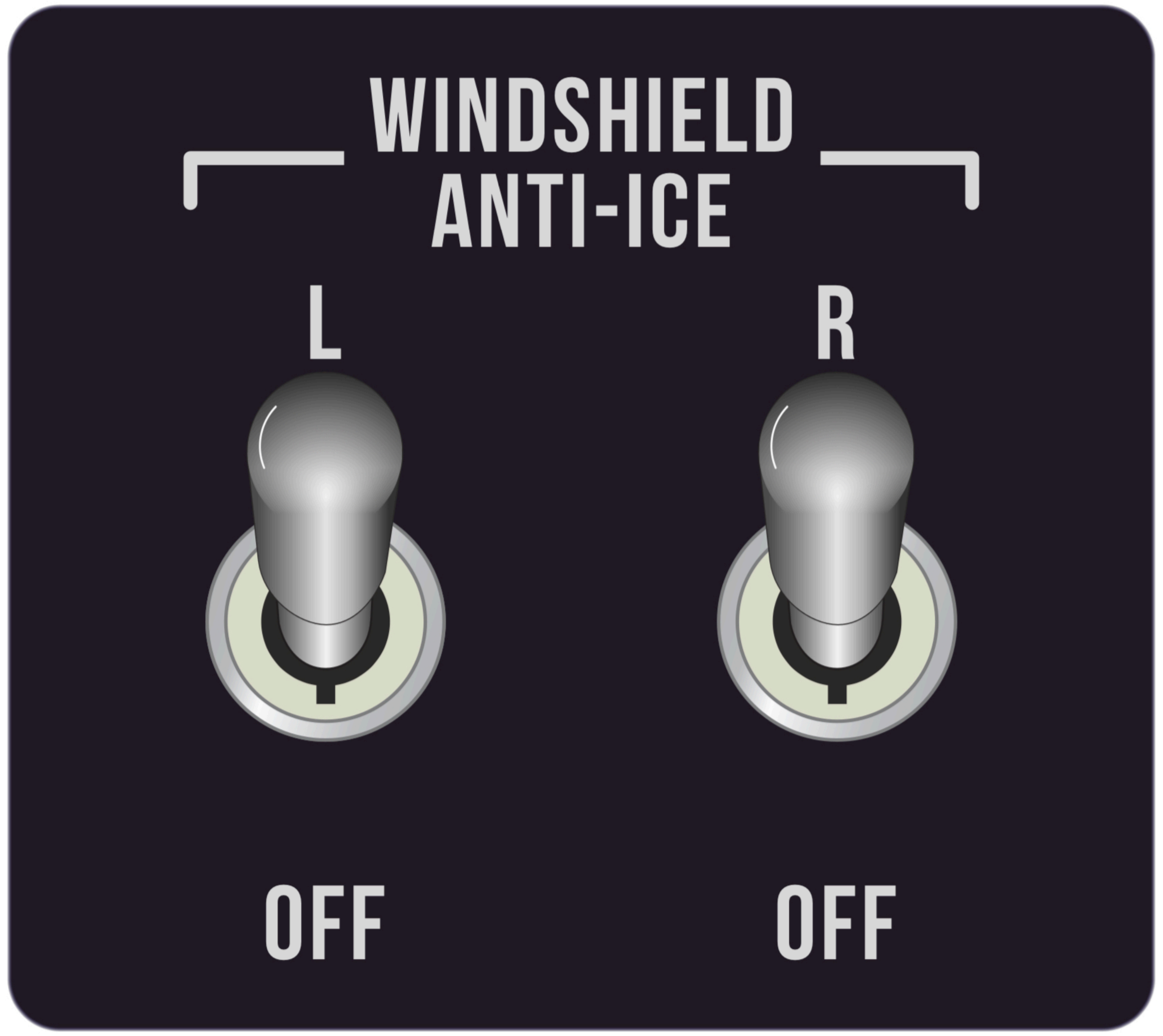
The L and R WINDSHIELD ANTI-ICE switches have two positions:

ANTI-ICE

Placing the respective switch in the UP position applies power to both defog and anti-ice windshield zones.

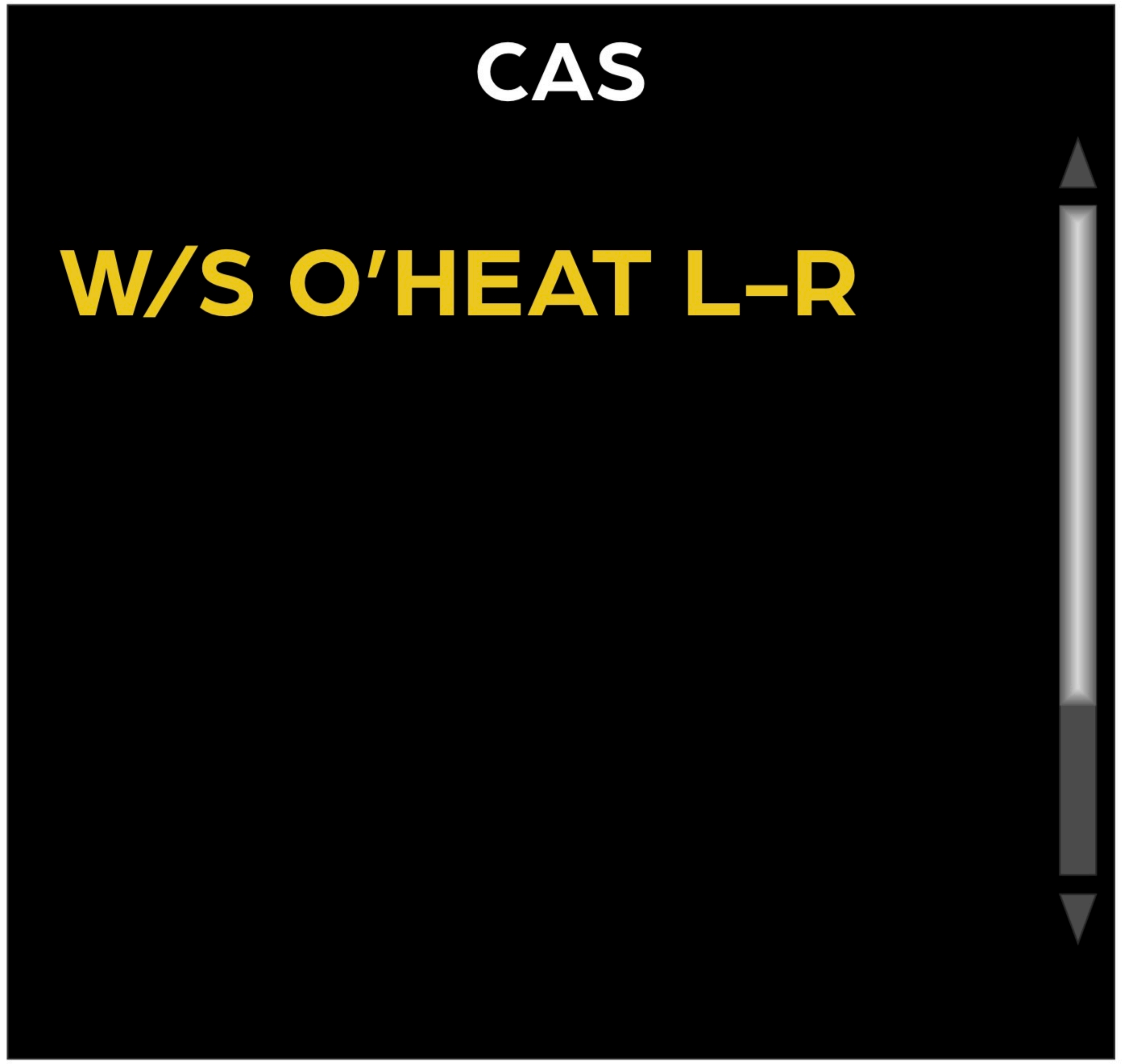
OFF

This position removes power from system.



W/S O'HEAT

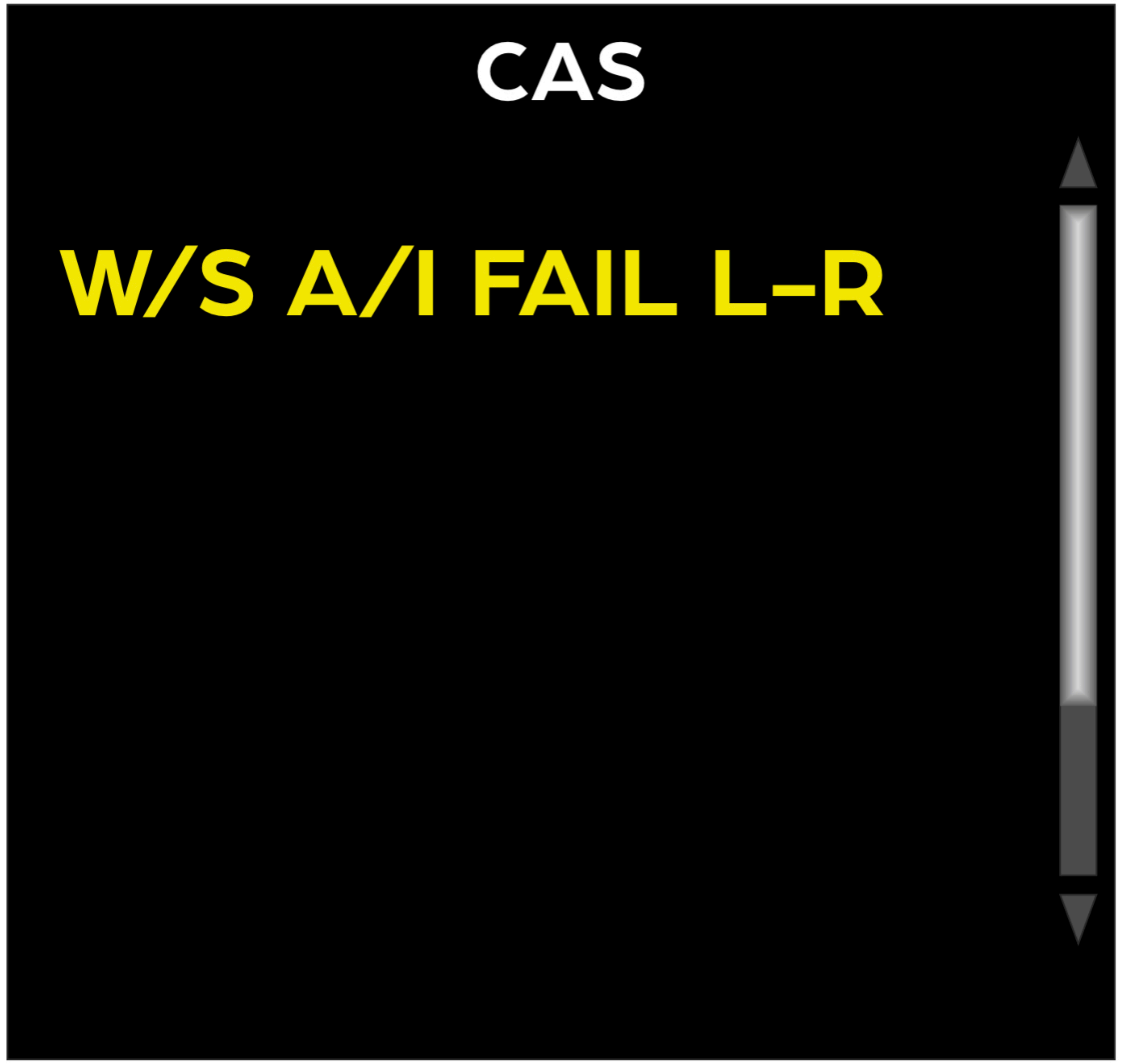
- If the windshield controller detects an overheat condition, electrical power is removed from the overheated zone and a white W/S O'HEAT message illuminates.
- The message will remain on until the temperature falls back to an acceptable range.
- If the overheat continues for more than 5 seconds, the CAS message changes to amber.



EXECUTIVE
FLIGHT TRAINING

W/S ANTI-ICE FAIL

- When the L or R WINDSHIELD switch is on and power is lost, a white W/S A/I FAIL (L or R) message will illuminate.
- If power failure continues for more than 5 seconds, the message becomes amber.



WINDSHIELD ICE DETECTION LIGHTS

- Two red LED lights are found at the base of the windshield:
- If the windshield is ice free, the lights shine through the windshield and cannot be seen.
- If ice forms on the windshield, the lights reflect back alerting the pilot that ice is accumulating.

EXECUTIVE
FLIGHT TRAINING

SENSOR ANTI-ICE COMPONENTS

Electric heat provides anti-ice protection for the following sensors:

- Pitot probes
- Static ports
- Stall warning vane
- T2 probes

SENSOR ANTI-ICE SWITCH

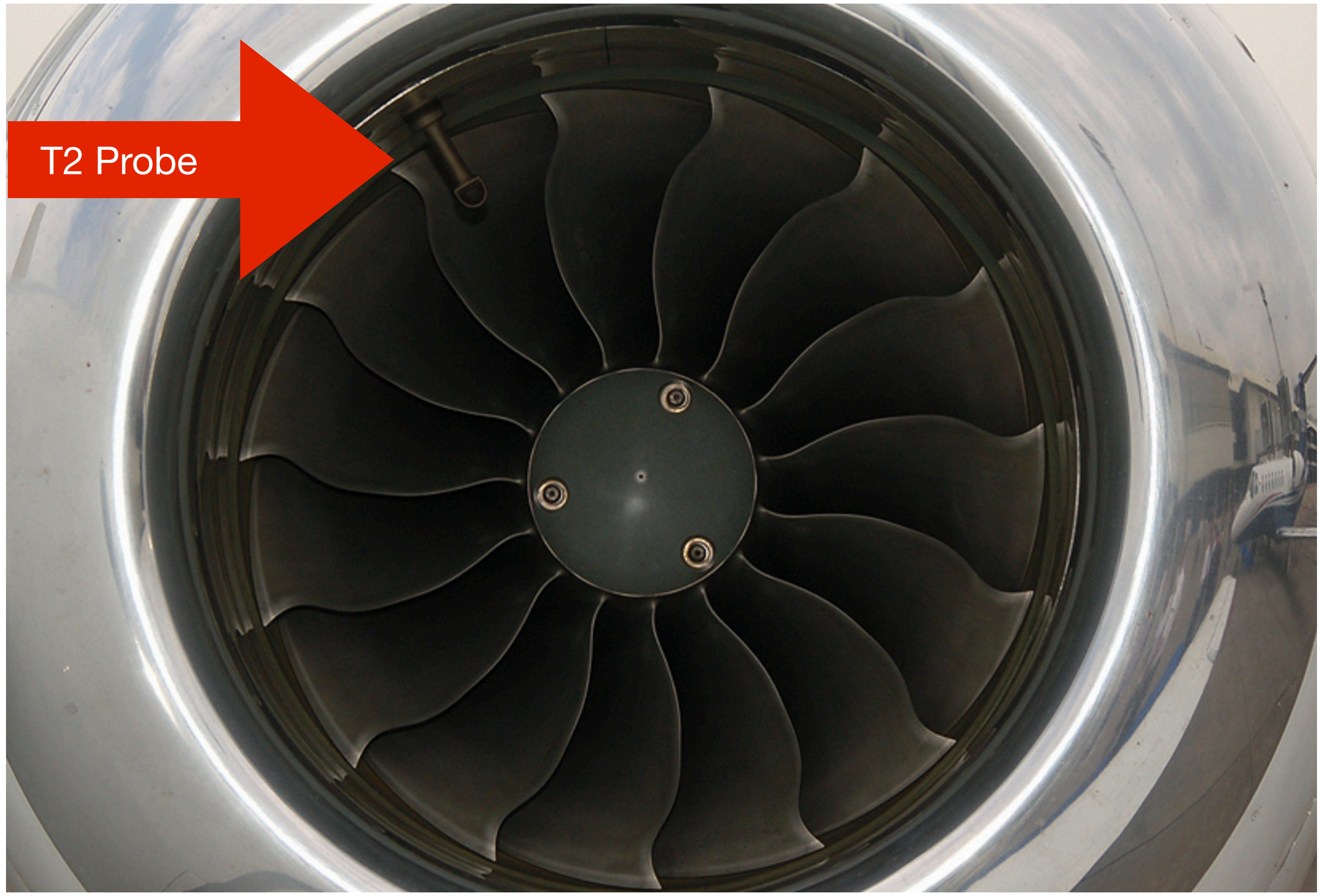
Pitot probes, static ports, and the stall warning vane heaters are all controlled by a three position switch on the ICE PROTECTION panel:

1. RESET STALL WARN – momentarily resets stall warning to normal stall airspeed.
2. PITOT STATIC – applies power to the sensors: both pitot probes, 4 static ports, and stall warning vane.
3. OFF – removes all power from those sensors

EXECUTIVE
FLIGHT TRAINING

ENGINE ANTI-ICE T2 SWITCHES

The T2 probes are electronically heated when their corresponding ENGINE ANTI-ICE switches are in the L or R position and the engine is running. Ice on the probe causes inaccurate FADEC T2 information and increases the possibility of ingesting ice into the engine.

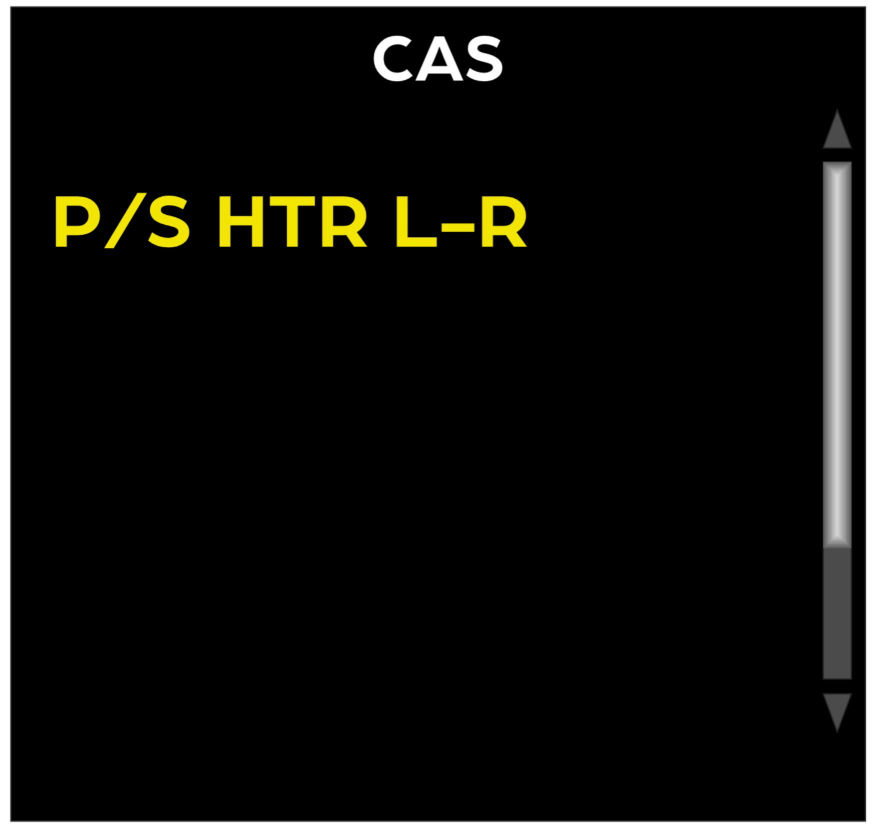


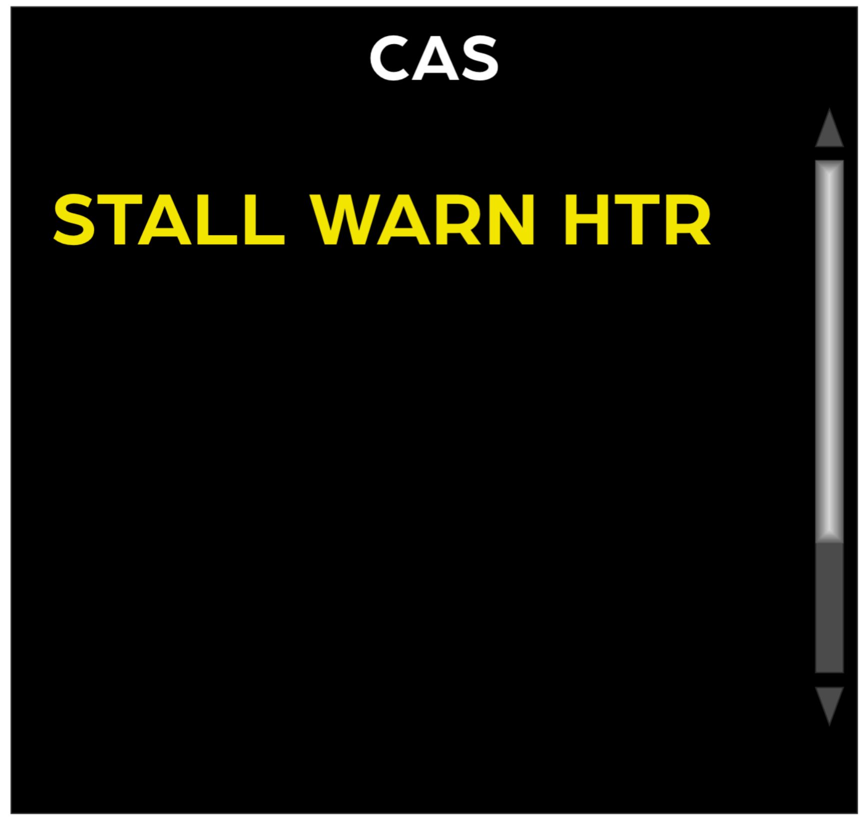
EXECUTIVE
FLIGHT TRAINING

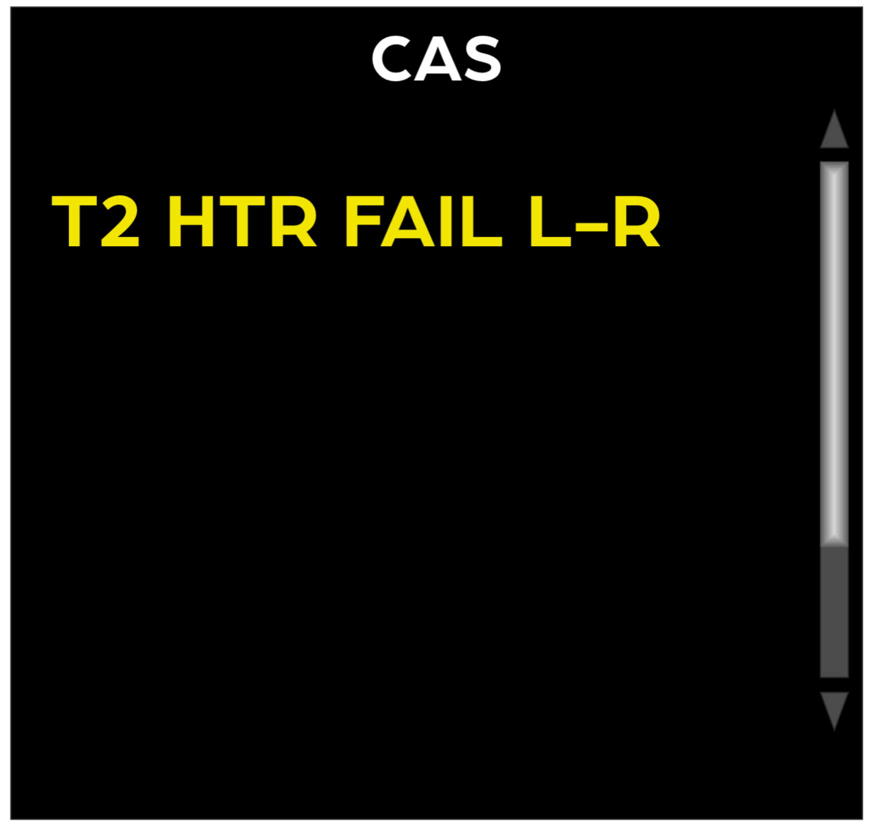
CAS MESSAGES

These amber messages indicate failure of the heating circuits for corresponding sensors:

- P/S HTR L-R – pitot-static systems.
- STALL WARN HTR – stall warning vane.
- T2 HTR FAIL L-R – T2 probes







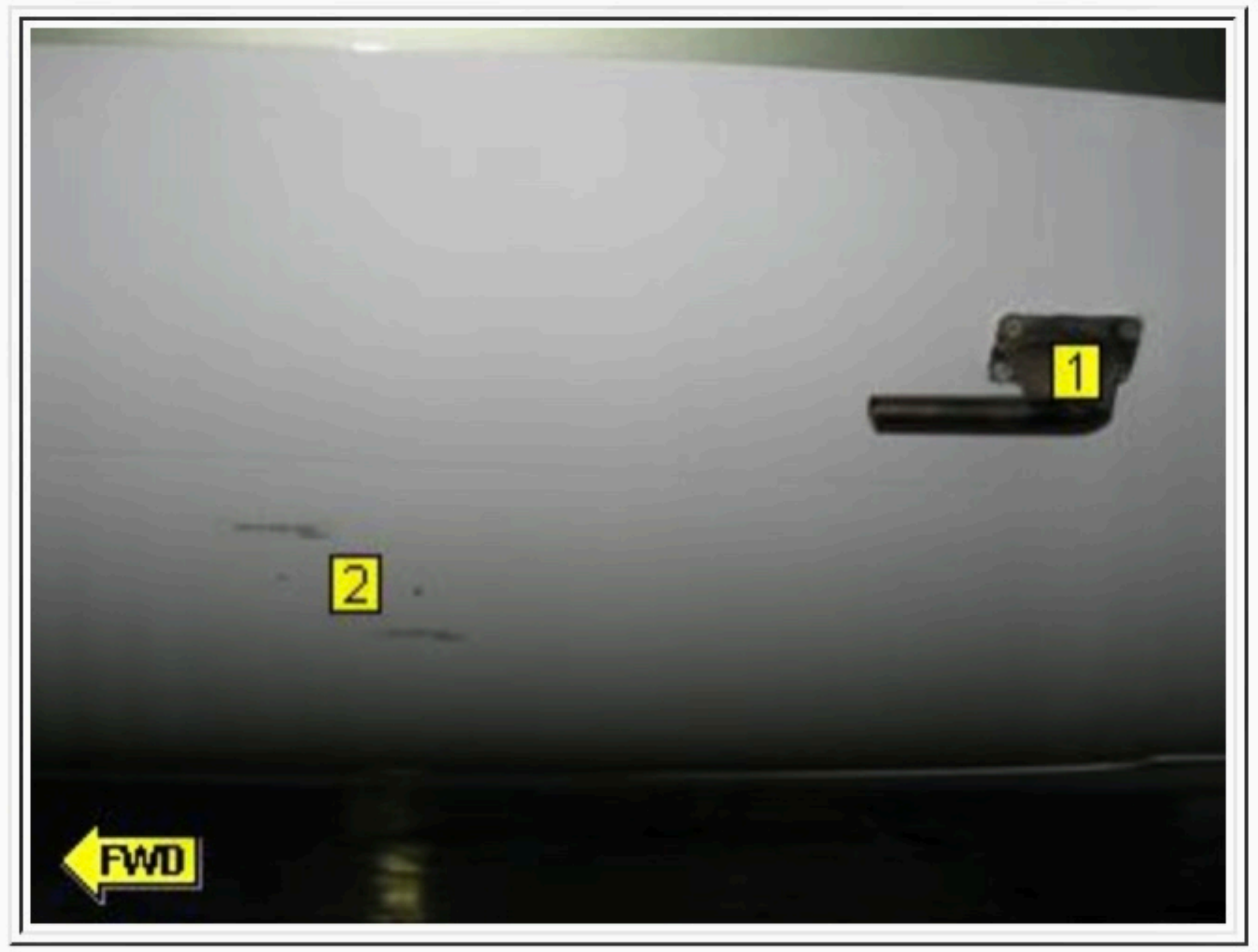
OPERATION

Pitot probe, static port, and the stall warning vane heaters are powered by selection of the PITOT STATIC position on the sensor anti-ice switch.

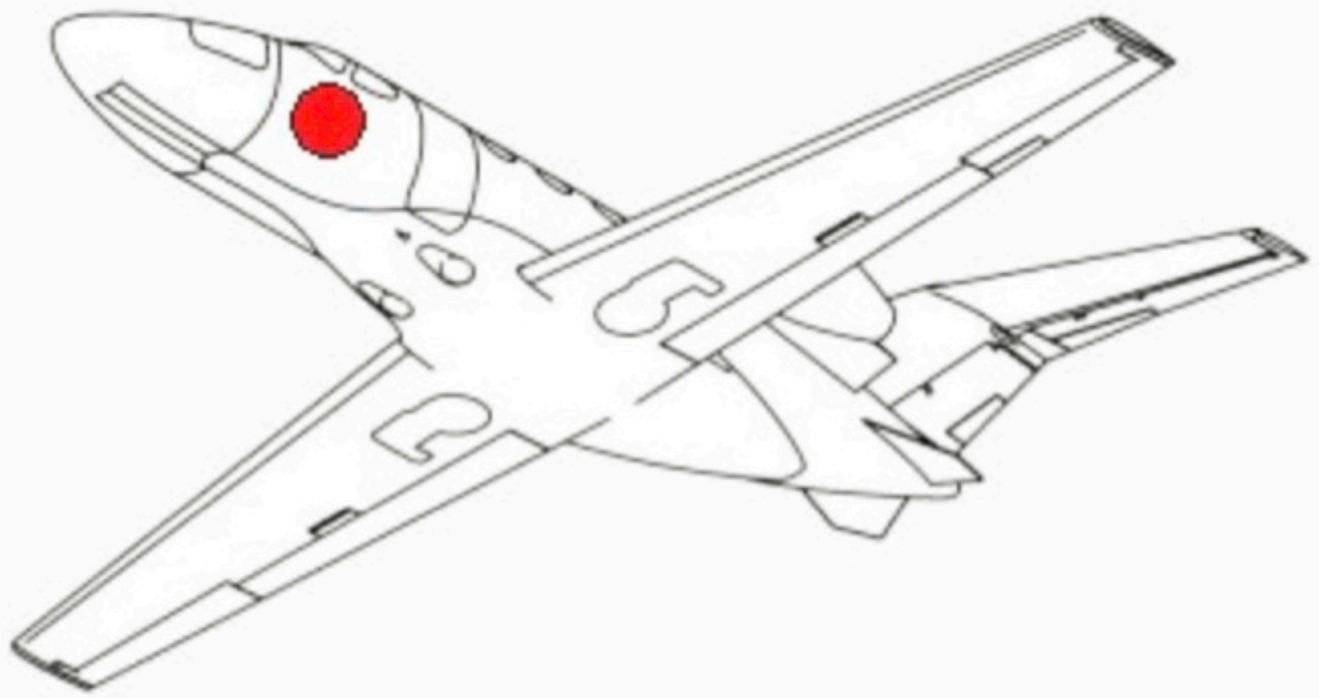
In flight – sensor anti-ice switch should be in the PITOT STATIC position (on) which is responsible for heating external sensors.

On ground – except when ready for takeoff, switch should normally be in OFF position to prevent overheating.

During preflight – switch may be set to PITOT STATIC for 30 seconds to verify the sensors are working.



View looking at left side of aircraft.



1. Left pitot tube
2. Left static ports

EXECUTIVE
FLIGHT TRAINING

STALL WARNING SYSTEM MODE

- Activating the surface deice system automatically changes the stall warning system to a higher airspeed protection mode and does not reset when the surface deice is switched OFF.

- The system remains at this ice-contamination airspeed mode until the flight ends or the RESET STALL WARN is selected.

- The white STALL WARN HI indicates that the stall-warning system is operating in the ice contamination airspeed mode. When the STALL WARN HI CAS message is displayed, the Stall Warning-HIGH Performance tables should be used.

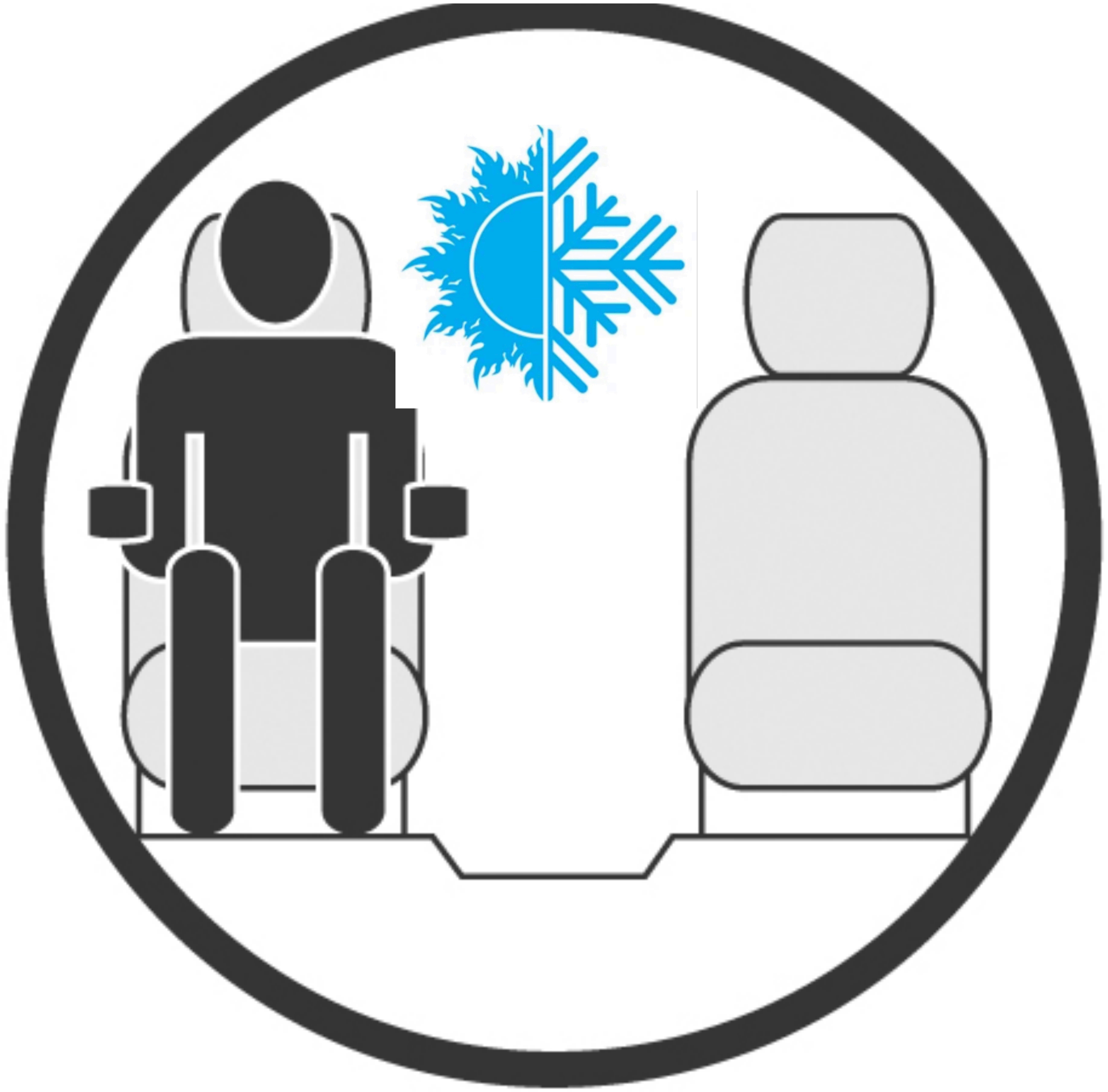
EXECUTIVE FLIGHT TRAINING

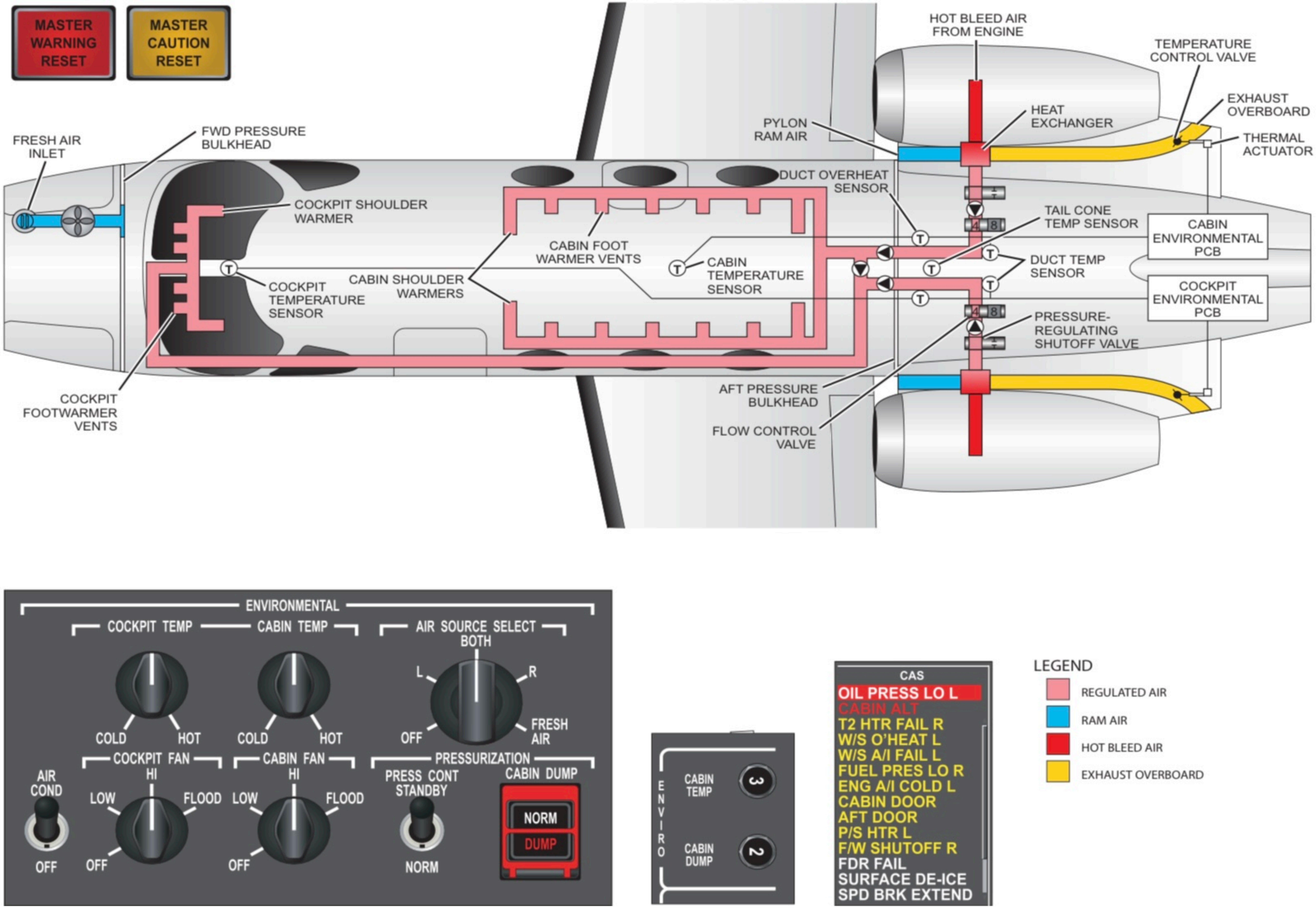
Air Conditioning

AIR CONDITIONING

Bleed air from the engines is used to heat, cool and pressurize the cockpit and the cabin.

Bleed-air inflow is also used to defog cabin and cockpit windows.



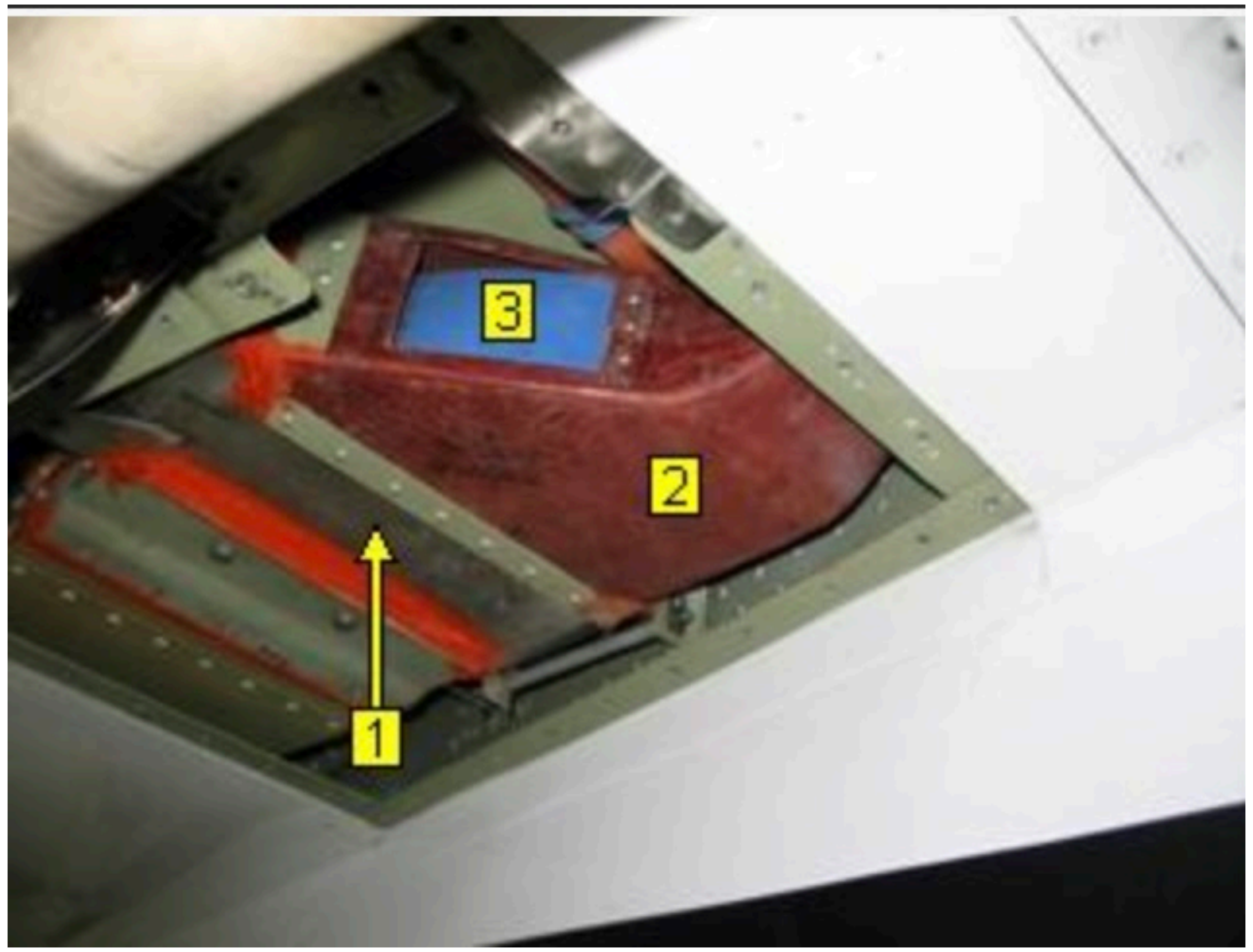

MASTER WARNING RESET
MASTER CAUTION RESET
HOT BLEED AIR FROM ENGINE
TEMPERATURE CONTROL VALVE
EXHAUST OVERBOARD
THERMAL ACTUATOR
HEAT EXCHANGER
PYLON RAM AIR
FRESH AIR INLET
FWD PRESSURE BULKHEAD
DUCT OVERHEAT SENSOR
COCKPIT SHOULDER WARMER
TAIL CONE TEMP SENSOR
CABIN ENVIRONMENTAL PCB
CABIN FOOT WARMER VENTS
CABIN TEMPERATURE SENSOR
DUCT TEMP SENSOR
CABIN SHOULDER WARMERS
COCKPIT TEMPERATURE SENSOR
COCKPIT ENVIRONMENTAL PCB
PRESSURE-REGULATING SHUTOFF VALVE
AFT PRESSURE BULKHEAD
FLOW CONTROL VALVE
COCKPIT FOOTWARMER VENTS
ENVIRONMENTAL
COCKPIT TEMP
CABIN TEMP
AIR SOURCE SELECT
BOTH
L
R
OFF
FRESH AIR
COLD
HOT
COCKPIT FAN
CABIN FAN
HI
LOW
FLOOD
OFF
PRESSURIZATION
PRESS CONT STANDBY
NORM
CABIN DUMP
NORM
DUMP
AIR COND
OFF
ENVIRO
CABIN TEMP
CABIN DUMP
CAS
OIL PRESS LO L
CABIN ALT
T2 HTR FAIL R
W/S O'HEAT L
W/S A/I FAIL L
FUEL PRES LO R
ENG A/I COLD L
CABIN DOOR
AFT DOOR
P/S HTR L
F/W SHUTOFF R
FDR FAIL
SURFACE DE-ICE
SPD BRK EXTEND
LEGEND
REGULATED AIR
RAM AIR
HOT BLEED AIR
EXHAUST OVERBOARD

BLEED-AIR SUPPLY

- The cabin temperature is controlled by conditioning the bleed air from the engines.
- Hot bleed air is cooled by flowing through heat exchangers before entering the cabin.
- This conditioned air supplies heat or cool air to the cabin and cockpit.
- The left engine supplies air to the cockpit.
- The right engine supplies air for the cabin area.
- Each system is independent, and failure of one system does not affect the other from operating.

BLEED-AIR TEMPERATURE CONTROL

1. Before entering the cabin, bleed air passes through an air-to-air heat exchanger assembly.
2. Temperature control valve limits ambient ram-air flow through the heat exchanger duct to control temperature of bleed air.
3. An alternate ram air inlet door.



EXECUTIVE
FLIGHT TRAINING

BLEED-AIR FLOW INTO THE CABIN

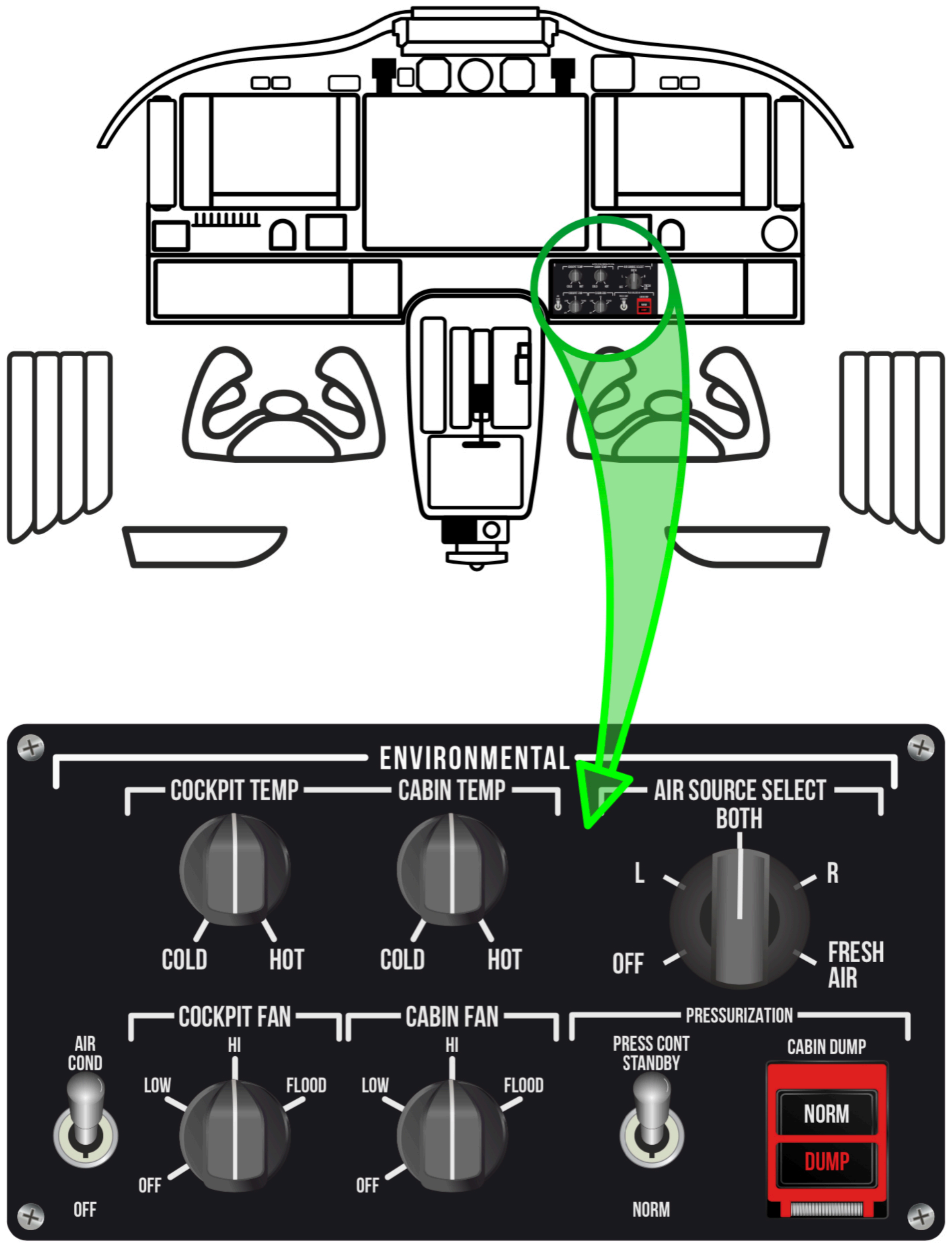
- Cooled, high-pressure bleed air enters the cabin through the pressure regulating and shutoff valves (PRSOV).
- Under normal conditions, both PRSOVs stay open, although the bleed air supply can be manually turned off.
- In the event of a DC power failure, the PRSOVs will fail to the open position, supplying 4 ppm of air flow each.

BLEED-AIR DISTRIBUTION

- The left engine routes warm bleed air to the cockpit foot warmer outlets and to defog the side windows.
- The right engine system routes warm bleed air to the cabin shoulder and foot warmer outlets.

CONTROLS AND INDICATIONS

The environmental bleed-air system controls are located on the ENVIRONMENTAL control panel.



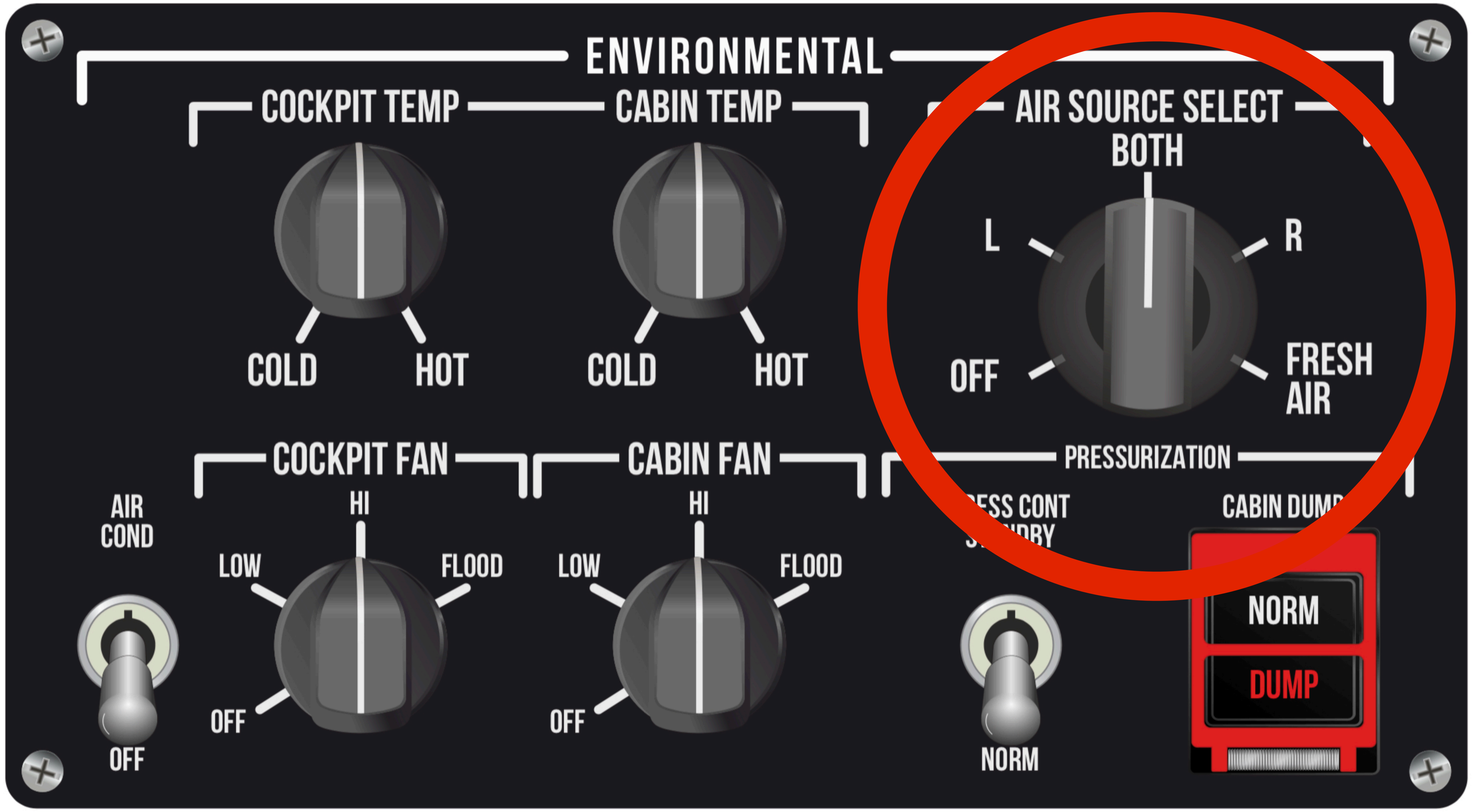
EXECUTIVE
FLIGHT TRAINING

STANDARD OPERATION

In Flight – The AIR SOURCE SELECT knob is set to both to ensure proper pressurization inflow and adequate warm air.

On Ground – If the AIR SOURCE SELECT knob is set to BOTH, bleed-air heat is only available if cabin temperature is below 65°F or the throttles are above 85% TLA. If knob is set to L or R, bleed-air will be supplied regardless of temperature or TLA position.

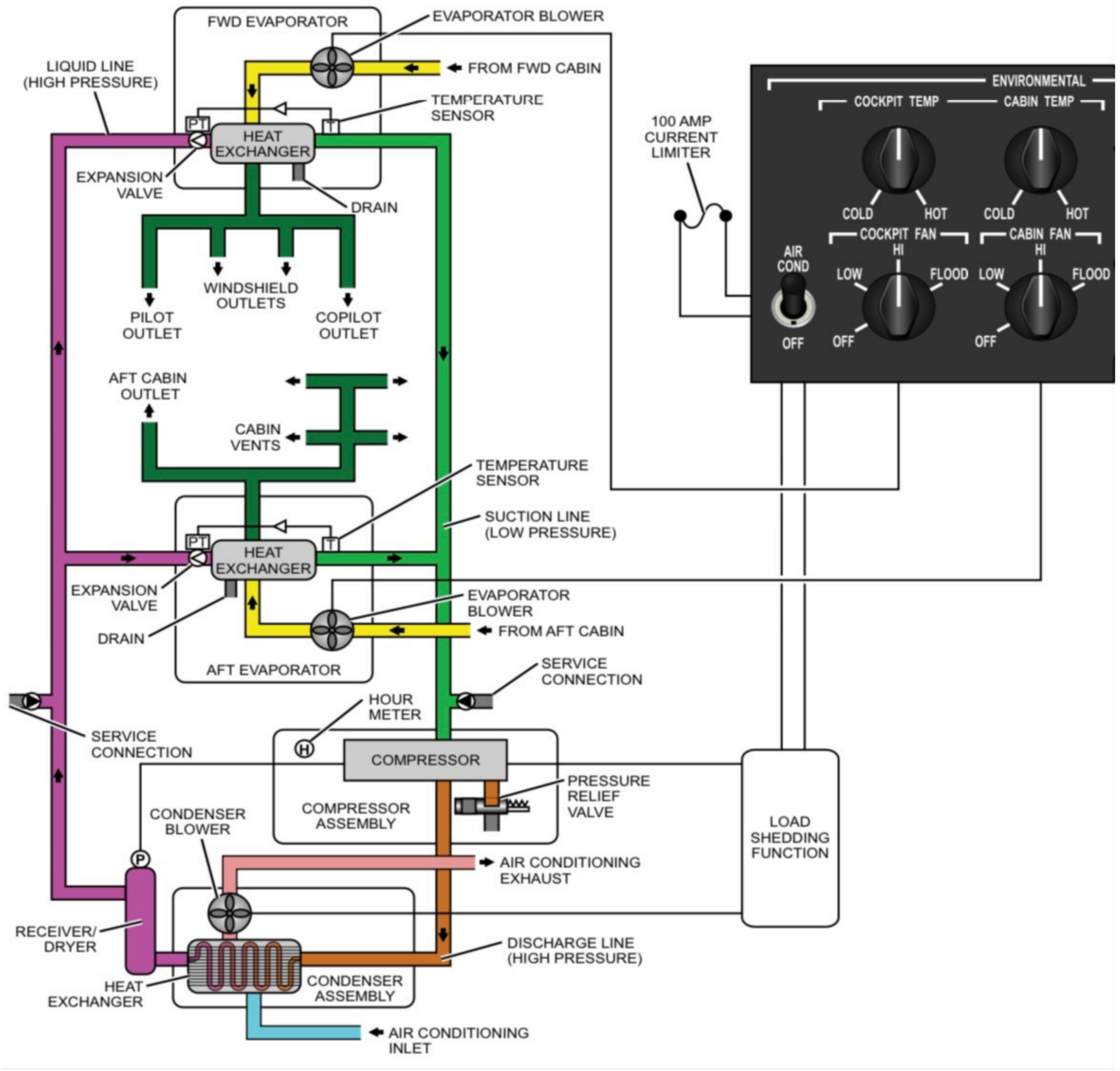
In flight, bleed-air inflow is available all the time.



EXECUTIVE
FLIGHT TRAINING

VAPOR-CYCLE AIR CONDITIONING

The vapor-cycle air conditioning system provides cool, dry air for the cockpit and the passenger cabin. The system works in conjunction with the temperature controlled bleed air.



EXECUTIVE
FLIGHT TRAINING

AIR CONDITIONING COMPONENTS

REFRIGERANT – The Citation Mustang uses R-134 refrigerant.

COMPRESSOR – A DC-powered compressor in the tail cone compresses warm, low-pressure vapor from evaporators into a hot, high-pressure gas. It then pumps it through the condenser.

CONDENSER – Cools the hot high-pressure gas flowing from the compressor before it enters the pressure vessel.

EVAPORATORS – The cold refrigerant chills the evaporator coils. Blower fans push the cockpit or cabin air over the coils which reduces the temperature before forcing the cold air into the cockpit or cabin.

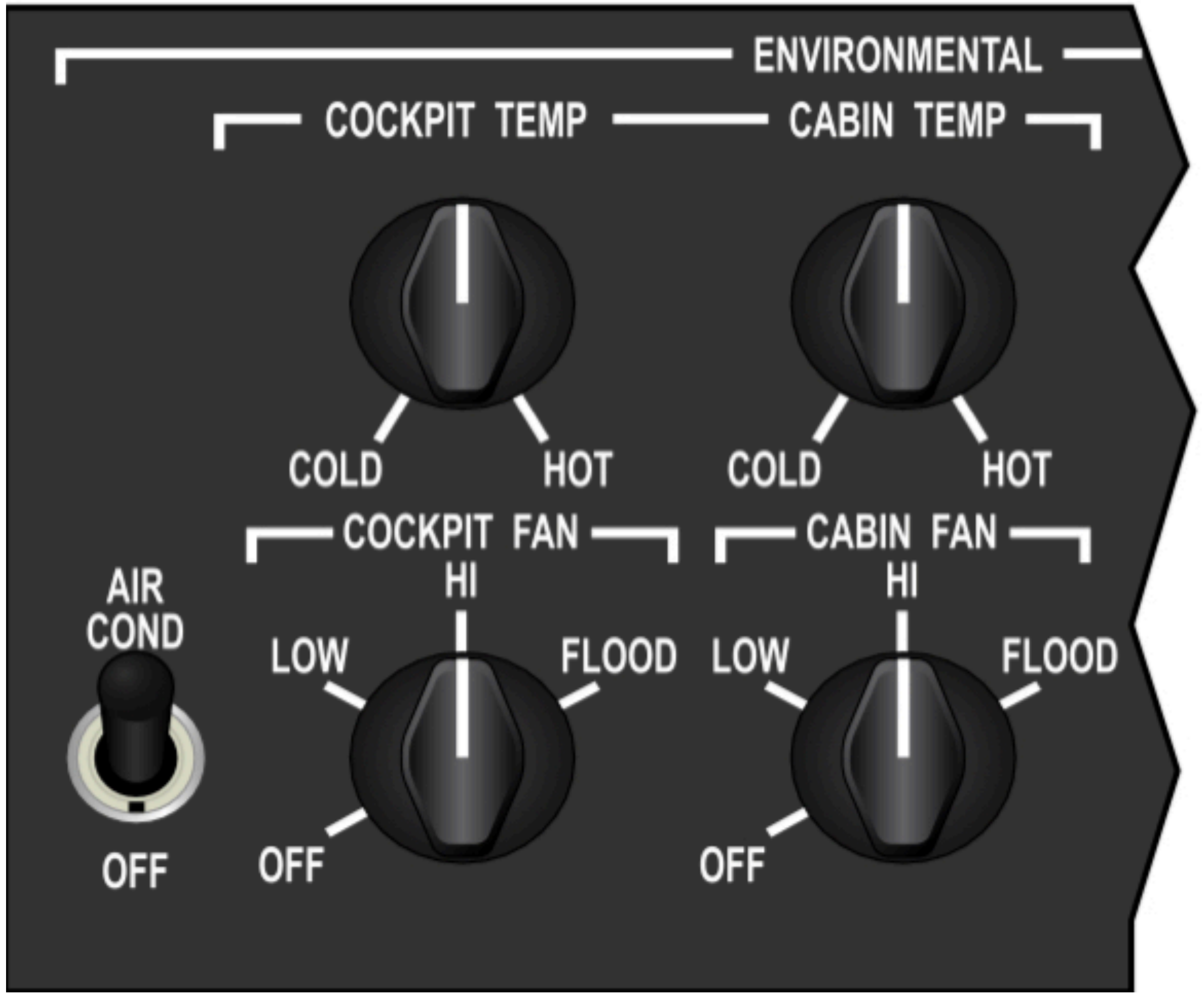
CONTROLS AND INDICATIONS

The AIR COND switch:

- This activates the vapor cycle system when selected on.

COCKPIT FAN and CABIN FAN switches:

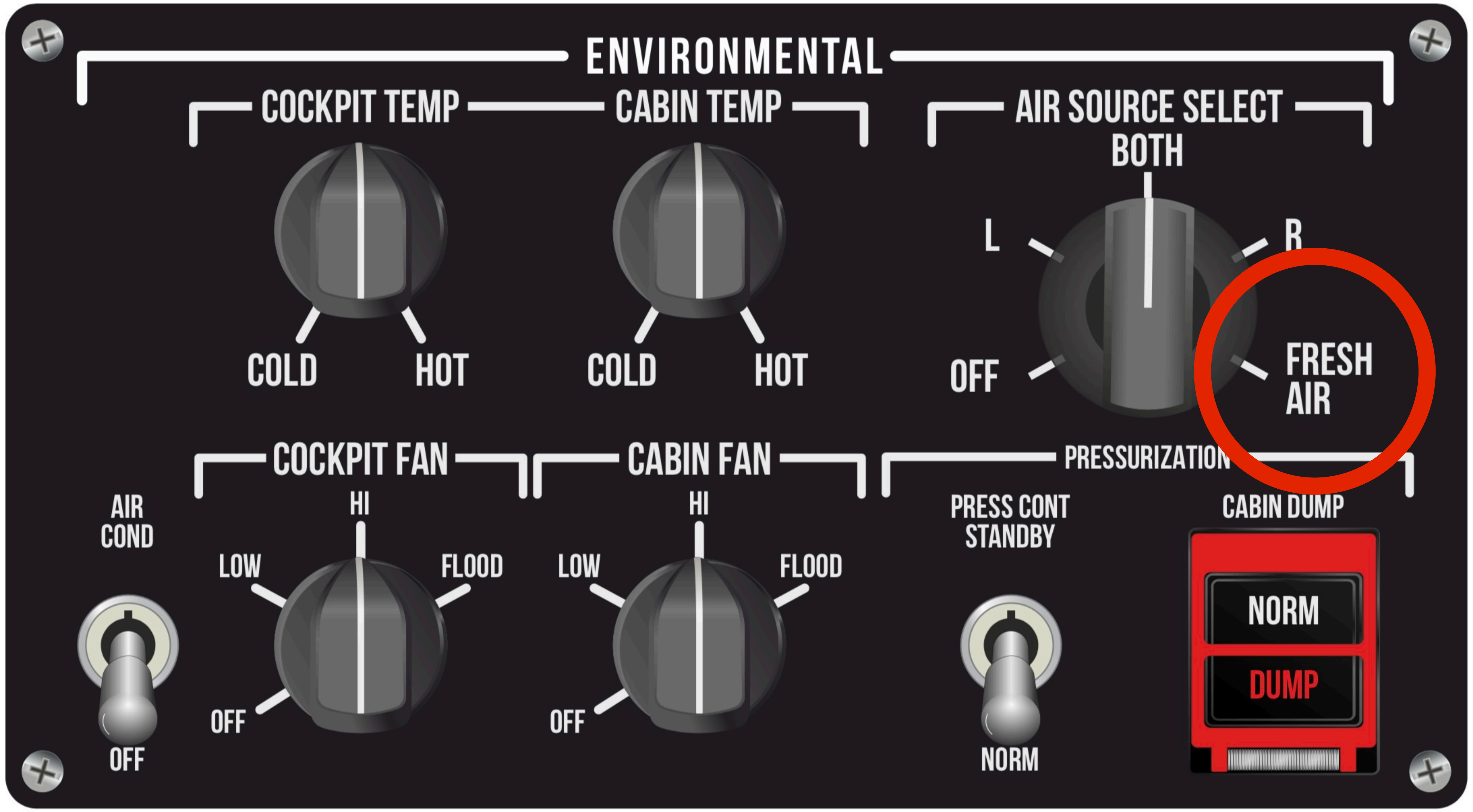
- The LOW, HIGH and FLOOD positions direct air flow through adjustable cockpit/cabin outlets.
- The OFF position de-energizes the fan.



EXECUTIVE FLIGHT TRAINING

FRESH AIR & FANS

- A separate fresh-air system is in the cockpit located between the copilot rudder pedals.
- If FRESH AIR is selected, the duct will route fresh air to the cockpit between the copilot rudder pedals.
- The FRESH AIR position shuts off pressurized bleed-air inflow and the vessel will depressurize at a nominal leak rate.
- For use only when on ground or in unpressurized flight



Pressurization System

PRESSURIZATION

General

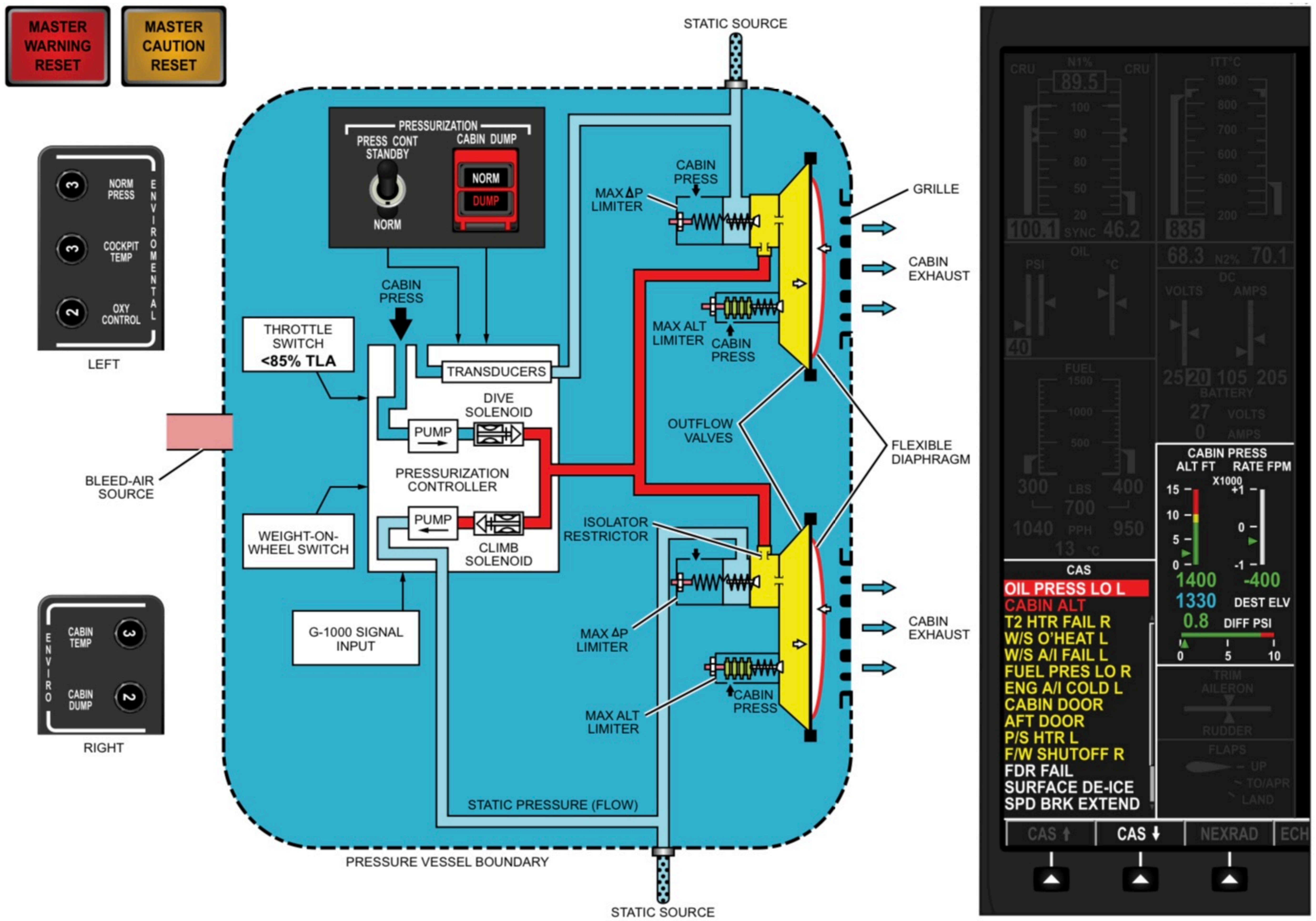
There are two requirements for cabin pressurization:

1. A constant source of temperature controlled bleed air flowing into the cabin.
2. A controlled outflow of bleed air from the cabin.

SYSTEM OPERATION

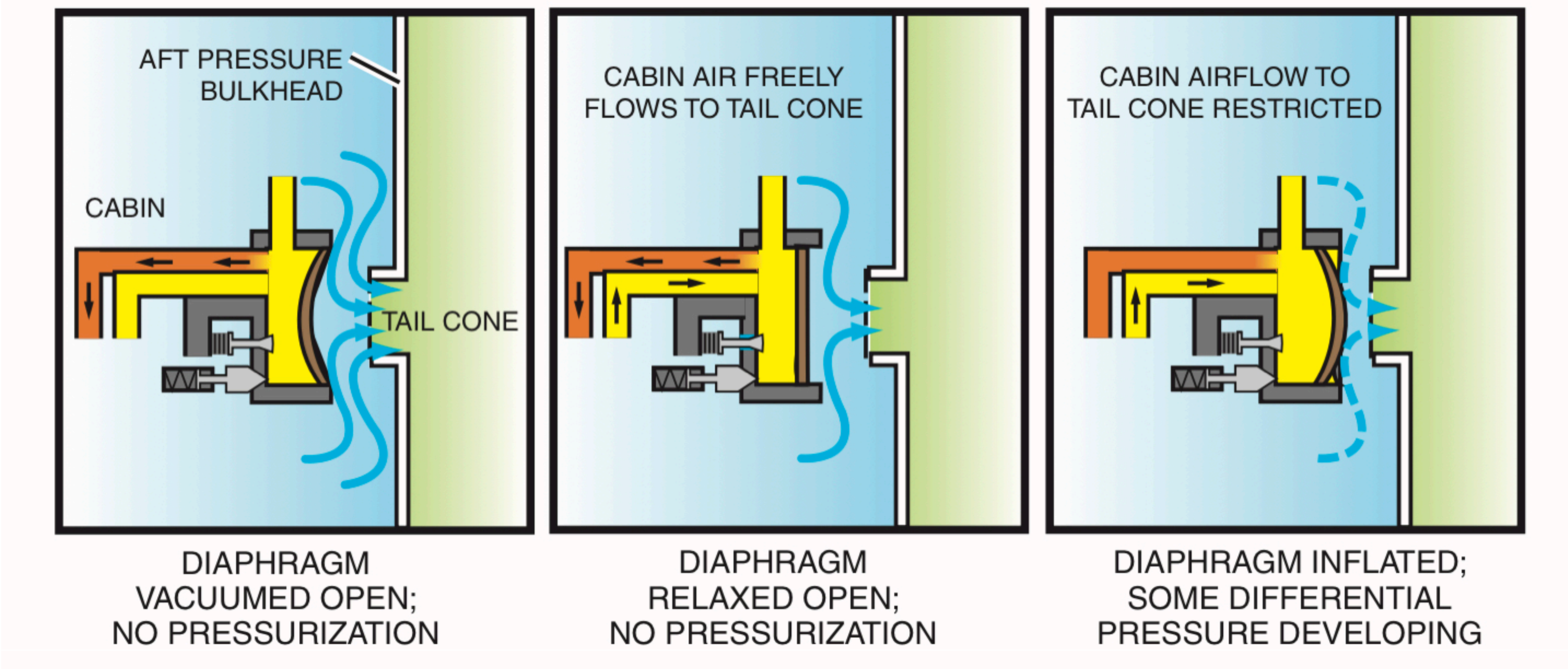
Two outflow valves located on the aft cabin pressure bulkhead open and close regulating the amount of air flowing out of the cabin and into the tail cone.

- When the outflow valves open – the air flowing out of the cabin increases, reducing the cabin pressure, resulting in the cabin altitude climbing.
- When the outflow valves close – the air flowing out of the cabin decreases, increasing the cabin pressure, resulting in the cabin altitude decreasing.



EXECUTIVE FLIGHT TRAINING

OUTFLOW VALVES



- The outflow valves releases cabin air at a regulated rate to establish a balance between incoming bleed air and outgoing cabin air. This result is cabin pressure (“cabin altitude”).
- The outflow valves open or close with a flexible diaphragm to restrict airflow between the cabin and outside air resulting in a pressure differential (“cabin differential “) between the two.

EXECUTIVE
FLIGHT TRAINING

OUTFLOW VALVE REGULATION

THERE ARE SEVERAL REGULATING VALVES INCORPORATED INTO EACH OUTFLOW VALVE.

The following valves regulate the air pressure in the outflow valve to control the diaphragm position:

- Dive solenoid valve
- Climb solenoid valve
- Maximum differential pressure limiter (maximum Delta-P)
- Maximum cabin altitude safety limiter valve (operates pneumatically and does not require power)

CLIMB AND DIVE VALVES

The two valves open or close on command of the pressurization controller to regulate cabin air outflow.

- When Dive Solenoid Valve Opens – bleed
  air flow is restricted from flowing out and cabin pressurizes (cabin dives)
- When Climb Solenoid Opens – increased airflow goes out the outflow valve and reduces cabin pressure (cabin climbs)

MAX. CABIN ALTITUDE LIMIT VALVES

- The max. cabin altitude limit valves prevent cabin pressure altitude from exceeding 14,300 ± 300 ft.
- Inside the valve a sealed bellows maintains and regulates a constant reference pressure of 14,300 ft.
- The limit valves do not require DC power and override all other pressurization system controls.

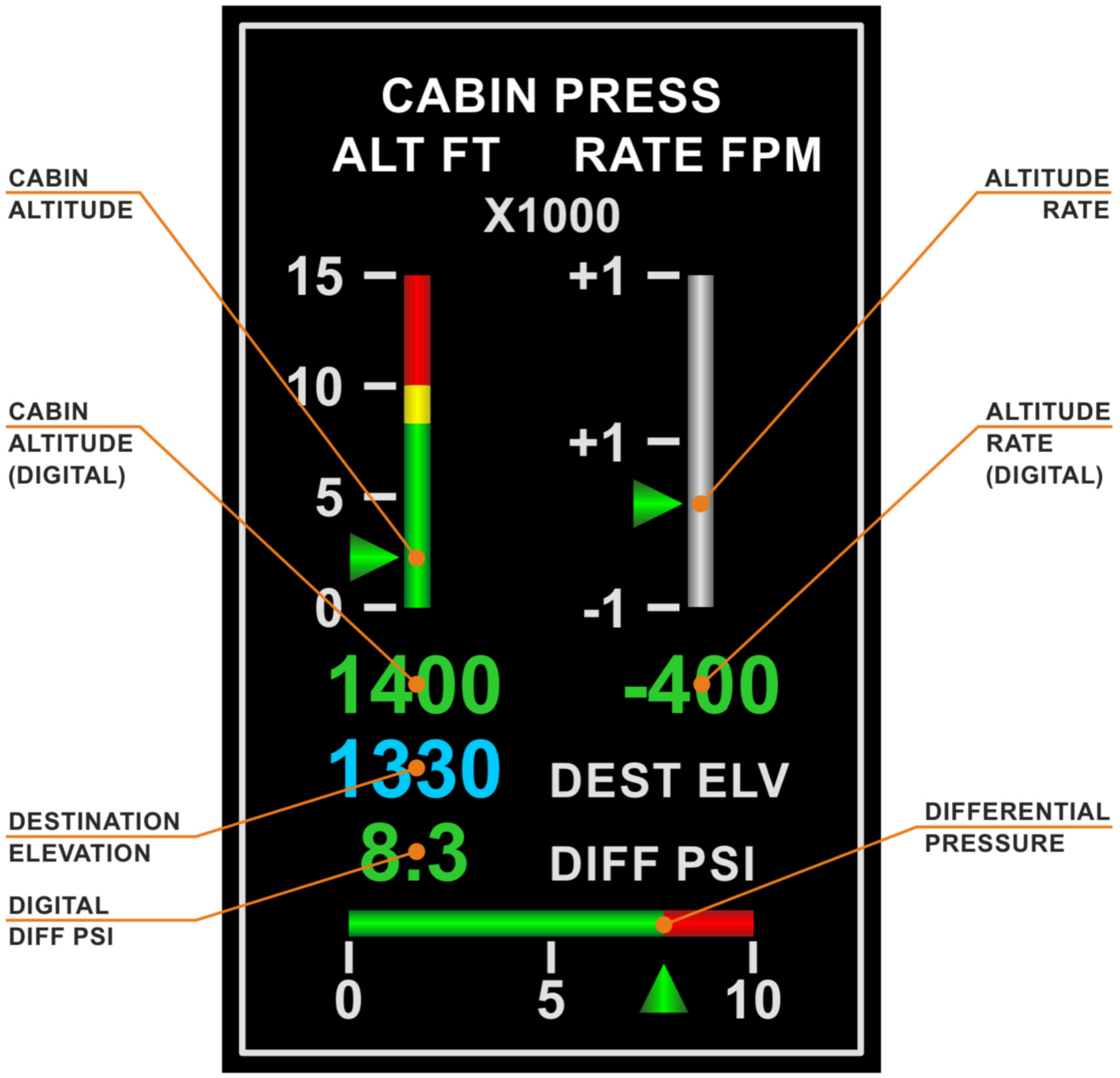
MAXIMUM DELTA-P

If cabin pressure exceeds 8.5 + 0.1, the maximum differential pressure valves will open to release the pressure.

- As a result, the cabin altitude climbs until reaching a differential pressure of 8.5 + 0.1
- Max Delta-P valves will override all other system controls, except the maximum cabin altitude limit valves.

CONTROLS AND INDICATIONS

The pressurization system controls are displayed on the ENVIRONMENTAL panel. Indications on the EICAS on the CABIN PRESS display show operational performance.



PRESSURIZATION CONTROLLER

The pressurization controller has two operating modes – normal and high altitude. The controller has a built-in schedule that will automatically:

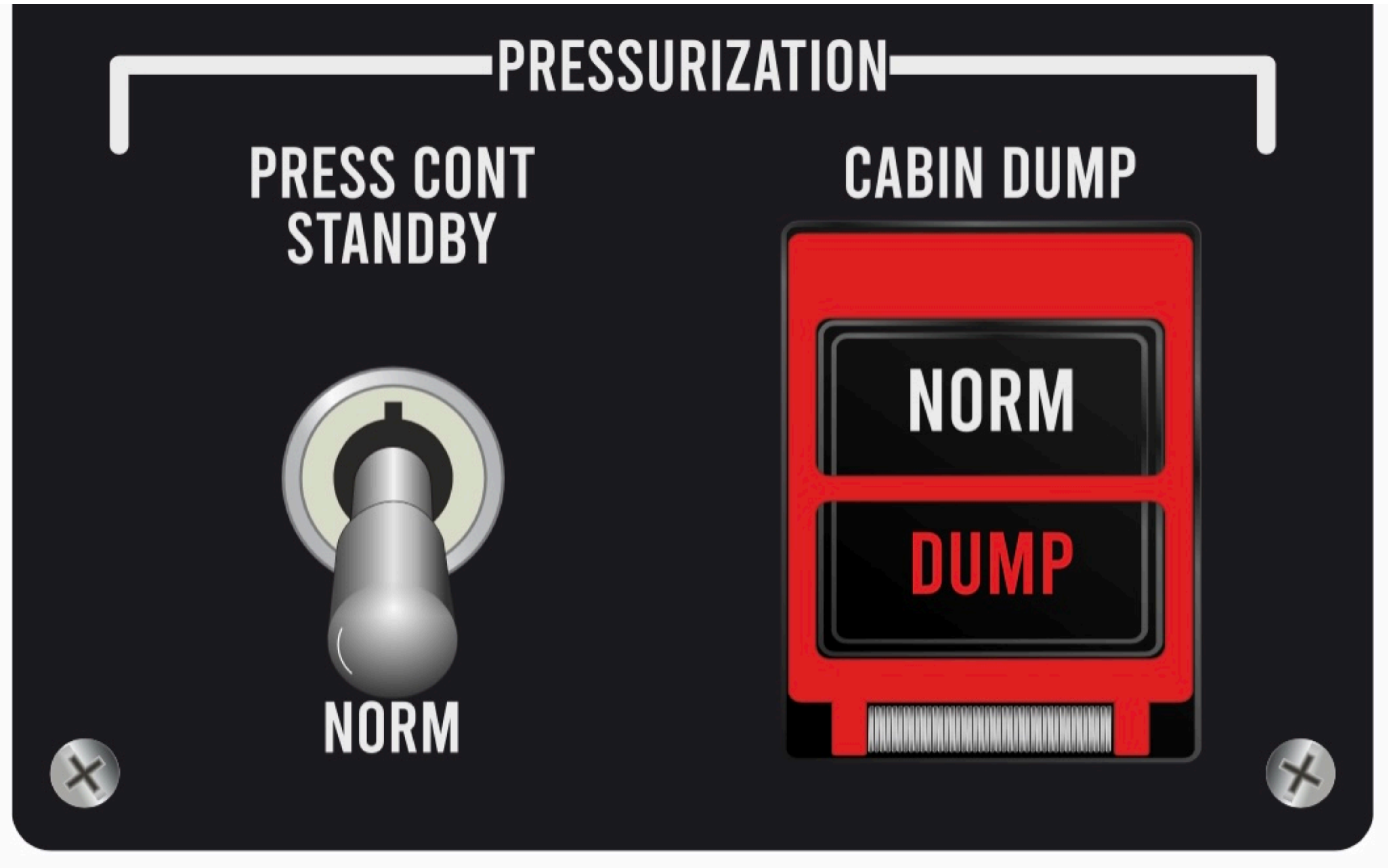
- Control the cabin altitude based on aircraft altitude
- Adjust the cabin rate of climb/descent vs. the aircraft rate of climb/descent
- Adjust for the selected destination elevation.

PRESS CONT SWITCH

The PRESS CONT switch selects one of two modes of operation in flight.

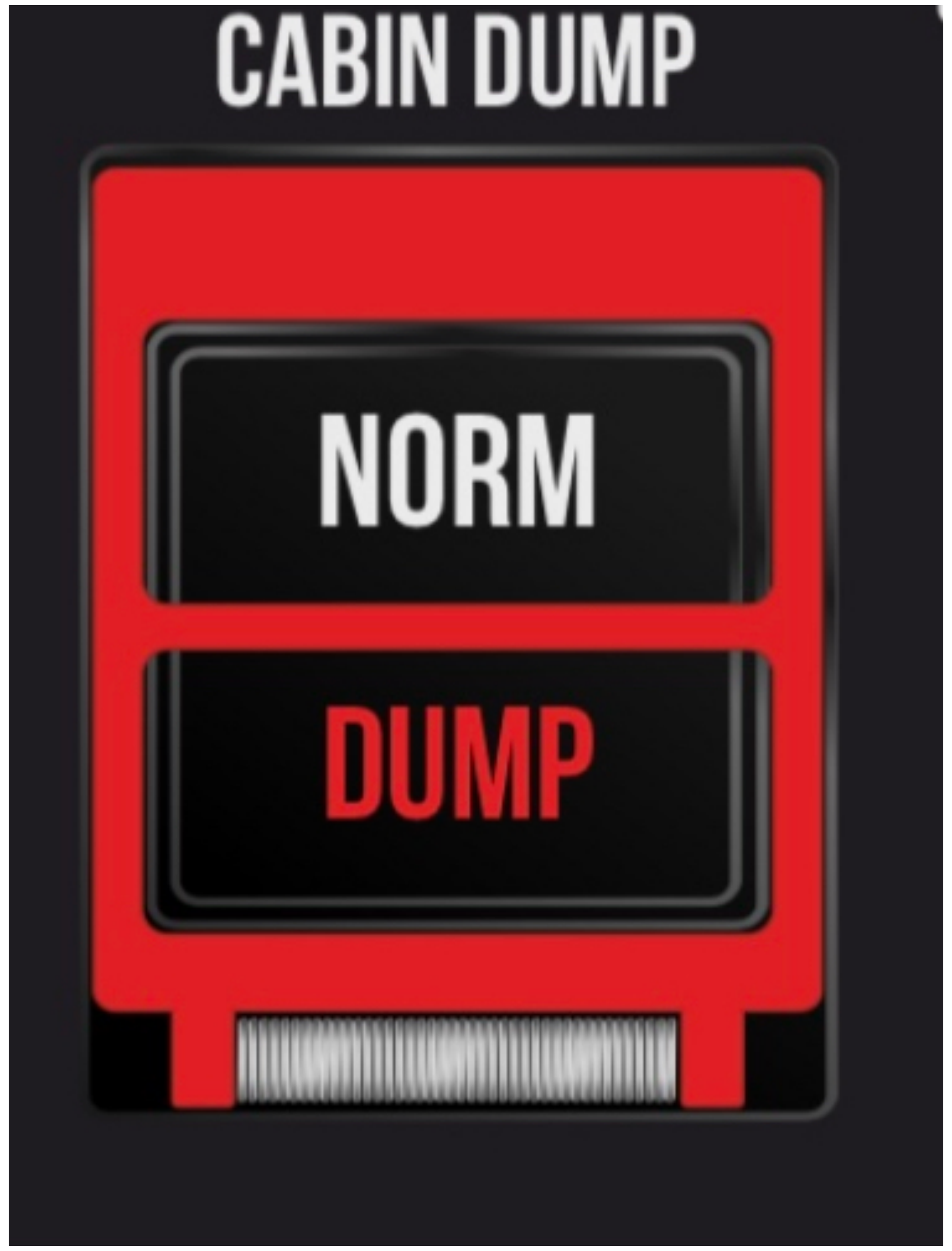
- NORM – the controller automatically functions to control the cabin altitude.
- STANDBY – the controller operates in the pneumatic backup mode.

With PRESS CONT switch in either the standby or normal position, the CABIN DUMP switch remains functional.



MANUAL CABIN DUMP SWITCH

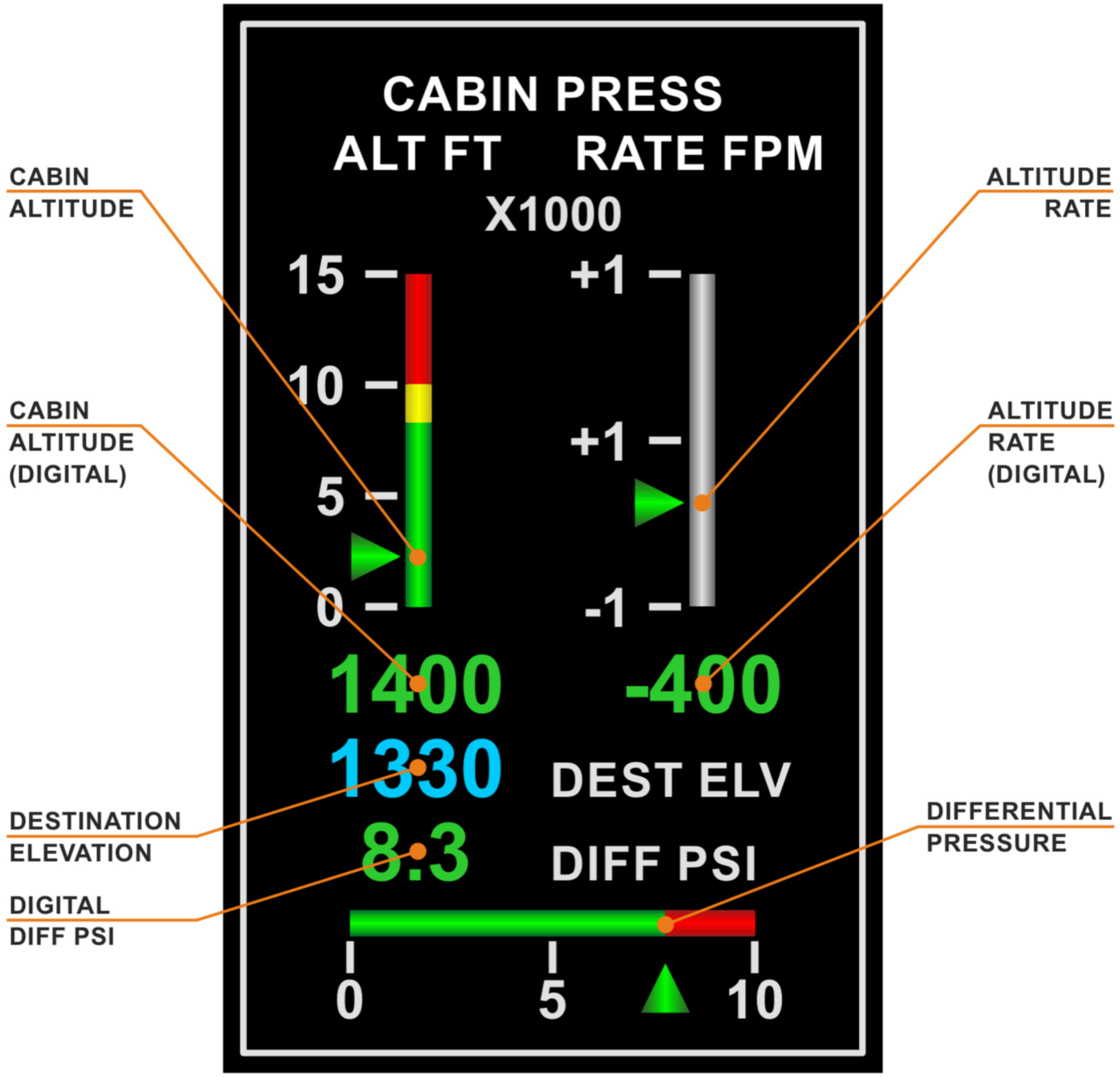
- CABIN DUMP switch can be manually turned on to reduce cabin pressure.
- The maximum cabin altitude limit valves override the valves to prevent depressurization above 14,300 ± 300 ft.



PRESSURIZATION DISPLAY

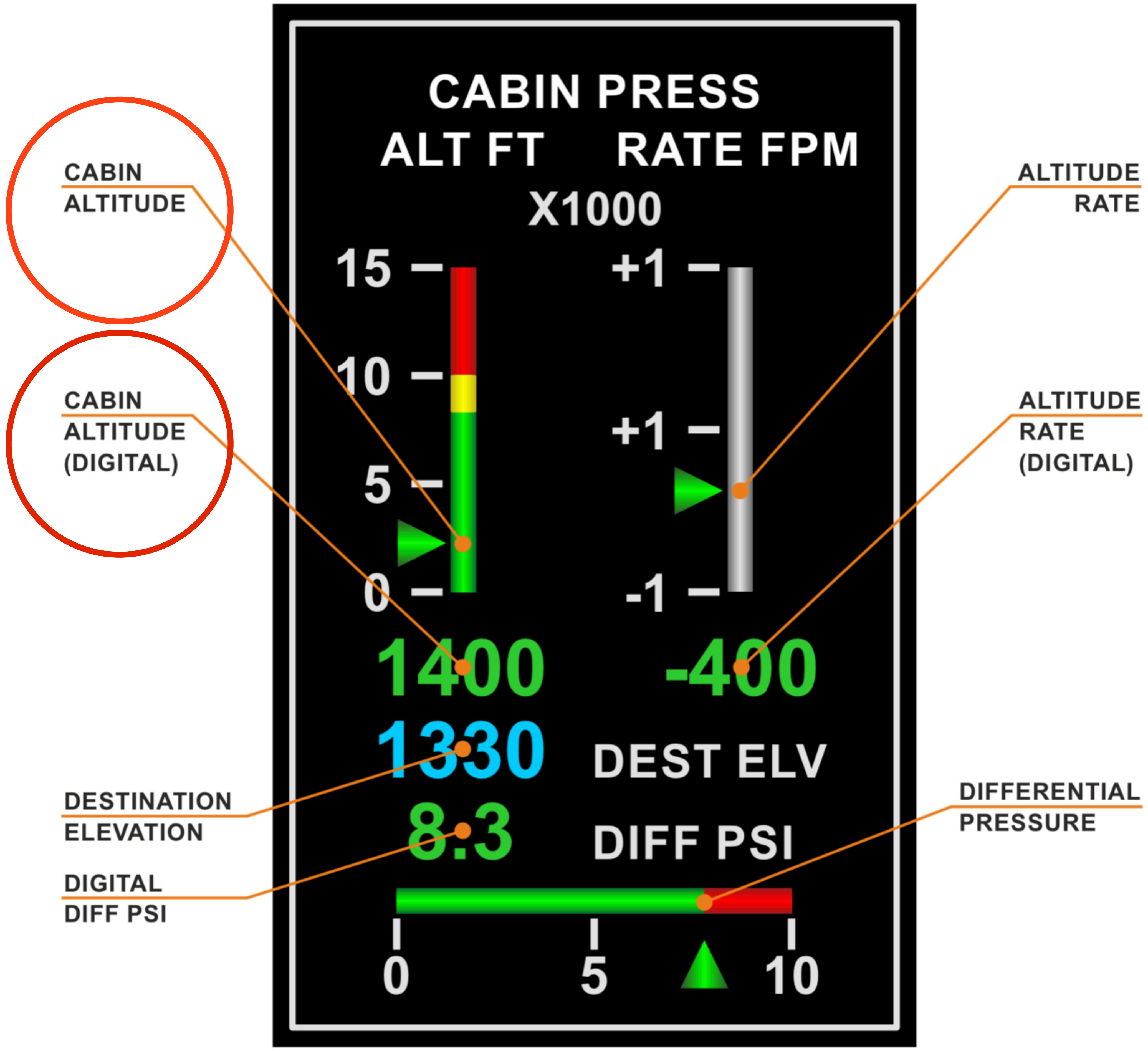
The pressurization display is labeled CABIN PRESS and indicates:

- The label "CABIN PRESS"
- Cabin altitude (ALT FT)
- Cabin altitude rate-of-change



CABIN ALTITUDE: ALT FT

- Cabin pressure altitude (in feet) is indicated as "ALT FT" in a vertical analog display and digital readout.
- The display pointer in normal mode is:
  - Red – Above 10,000-foot cabin alt.
  - Amber – Between 8,500-10,000-foot cabin alt.
  - Green – Below 8,500-foot cabin alt.



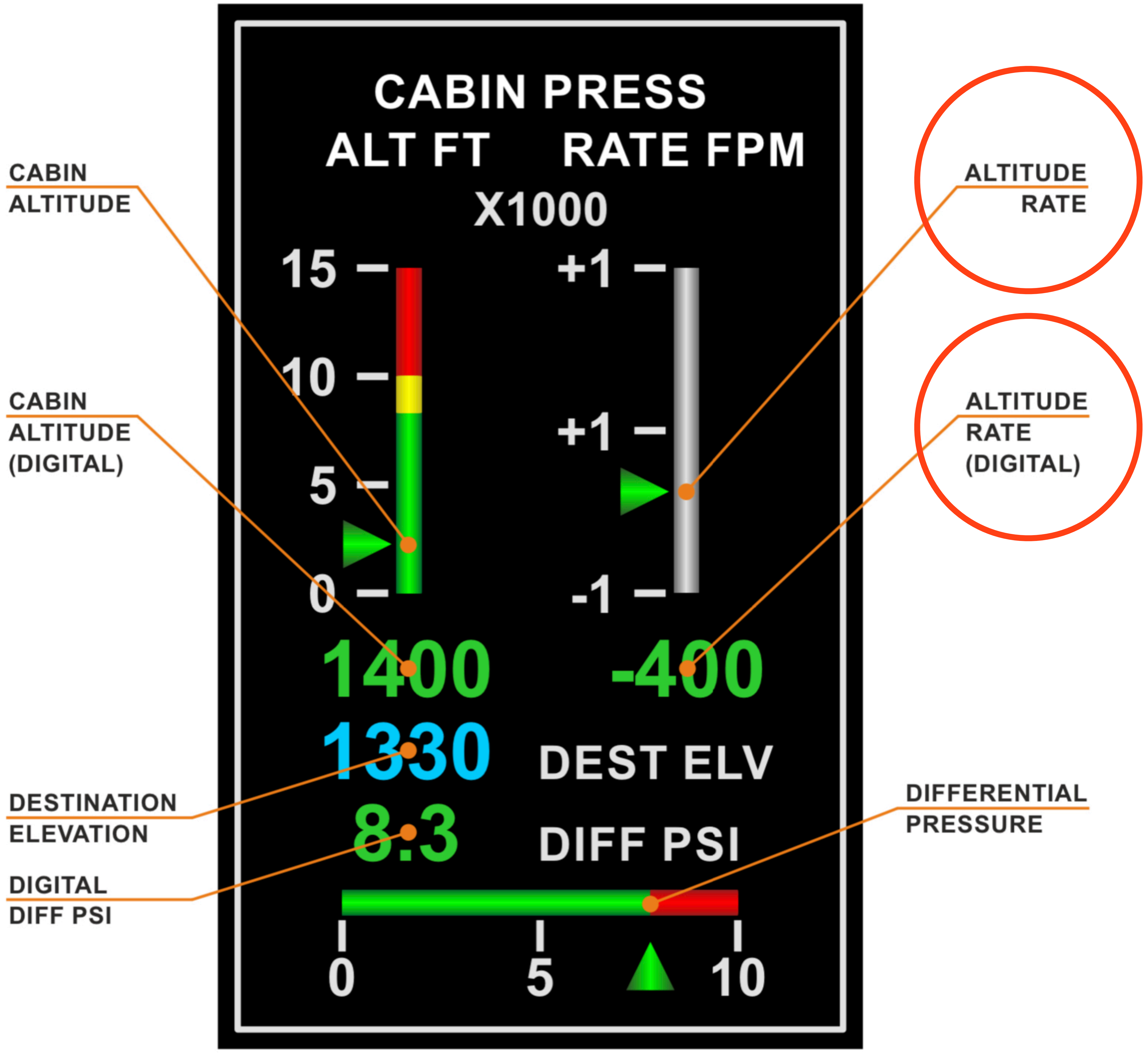
EXECUTIVE FLIGHT TRAINING

CABIN ALTITUDE RATE FPM

Cabin pressure rate-of-change (in feet per minute) is indicated as "RATE FPM"

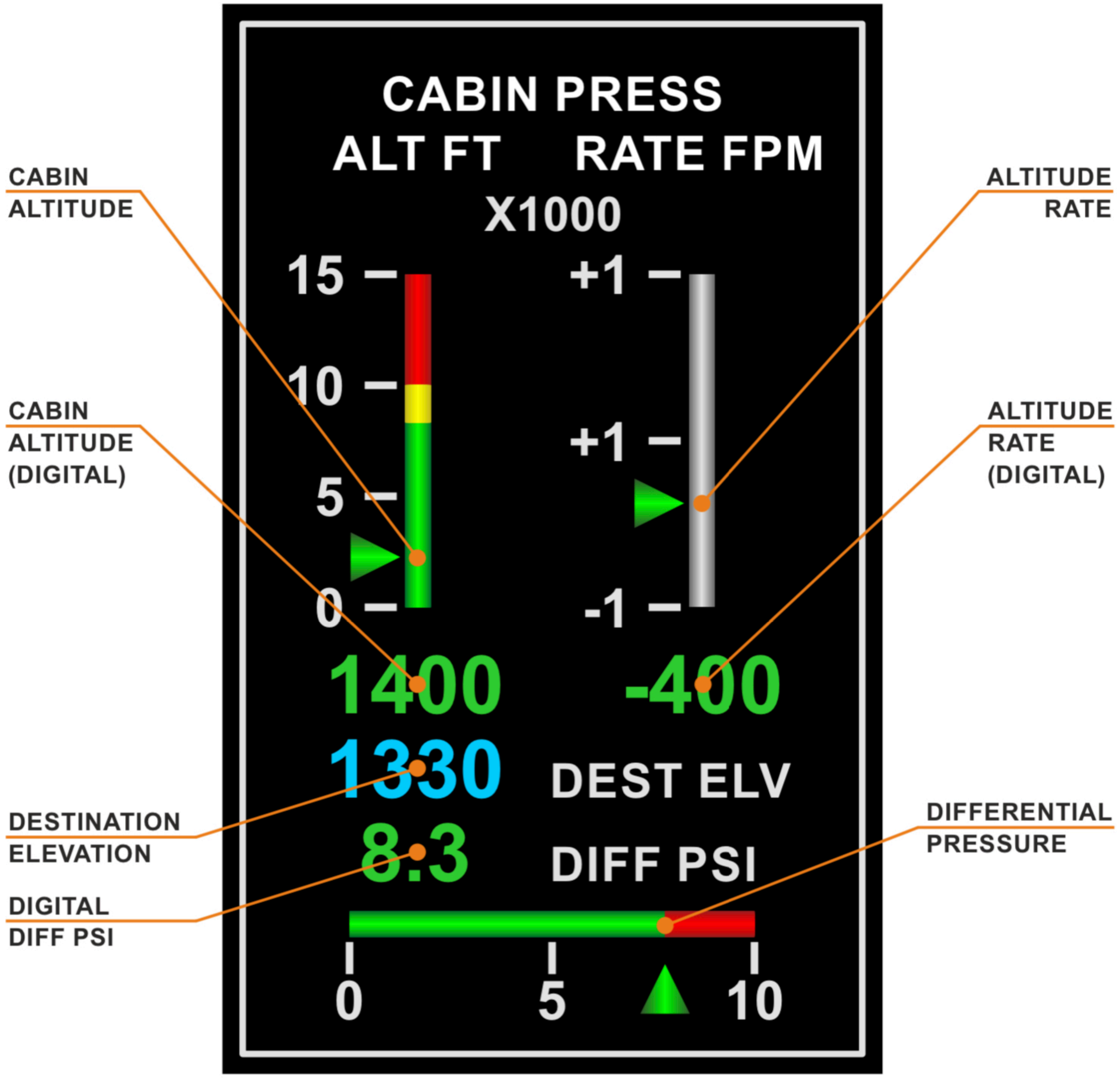
This shows rate of change of cabin altitude, not actual aircraft vertical speed, on an analog scale:

- +1 (1,000 fpm cabin climb rate)
- 0 (cabin altitude not changing)
- -1 (1,000 fpm cabin descent rate)



DESTINATION ELEVATION

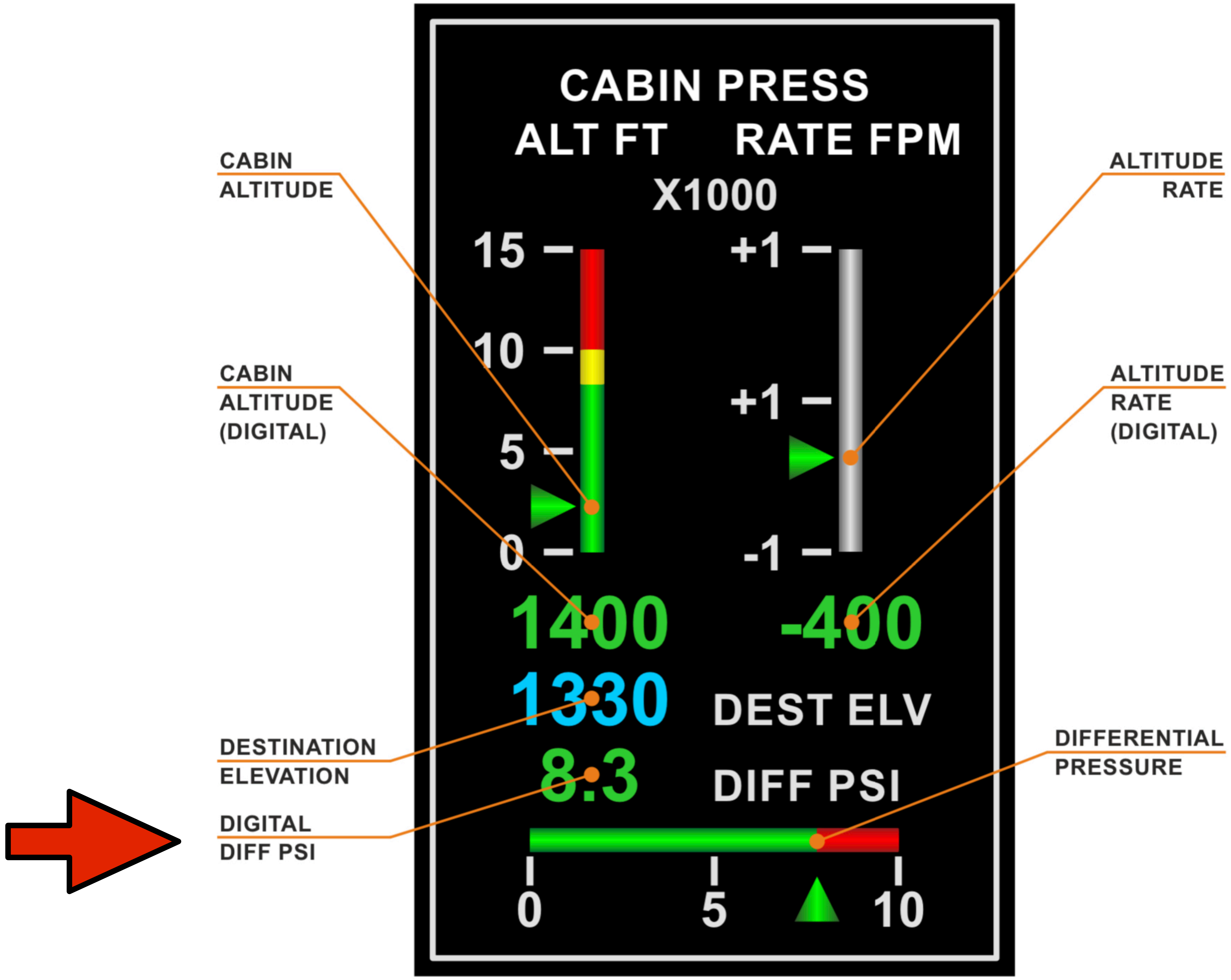
- In normal display mode, the altitude of destination airport is labeled "DEST ELV."
- The digits are cyan and may be set to any altitude between -1,000-14,000 feet.
  - This setting is retained by the G1000, and the value remains from previous flights until it is changed.



EXECUTIVE FLIGHT TRAINING

CABIN DIFFERENTIAL PRESSURE

- The “DIFF PSI” indicates the difference (in psid) between cabin pressure and outside air pressure.
- The scale and pointer are green below 8.6 and red at 8.6 or higher
- If cabin differential is less than 0.2, 0.0 will be displayed



EXECUTIVE
FLIGHT TRAINING

CAS MESSAGES

- RED CABIN ALT – With a destination elevation of 7,900 ft. and below, the message will appear if cabin pressure altitude exceeds 10,000 ft.

- WHITE CABIN ALT – If cabin pressure altitude exceeds 10,000-15,000 for less than 30 minutes in high alt. mode.

- RED CABIN ALT – Will display if cabin pressure altitude exceeds 14,800 ft.

PRESS OFF

A white PRESS OFF CAS message indicates the AIR SOURCE SELECT knob is set to OFF or to FRESH AIR.

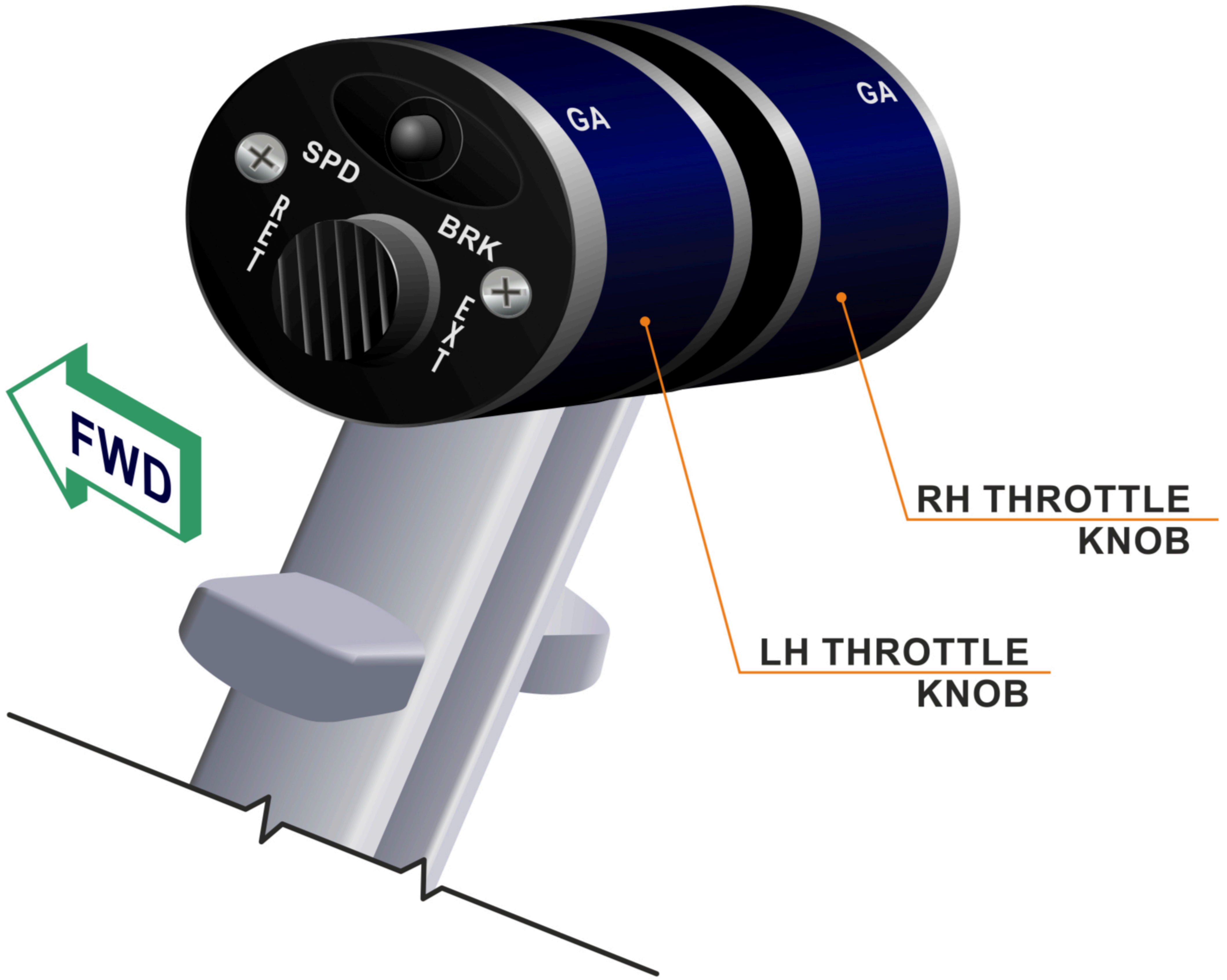
- Either position will stop the pressurized air inflow and slowly depressurize the cabin.

PRESS CTRL

- WHITE PRESS CTRL - Indicates failure of the G1000 system and that the controller may no longer be receiving accurate data on air pressure.
- AMBER PRESS CTRL – Indicates failure of the pressurization controller, or pilot has disabled the controller
  - The system will then function in pneumatic mode

OPERATION – GROUND / FLIGHT

- Maximum cabin pressure differential allowed by limiters is 8.5 + 0.1 psid
- Squat switches and engine throttle settings define four operating modes:
  - Ground / taxi mode
  - Prepressurization mode
  - Flight mode (including high altitude mode)
  - Pneumatic mode



EXECUTIVE FLIGHT TRAINING

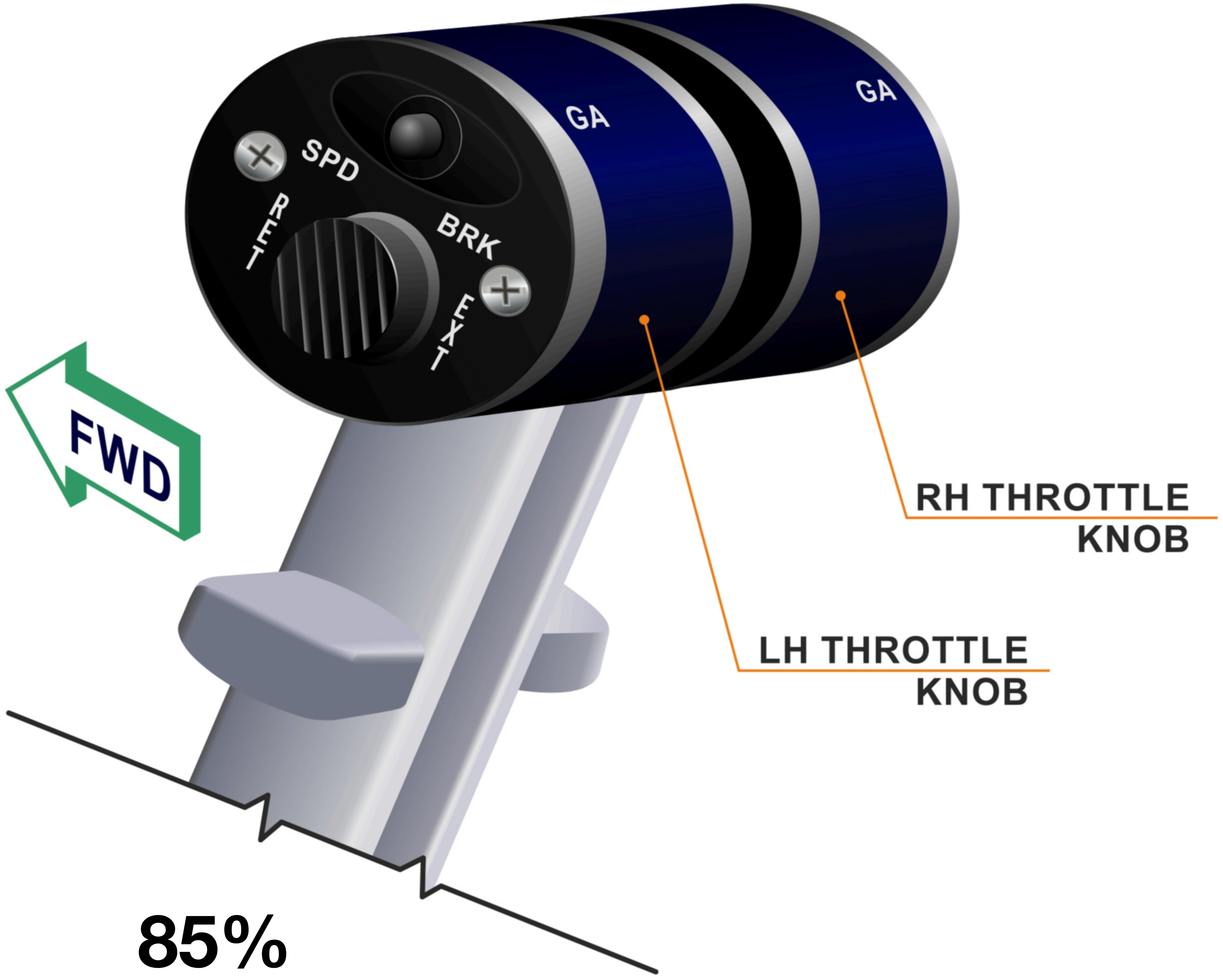
GROUND / TAXI MODE

While on the ground both outflow valves are fully open equalizing the pressure between the cabin and outside air.

EXECUTIVE
FLIGHT TRAINING

PRE-PRESSURIZATION MODE

- When either engine is set to greater than 85% TLA on the ground, both outflow valves restrict to bring the pressure difference to a maximum of 200 feet below departure altitude.



EXECUTIVE FLIGHT TRAINING

FLIGHT MODE

During flight, solenoids maintain cabin altitude by opening and closing. (Climb & Dive). The solenoids also provide gradual cabin climb to cruising cabin altitude.
The pressurization controller generates an auto schedule based on:

- Departure field elevation
- Maximum altitude reached in current flight
- Pilot-input destination elevation

SETTING DESTINATION ELEVATION

The destination elevation is using the TMR/REF softkey on the PFD:

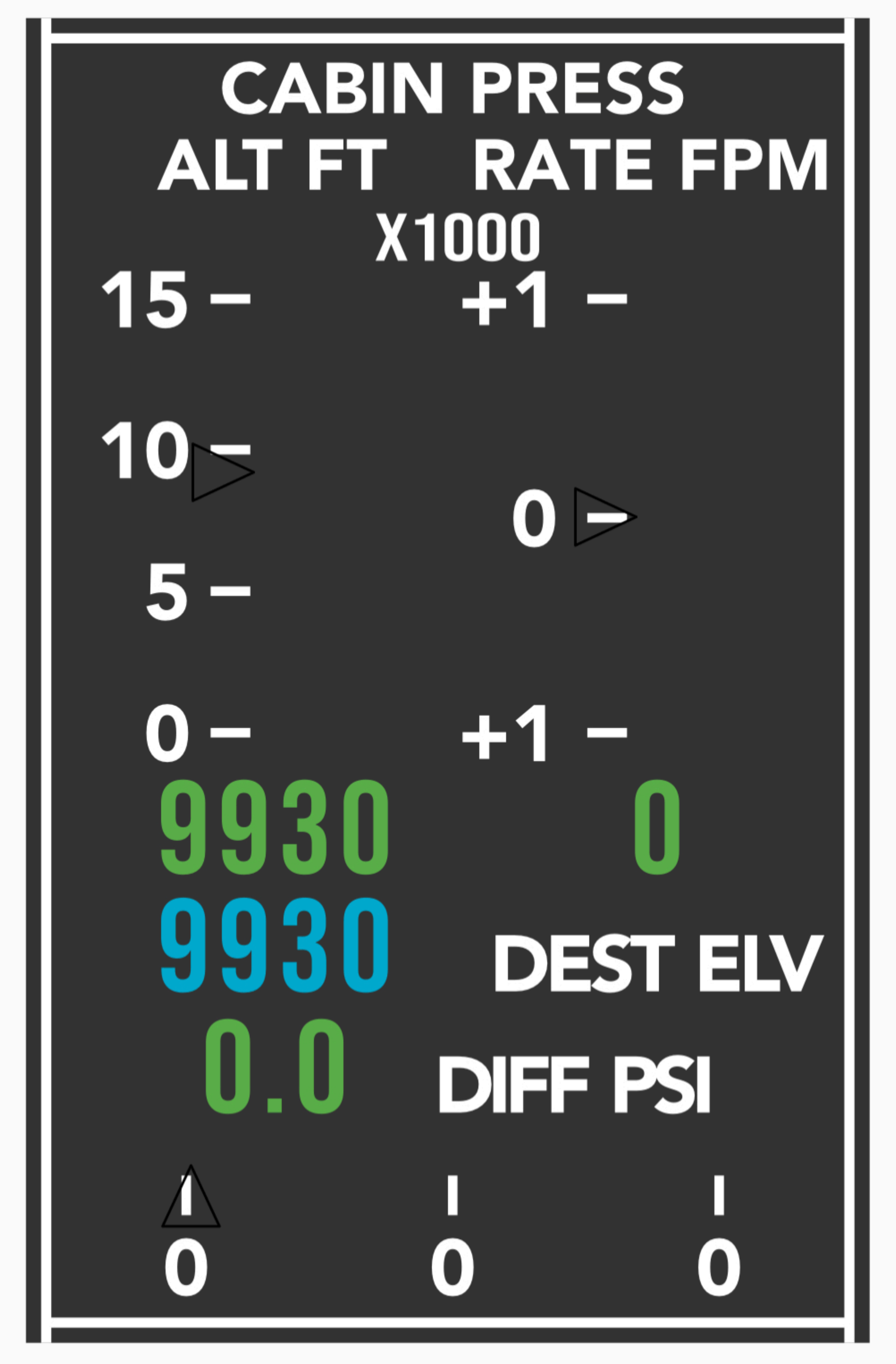
- Push TMR/REF on the PFD
- The reference window appears
- Use large FMS knob to select DEST ELV.
- Use small FMS knob to change number
- Press ENT button to accept elevation

EXECUTIVE
FLIGHT TRAINING

HIGH-ALTITUDE AIRPORT OPERATION

In high altitude mode, the color bands located on the analog display change from normal ranges to higher values.

- Green – 0 to 14,000 feet
- Amber – 14,000 to 14,800 feet
- Red – 14,800 – 15,000 feet



EXECUTIVE FLIGHT TRAINING

HIGH-ALTITUDE LANDINGS

When landing at an airfield between 8,000 and 14,000 feet, the controller automatically switches into the high-altitude mode when the following conditions are met:

- The landing airport's altitude is greater than 8,000 feet.
- The aircraft altitude is between 8,000 and 25,000 feet.
- The aircraft has descended 500 feet from maximum altitude.

When landing at a high altitude airport, cabin pressure altitude does not exceed 8,000 feet before the aircraft altitude descends below FL 245. Upon descending past FL 245, the cabin altitude climbs at the increased climb rate, until the selected landing altitude is reached.

EXECUTIVE FLIGHT TRAINING

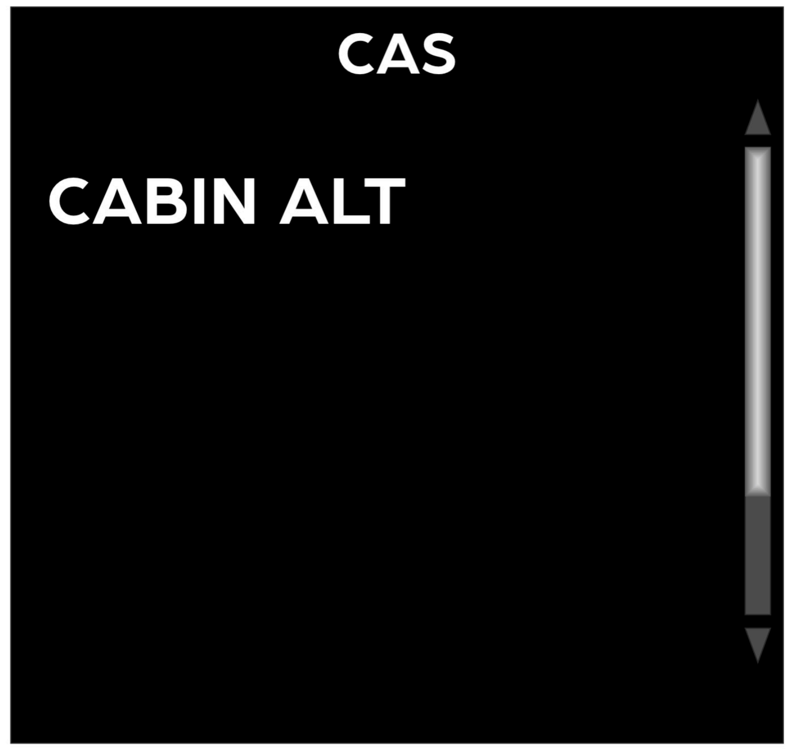
HIGH-ALTITUDE DEPARTURES

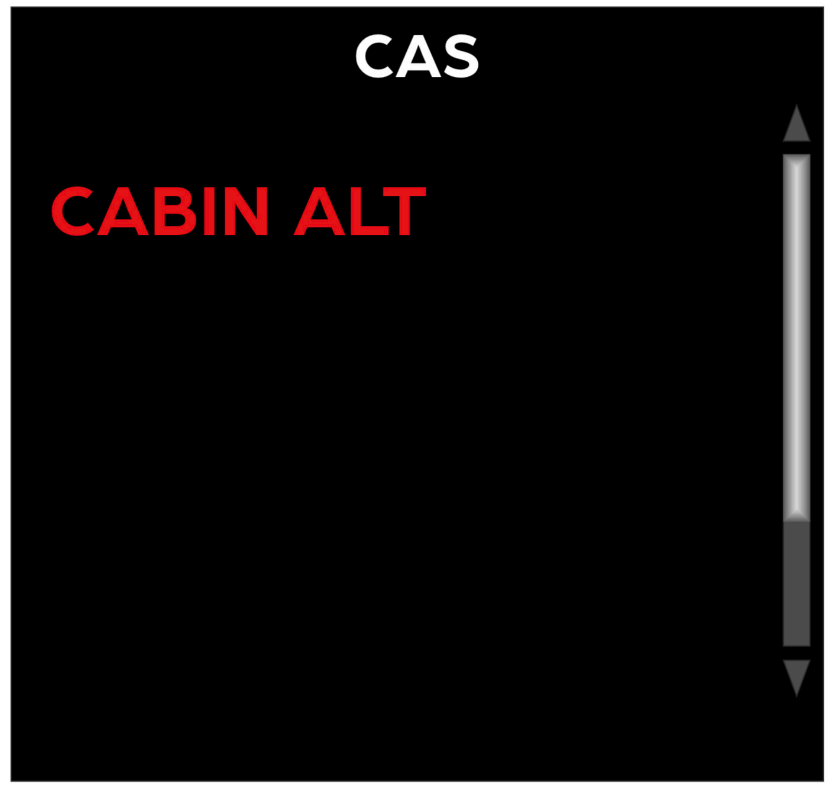
When the aircraft departs an airport between 8,000 and 14,000 feet, the pressurization system operates in the high altitude mode:

- The aircraft is unpressurized while on the ground with throttles below 85%.
- After takeoff, the cabin altitude starts to descend at a rate of 500 fpm until reaching 7,800 feet cabin altitude.
- The aircraft cabin continues to descend at reduced rate of 100 fpm until it reaches normal schedule cabin altitude

HIGH-ALTITUDE CABIN ALT

- When high altitude departures/ landings criteria is met, the CABIN ALT CAS message will change to these colors:
  - WHITE – cabin altitude between 10,000-15,000 for less than 30 minutes
  - AMBER – cabin alt. between 10,000-15,000 for more than 30 minutes
  - RED – cabin altitude is at or above 14,800 ± 200 ft.





STANDBY OPERATION

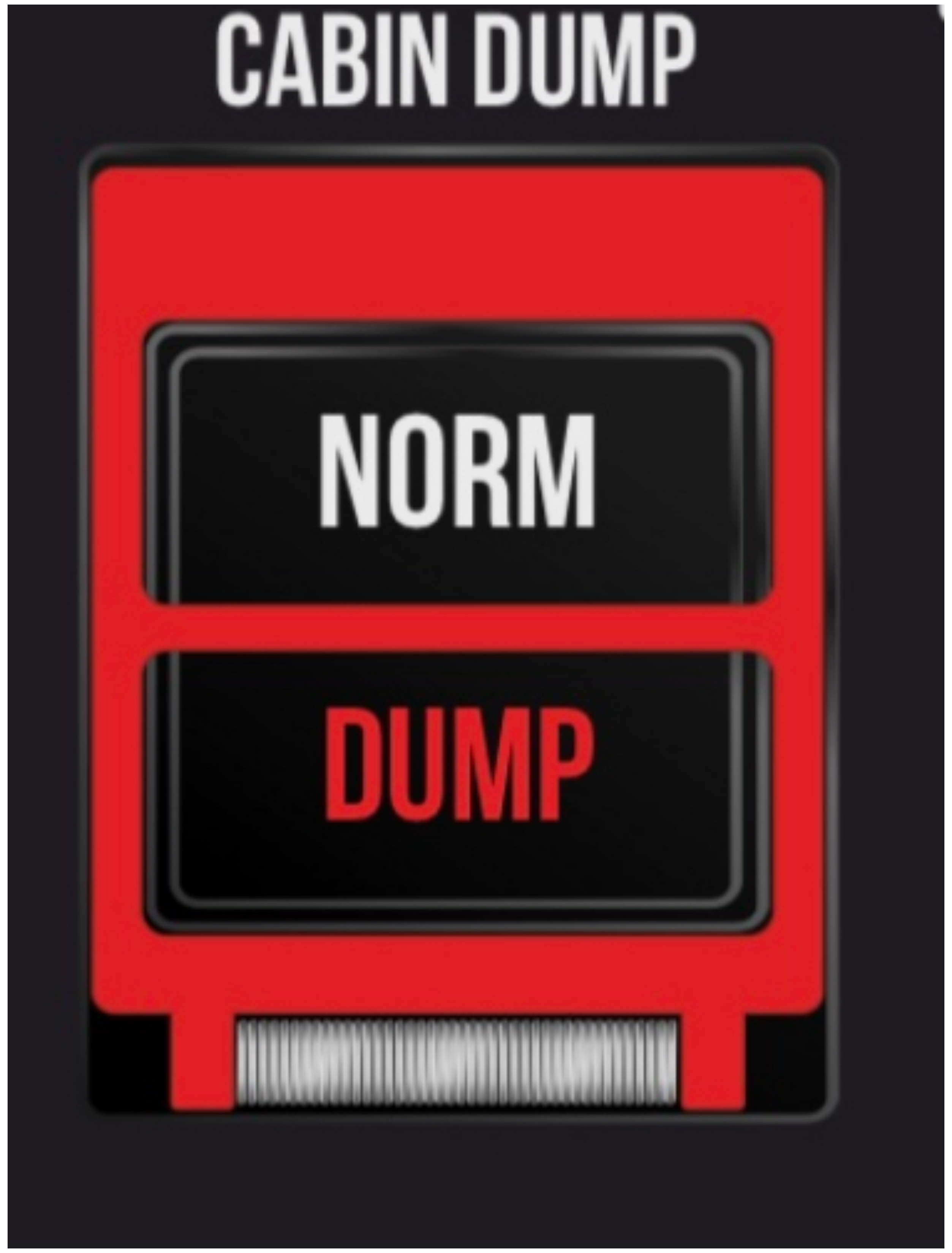
When in STANDBY mode, the pressurization controller valves fail in the closed position and:

- All air is stopped from entering or exiting the outflow valves.
- If bleed air remains constant, cabin altitude should also remain at a constant value.

MANUAL CABIN PRESSURE DUMP

Actuating the CABIN DUMP switch reduces cabin pressure and ventilates the cabin.

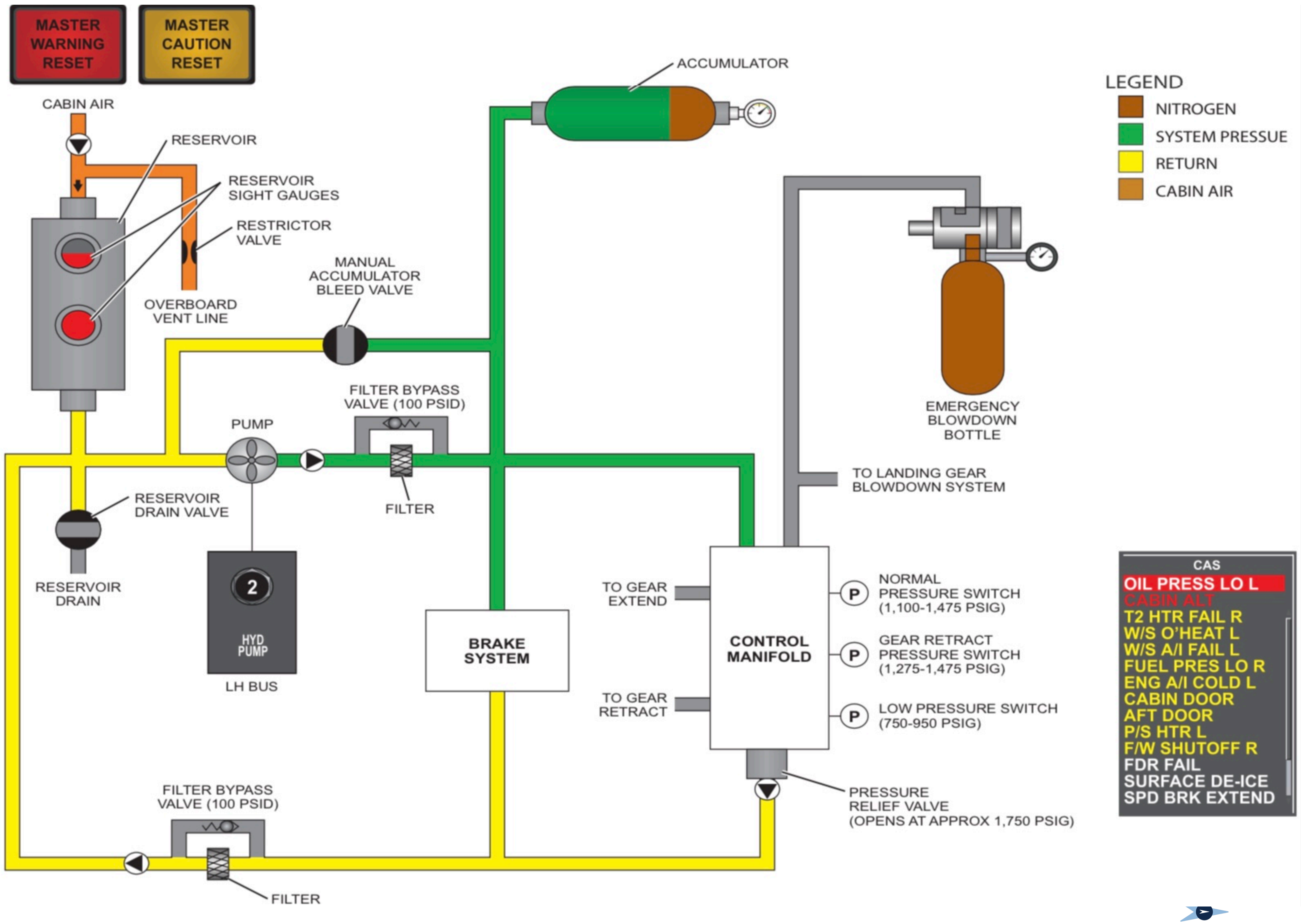
- Maximum altitude limit valves override the climb solenoid in order to prevent complete cabin depressurization above 14,300 ± 300ft.



HYDRAULIC SYSTEM DETAILS

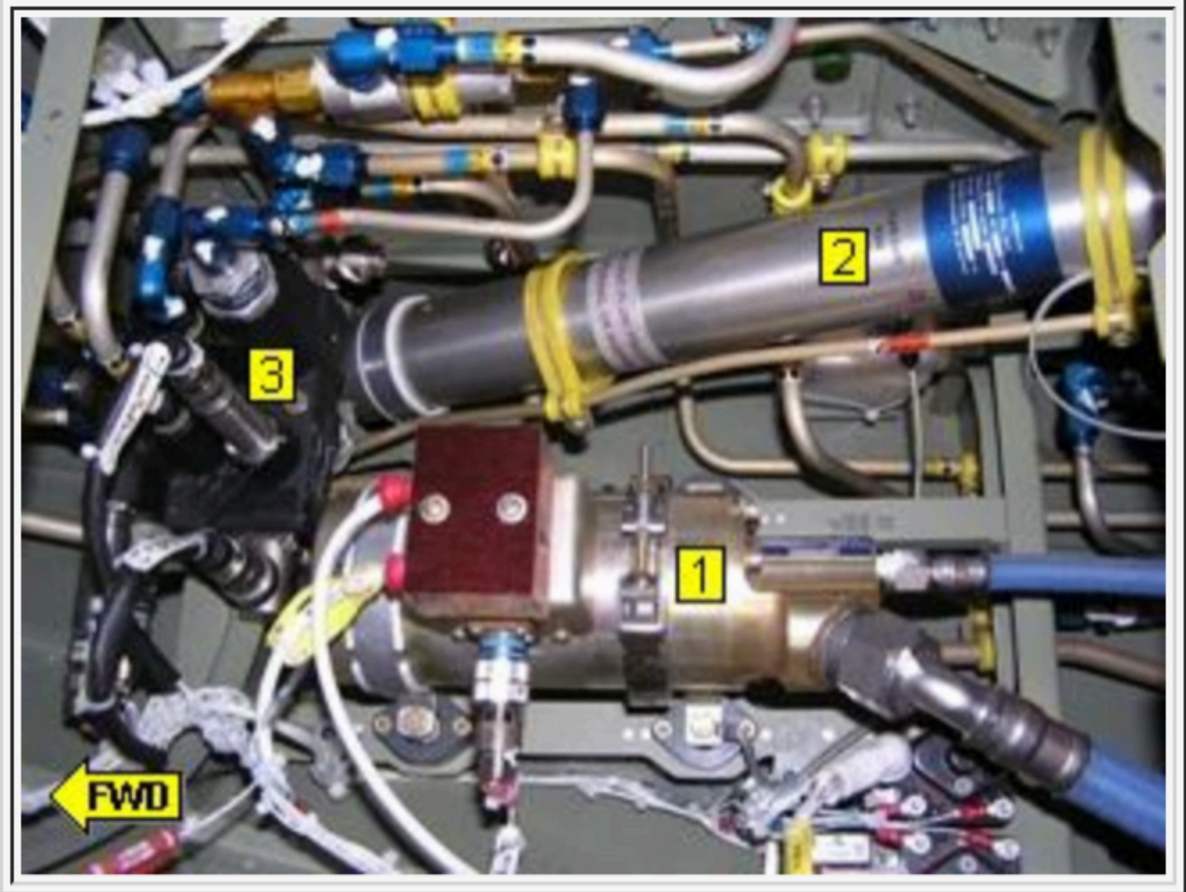
- The hydraulic system is labeled as a “closed center” system. When there are no subsystems in use (landing gear or brakes), there is normally no flow in the system, except to maintain accumulator charge.

- The Citation Mustang uses hydraulic power for retraction and extension of the landing gear, and operation of the brakes. The hydraulic system includes a single electrically driven hydraulic pump, which functions to maintain and supplement accumulator pressure.

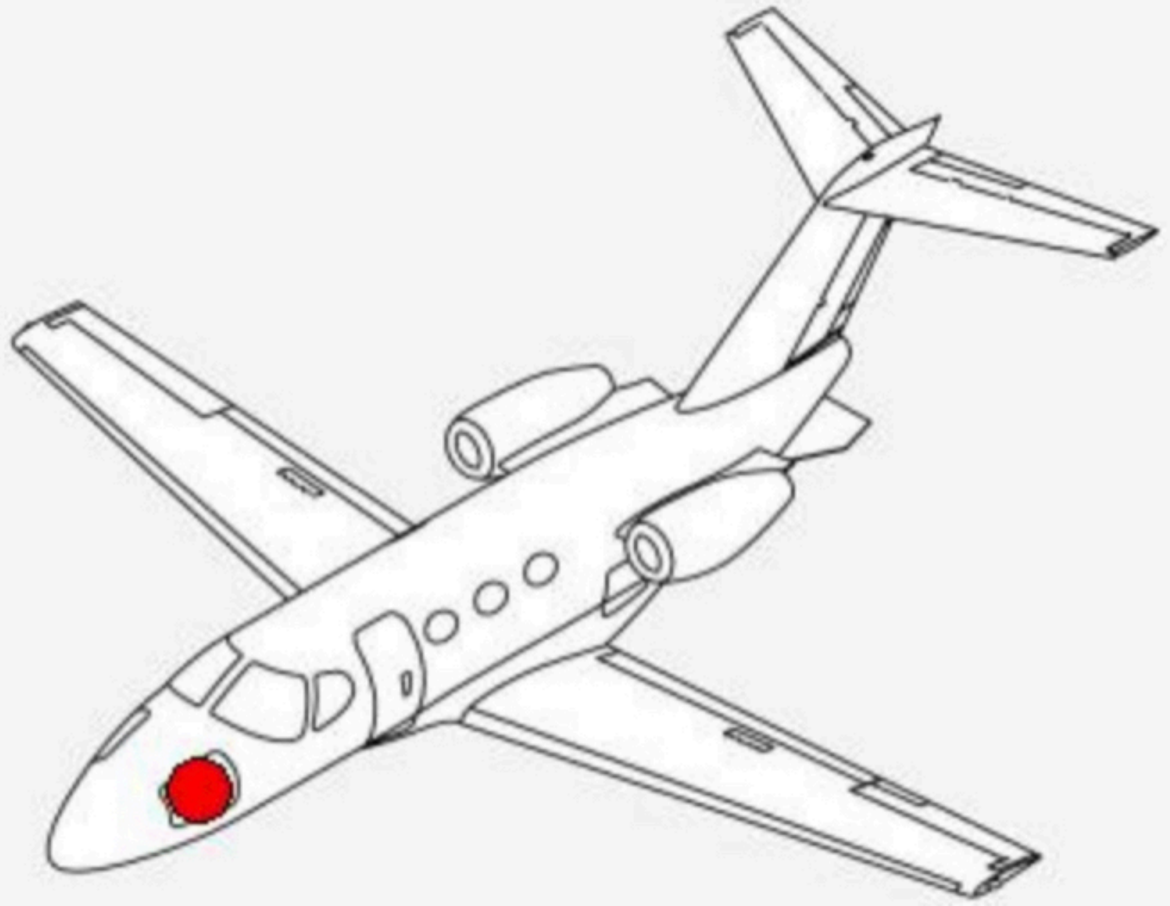


HYDRAULIC COMPONENTS

- The hydraulic system components are located in the lower left nose compartment outside of the pressure vessel.



View looking down



1. Hydraulic pump
2. Hydraulic accumulator
3. Landing gear control manifold

RESERVOIR

- The hydraulic reservoir is located on the left forward pressure bulkhead. The reservoir stores the hydraulic fluid for the pump. When the hydraulic system is in operation, the excess hydraulic fluid returns back to the reservoir. Cabin air is used to pressurizes the reservoir, helping to reduce foaming and assure a positive fluid flow to the pump. A relief valve will open at approximately 10 psi to prevent over pressurization.

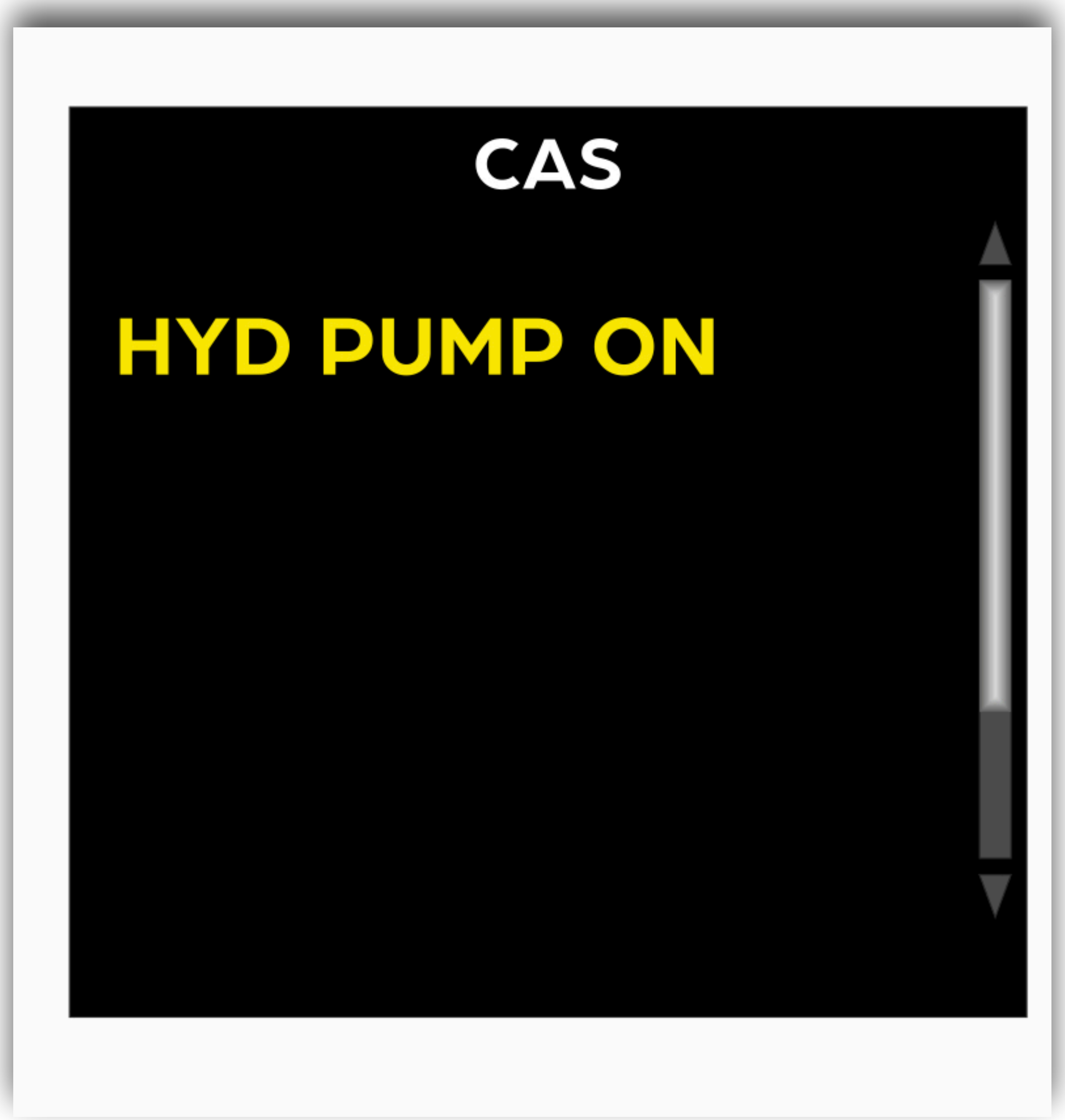
- Two sight gauges on the hydraulic reservoir are visible through the forward baggage compartment liner. The reservoir capacity is approximately 2.2 quarts (2 liters) as indicated by the full mark.

HYDRAULIC ACCUMULATOR PRESSURE GAUGE

The pressure gauge indicates the current pressure in the hydraulic accumulator. The gauge is located on the aft wall of the nose baggage compartment.

CONTROLS AND INDICATIONS

Whenever DC power is supplied to the aircraft, the hydraulic system functions automatically. Inflight hydraulic indications are shown as crew alerting system (CAS) messages on the multifunction display (MFD). While in the reversionary mode, the CAS messages will be on the primary flight displays (PFDs).



EXECUTIVE
FLIGHT TRAINING

MANUAL ACCUMULATOR BLEED VALVE

A manually actuated accumulator bleed valve is located next to the accumulator pressure gauge. During preflight, the valve enables the crew to release pressurized fluid from the accumulator to the reservoir. This is done if the hydraulic system was previously energized to ensure accurate reservoir fluid level and accumulator precharge readings.

OPERATION

PREFLIGHT

- Bleed the accumulator before checking the accumulator precharge and fluid level in the reservoir. Then verify that the accumulator is precharged per the placard and that the hydraulic fluid level is adequate (no air visible in lower sight gauge).

IN FLIGHT

Hydraulic System

- The hydraulic system operates automatically to maintain pressure and sends cautionary CAS messages to the pilot if there is a fault.

Hydraulic Subsystems

- The hydraulically powered subsystems include landing gear and brakes.

LANDING GEAR AND BRAKES

The landing gear has trailing-link struts and is electronically controlled and hydraulically actuated. Nosewheel steering is through linkages to the rudder pedals. The power brake system is hydraulically actuated and includes antiskid protection.

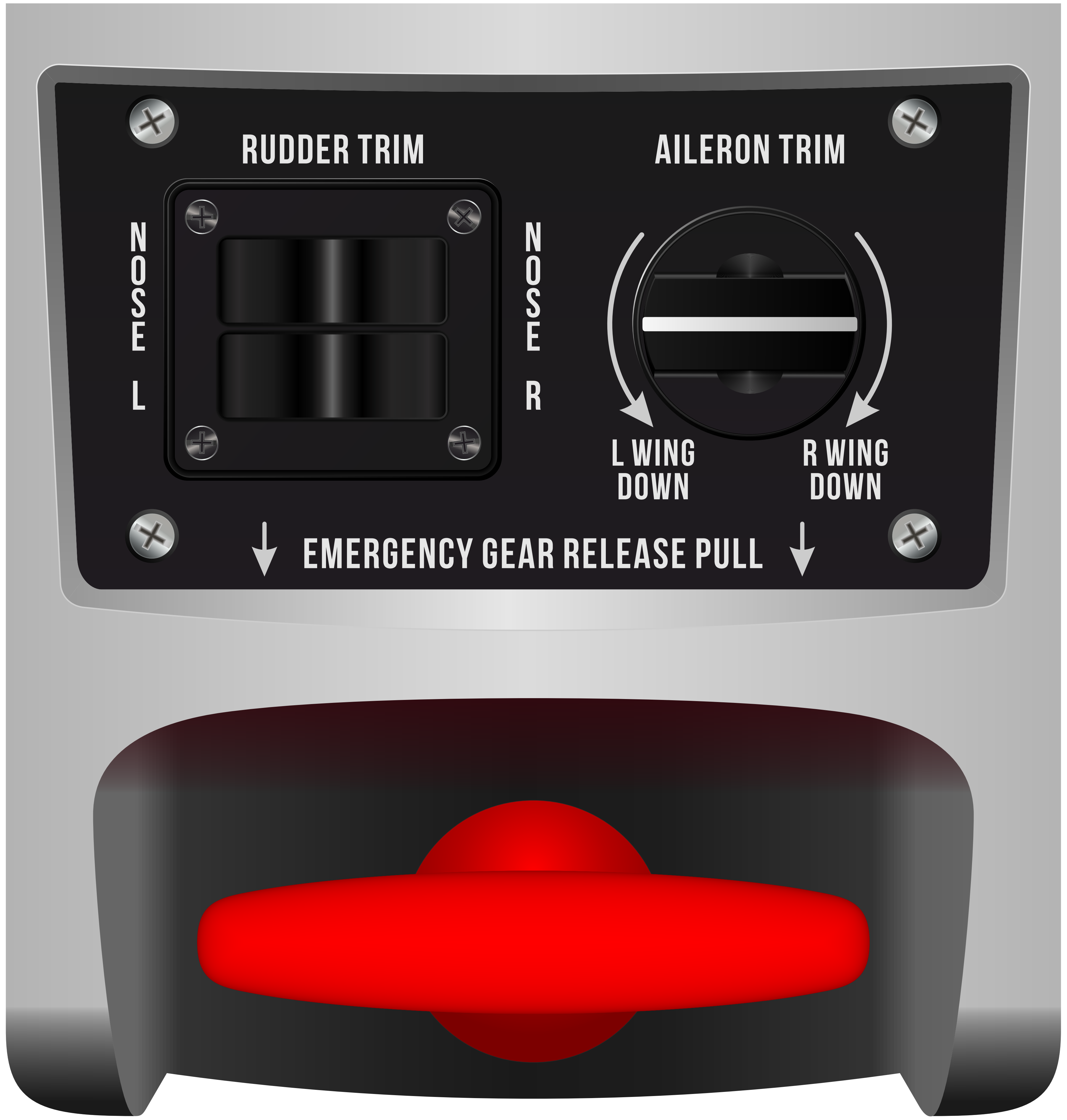
EXECUTIVE
FLIGHT TRAINING

UPLOCKS & LANDING GEAR EXTENSION

- The landing gear struts are mechanically locked in the retracted position by a spring-loaded, hydraulically released, uplock hook.
- When the uplock actuator is fully retracted, fluid passes through the actuator to the gear-extend side of the gear actuator.
- Then pressure is applied to the actuators, which extend until the gear is down and locked

ABNORMAL GEAR EXTENSION

The backup gear-extension system is operated by a T-handle connected to a cable releases the uplock hooks. This allows the gear to free-fall into the locked position. If that doesn't work, yawing the aircraft. (it may take 150+ KIAS to lock nose gear).
A round knob located behind the T-handle releases pneumatic pressure to extend the gear, if releasing the unlocks is insufficient.



EXECUTIVE
FLIGHT TRAINING

NOSE GEAR EXTENSION

The nose gear extension is similar to the main landing gear extension. The uplock hook is hydraulically released, the nose gear is rotated down and aft from wheel well, and locked in the extended position by a spring actuated downlock.

REMEMBER: Whenever the landing gear is extended, the nosewheel steering is engaged and coupled to the rudder pedals regardless of being in flight or on the ground.

NOSE GEAR RETRACTION

The downlock is hydraulically released and the actuator extends the landing gear forward into the wheel well. During retraction, the steering is disengaged and the nose gear is mechanically centered.

EXECUTIVE
FLIGHT TRAINING

LANDING GEAR HANDLE

- The LANDING GEAR control handle is located on the left side of the center tilt panel.
- The LANDING GEAR controls normal landing gear retraction and extension.

GEAR POSITION INDICATORS

- Green NOSE-LH-RH lights indicate gear is down and locked.
- Red UNLOCK indicates the gear condition is unsafe.
  - Indicators illuminate when gear handle is moved out of GEAR UP detent, remains on until all three are down and locked.

- Normal gear down indication – 3 green lights
- Normal retracted indication – all 3 green and red UNLOCK light extinguish

DOWN AND LOCKED

UP AND LOCKED

GEAR POSITION INDICATORS

- A red UNLOCK light indicates the land gear is unsafe.
- The unlock Indicator will illuminate when the gear handle is moved out of GEAR UP detent, and remains on until all three are down and locked.

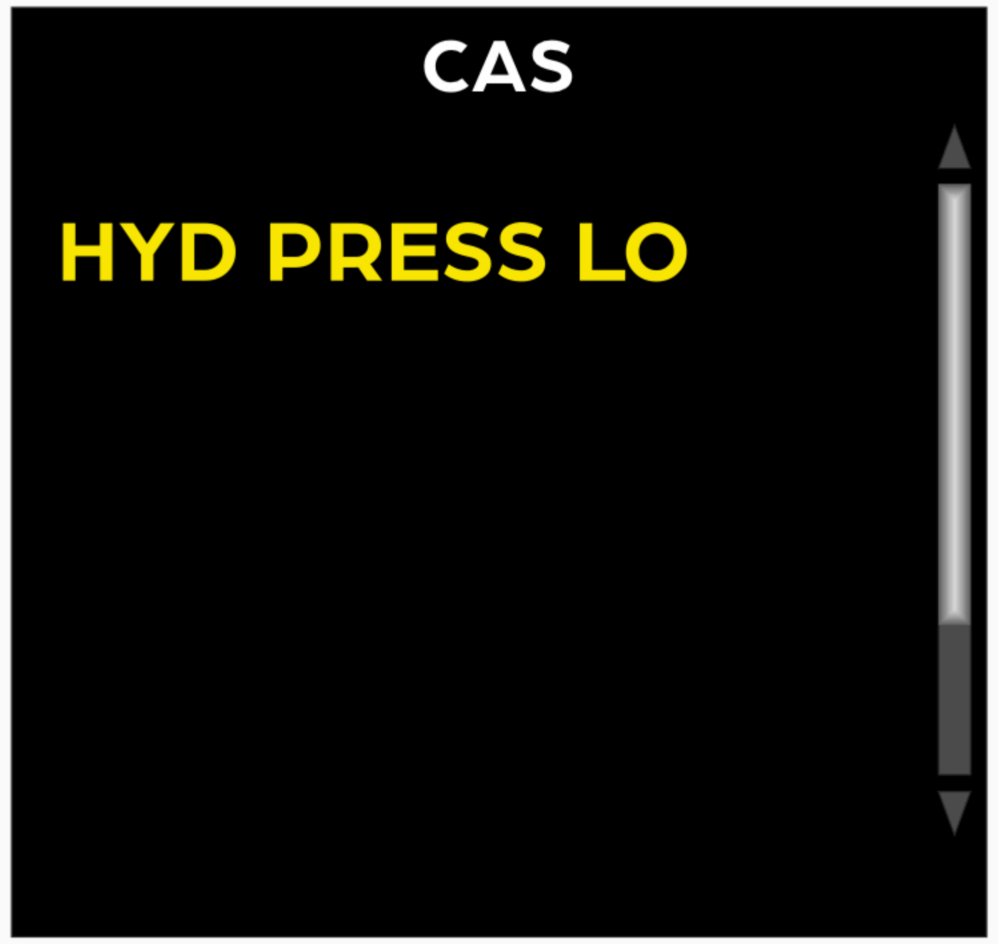
NOSE GEAR NOT DOWN AND LOCKED

ONE OR MORE GEAR NOT UP AND LOCKED

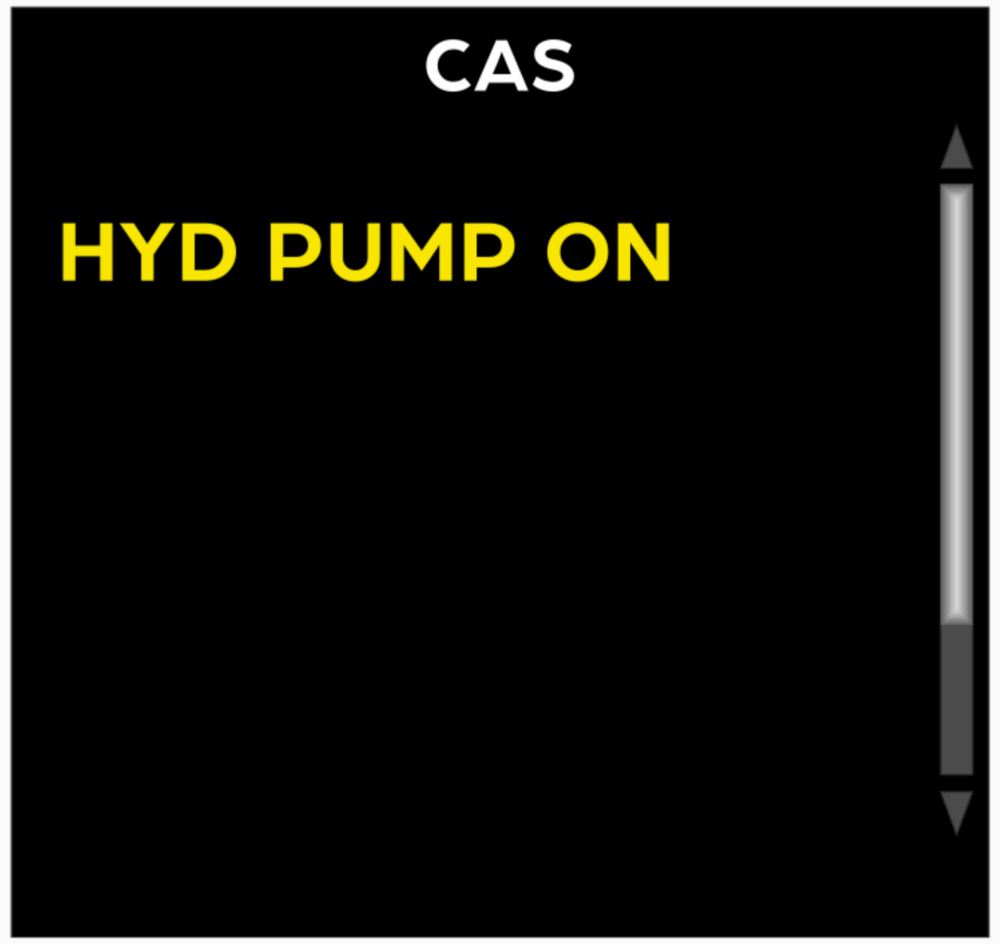
EXECUTIVE FLIGHT TRAINING

CAS MESSAGES

HYD PRESS LO – indicates low hydraulic pressure.



HYD PUMP ON – The hydraulic pump has been operating for more than a minute.

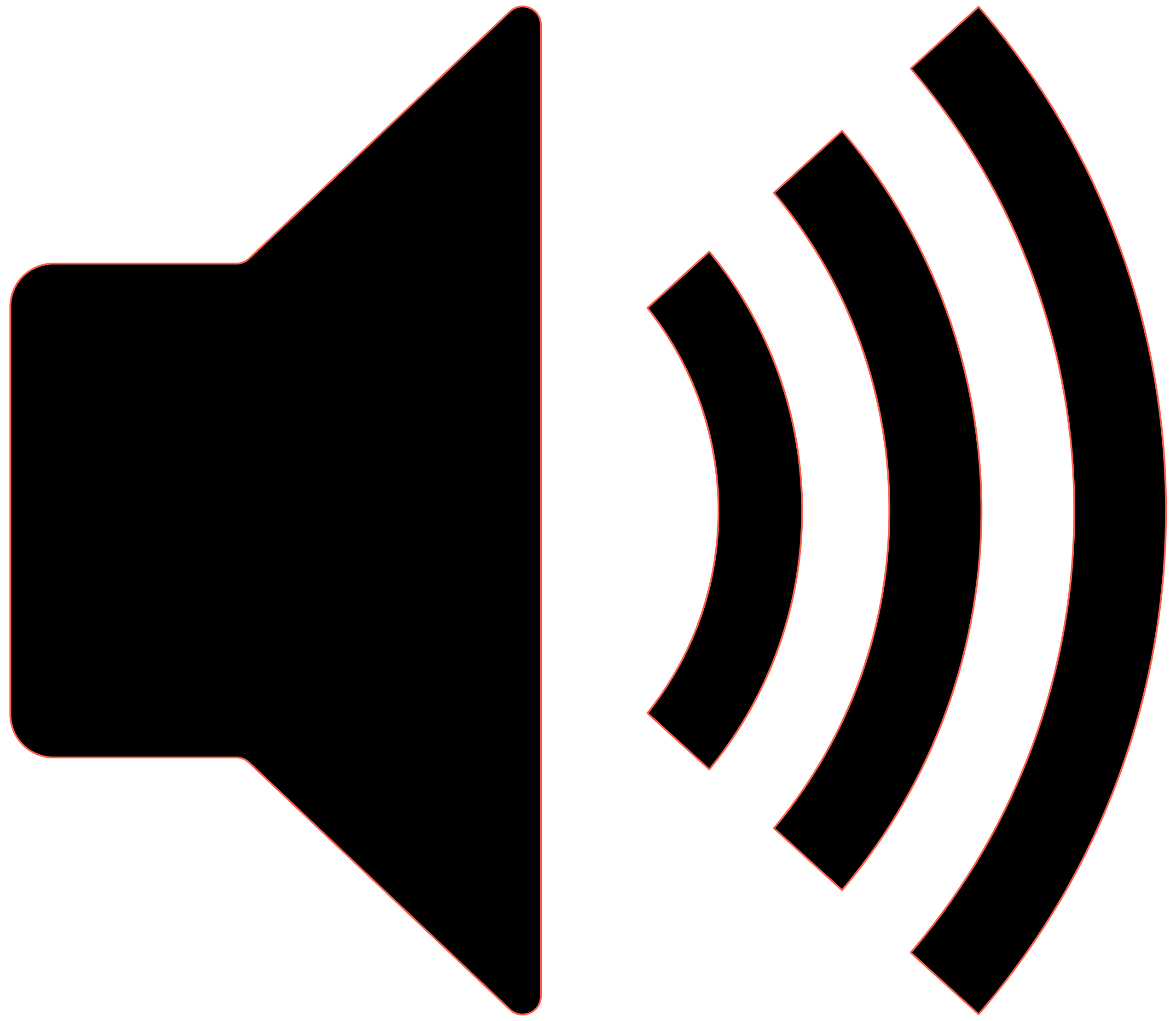


EXECUTIVE
FLIGHT TRAINING

AURAL WARNING

A warning horn sounds when any landing gear are not down and locked and either situation occurs:

- Both throttles are below 82% and airspeed is below 130 KIAS.
- The flaps are beyond TAKE OFF and APPROACH setting.

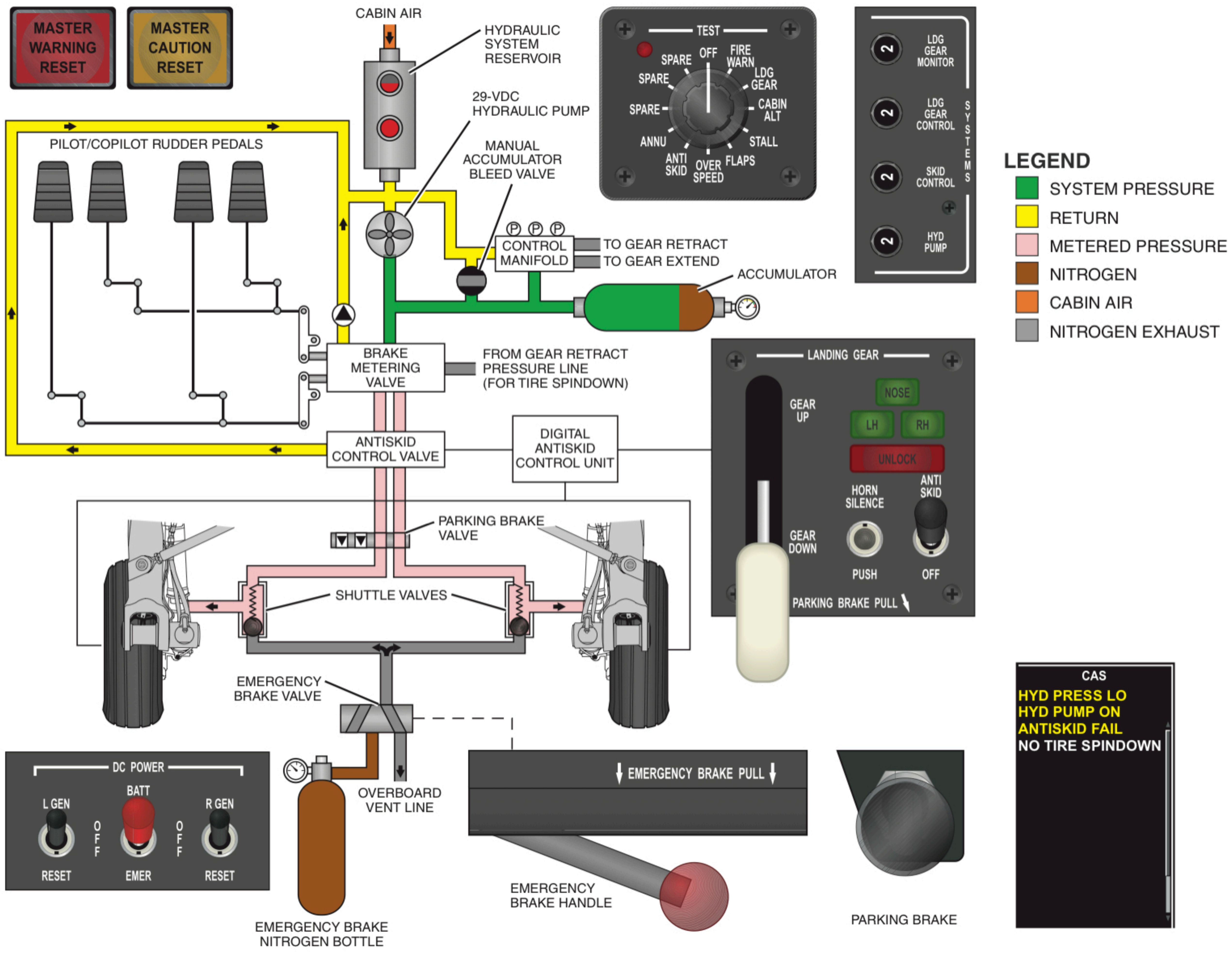


NOSEWHEEL STEERING

- Mechanical linkages from the rudder pedals provide nosewheel steering.
- The rudder pedals can steer up to 20° with spring linkages providing an additional 55°. Maximum deflection is 75°.
- For towing, ensure the rudder lock is disengaged and do not exceed 75° deflection.
- With gear extended, the nosewheel deflects with pedal movement. **The pedals must be centered immediately before touchdown during crosswind landing.**

BRAKES

The disc brakes are powered by the hydraulic system. A pneumatic system provides emergency braking in the event of a failure. Braking is applied by pressing on the tops of the rudder pedals.



EXECUTIVE FLIGHT TRAINING

ANTISKID SYSTEM

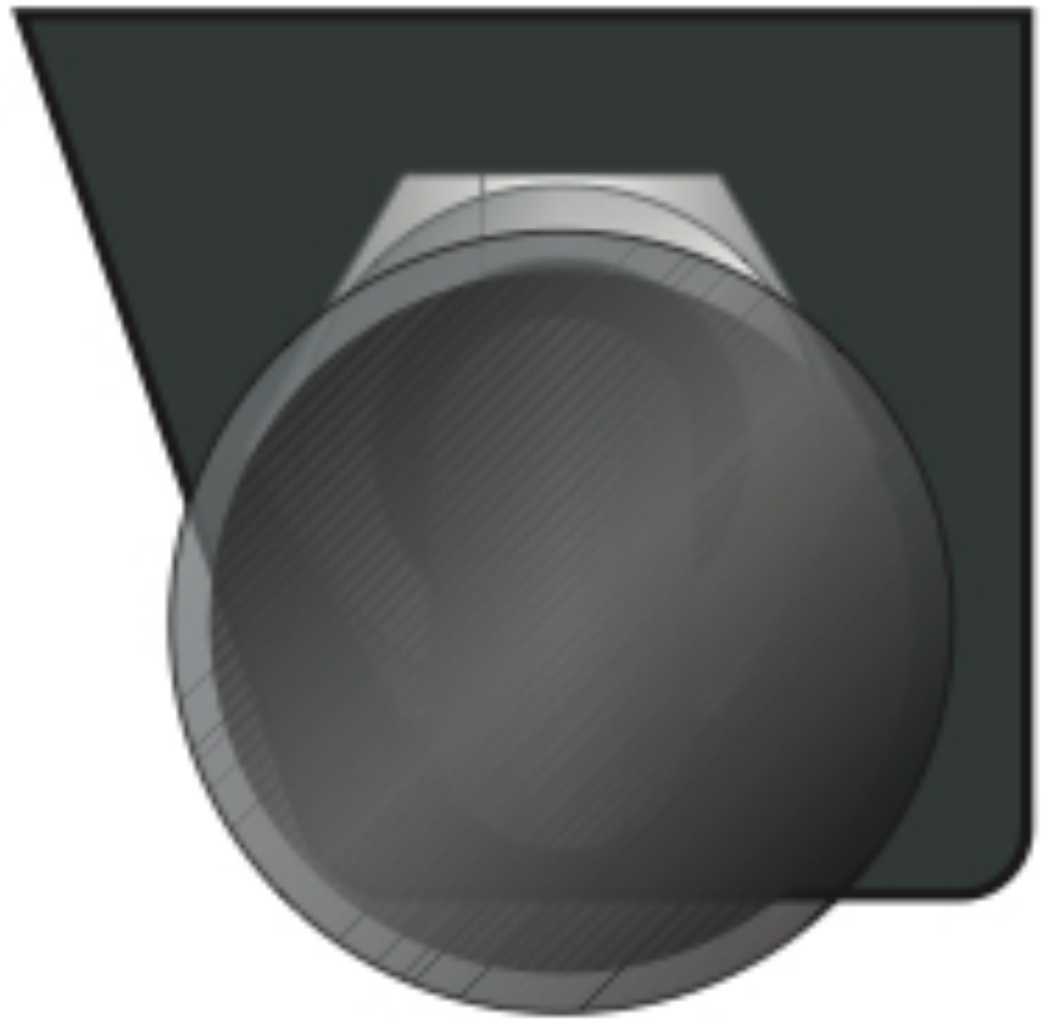
- The antiskid system provides maximum braking efficiency on all runway surfaces.
- The system includes “touchdown protection”.
- The “Locked-wheel crossover protection” prevents sudden yawing due to differential braking.

EXECUTIVE
FLIGHT TRAINING

PARKING BRAKES

The parking brakes lock when the parking brake valve traps hydraulic fluid in the brake lines.

The brakes can be set by pulling on the PARKING BRAKE knob on right lower side of the instrument panel.



PARKING BRAKE

EMERGENCY BRAKES

- If the hydraulic brake system fails, pneumatic brakes are available.
- Pulling the EMERGENCY BRAKE handle actuates the emergency brake system.
    - Pull the handle to apply and modulate braking pressure.The lever has a stop to prevent locking the brakes and blowing the tires. The emergency brakes are effective for six pulls on the handle. No electrical power is required for the emergency brakes.

EXECUTIVE
FLIGHT TRAINING

CONTROLS & INDICATIONS

ANTI SKID Switch – Normally in the on position, before turning off, ensure brake pressure is released.

Circuit Breakers – Located in SYSTEM section of left CB panel.

Disengaging HYD PUMP breaker disables the hydraulic pump, resulting in limited or improper functioning of power brakes.

The SKID CONTROL can be disengaged in the breaker panel to disable antiskid and touchdown protection.

EXECUTIVE
FLIGHT TRAINING

CAS MESSAGES

ANTISKID FAIL – Is displayed if a fault develops in the antiskid system, system must be deactivated.

HYD PRESS LO – Displayed if pressure has dropped below operational levels, use of emergency braking system is required

POWER BRAKING OPERATION

- For normal operation, these 3 conditions must exist:
  - ANTI SKID switch is on.
  - Both wheels are rotating at aircraft groundspeed.
  - Either squat switch senses weight on wheels.

Flight Controls

FLIGHT CONTROLS

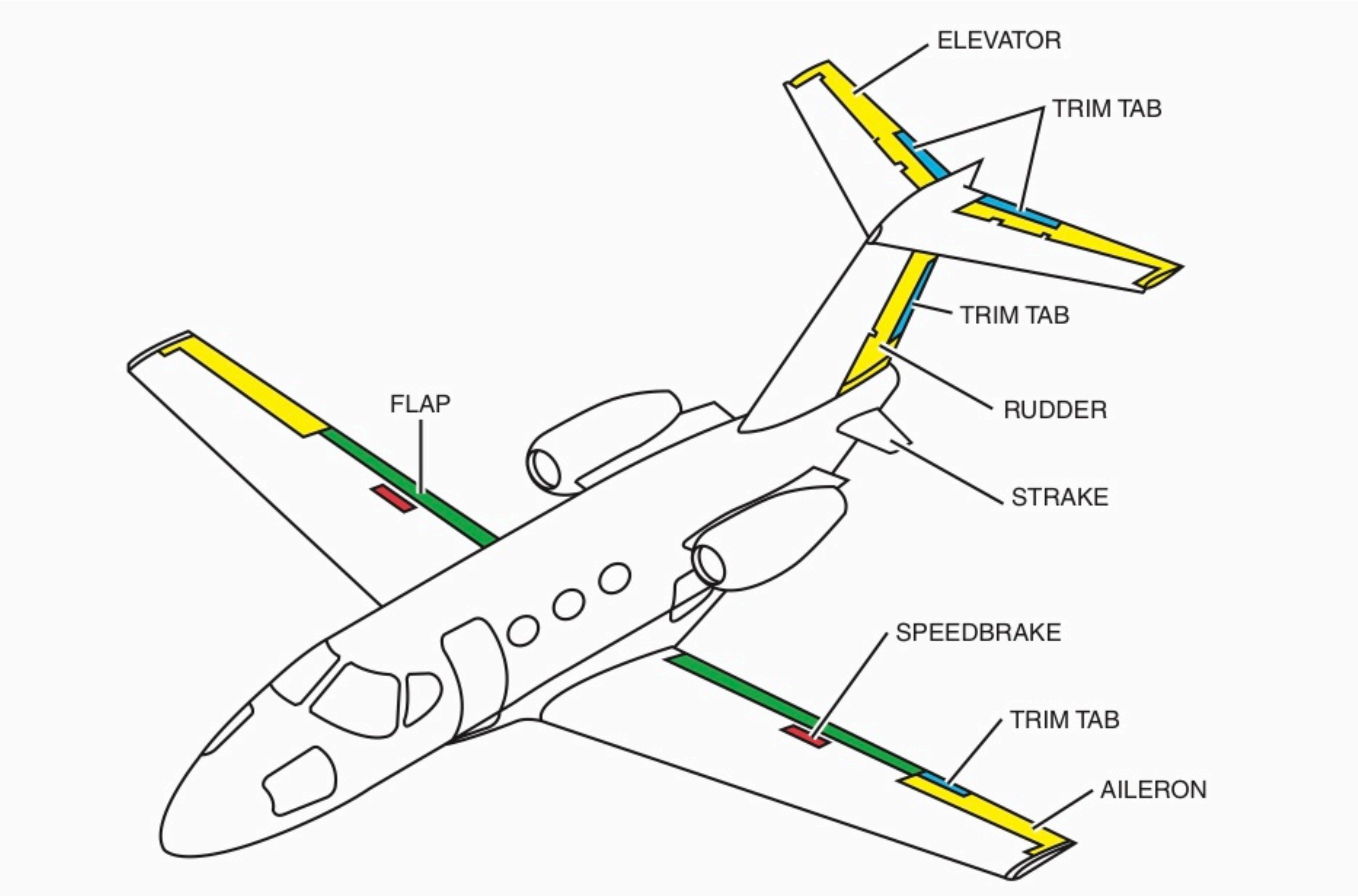
The primary flight controls are cable operated and include:

PRIMARY CONTROLS:

- Ailerons, rudder, and elevators.

SECONDARY CONTROLS:

- Trim devices, flaps, and speedbrakes.



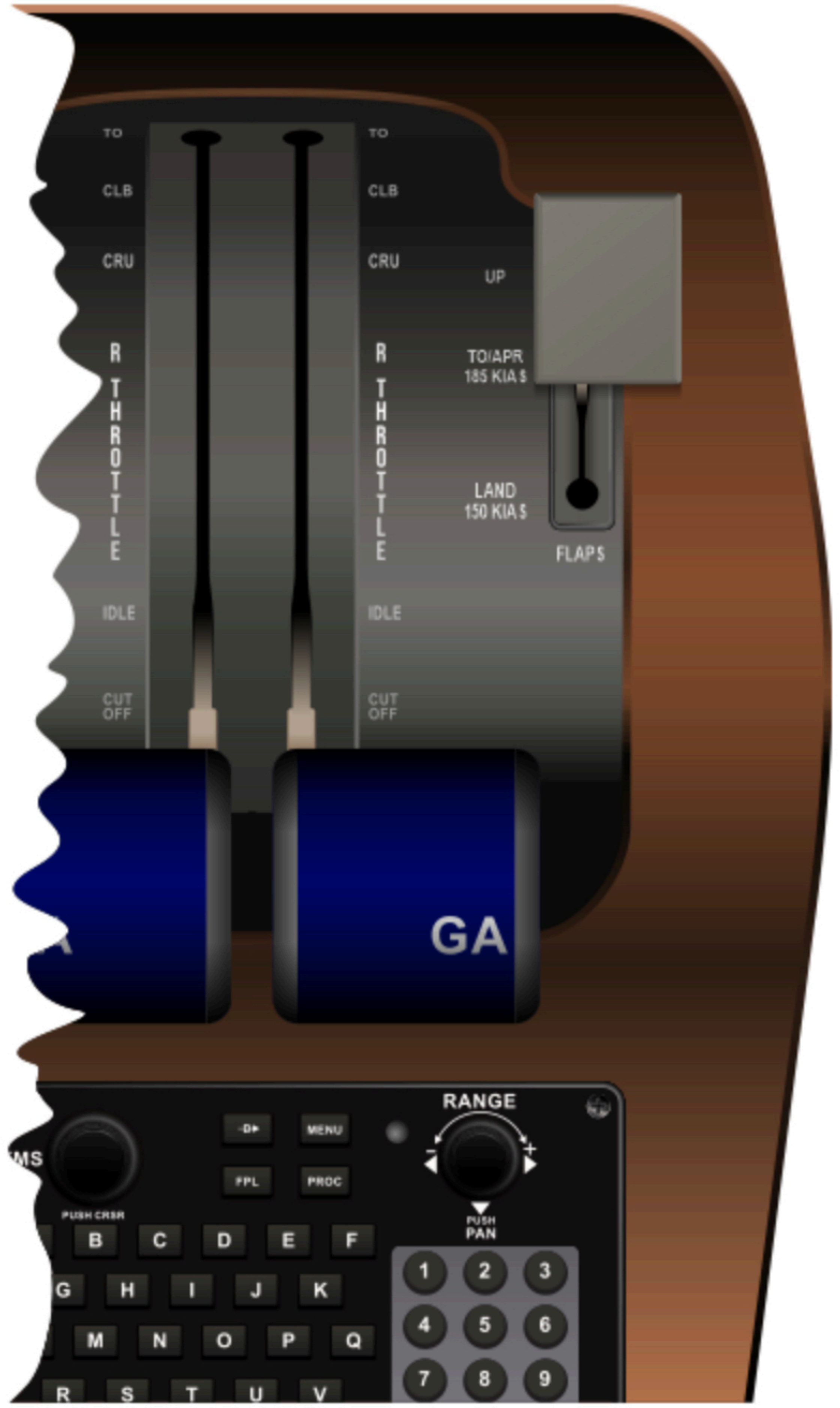
PRIMARY FLIGHT CONTROLS

- The primary flight controls directly control aircraft movement around three axes of flight – pitch, roll and yaw
- The controls manually actuated through cables by dual conventional control yokes and rudder pedals

EXECUTIVE
FLIGHT TRAINING

SECONDARY FLIGHT CONTROLS

- Secondary flight controls include the trim, flaps, and speedbrakes.
- The Trim tabs are electrically or mechanically adjusted through controls on the cockpit pedestal or yoke.
- The flaps and speedbrakes directly adjust airplane lift and drag, and are electrically actuated.



AILERON SYSTEM

- The two ailerons provide roll control.
- Neutral aileron position is 2° up.
- Control yoke rotates 70° in each direction providing maximum deflection.

AUTOPILOT CONTROL

- When autopilot is engaged, servo provides autopilot input to the aileron system.
- Disengaging autopilot can be achieved by:
  - The AP or YD button on AFCS controller
  - The AP TRIM DISC switch on either yoke
  - By commanding pitch trim
- Either pilot can override servo motor by applying force to the control yoke.

AILERON-RUDDER INTERCONNECT

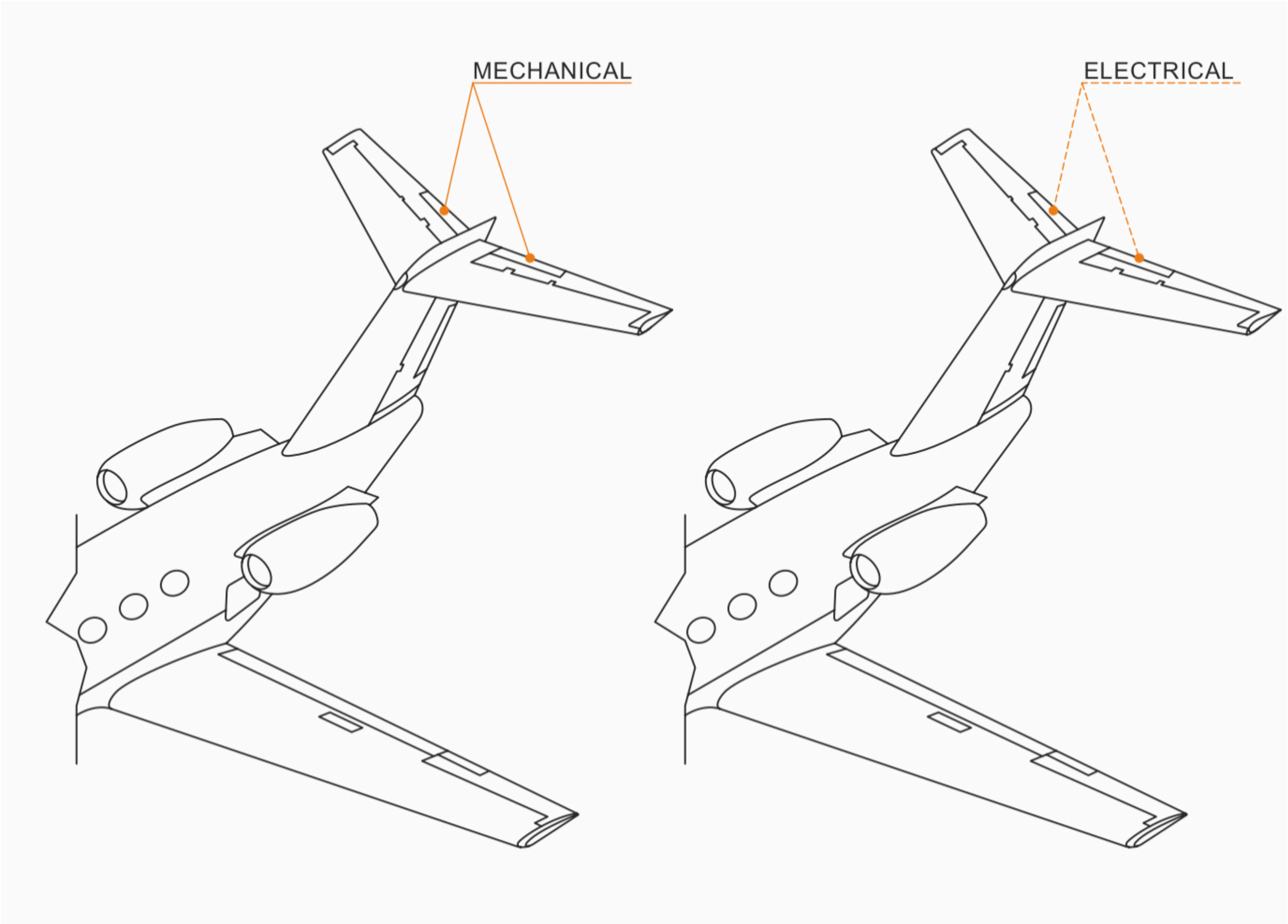
- Flexible mechanical interconnect between the rudder and ailerons provides improved lateral stability.
- If pilot rolls aircraft to the left, interconnect causes some rudder deflection (and resultant airplane yawing) to the left.

RUDDER SYSTEM

- The rudder on the trailing edge of the vertical stabilizer provides yaw control.
- System moves as much as 35° left or right of center.
- Rudder is moved by fore and aft movement of the pedals.

ELEVATOR SYSTEM

The elevators are on the trailing edge of the horizontal stabilizer and provide pitch control. The system is mechanically controlled by the yoke or by the electric pitch servo. Moving the control column aft (approx. 4” maximum deflection) rotates the elevators up. Moving the control column forward (approx. 3” maximum deflection) rotates the elevators down.



EXECUTIVE
FLIGHT TRAINING

CONTROL LOCK SYSTEMS

- Control locks, when engaged, restraining primary flight controls.
- It prevents damage to control surfaces and systems from wind gusts striking the aircraft while it is on the ground.

AILERON/ELEVATOR CONTROL LOCK

- A removable flag-insert device fits through a hole in the control yoke bushing at control panel and the back of the pilot control yoke to lock the controls.
- The lock pins the control yoke to the instrument panel.

EXECUTIVE FLIGHT TRAINING

RUDDER LOCK

- The rudder control lock inserts a pin into the aft rudder pulley, preventing movement.
- The rudder lock must be engaged from outside the aircraft. The lock can be disengaged from the cockpit by pulling the control yoke aft from the neutral position

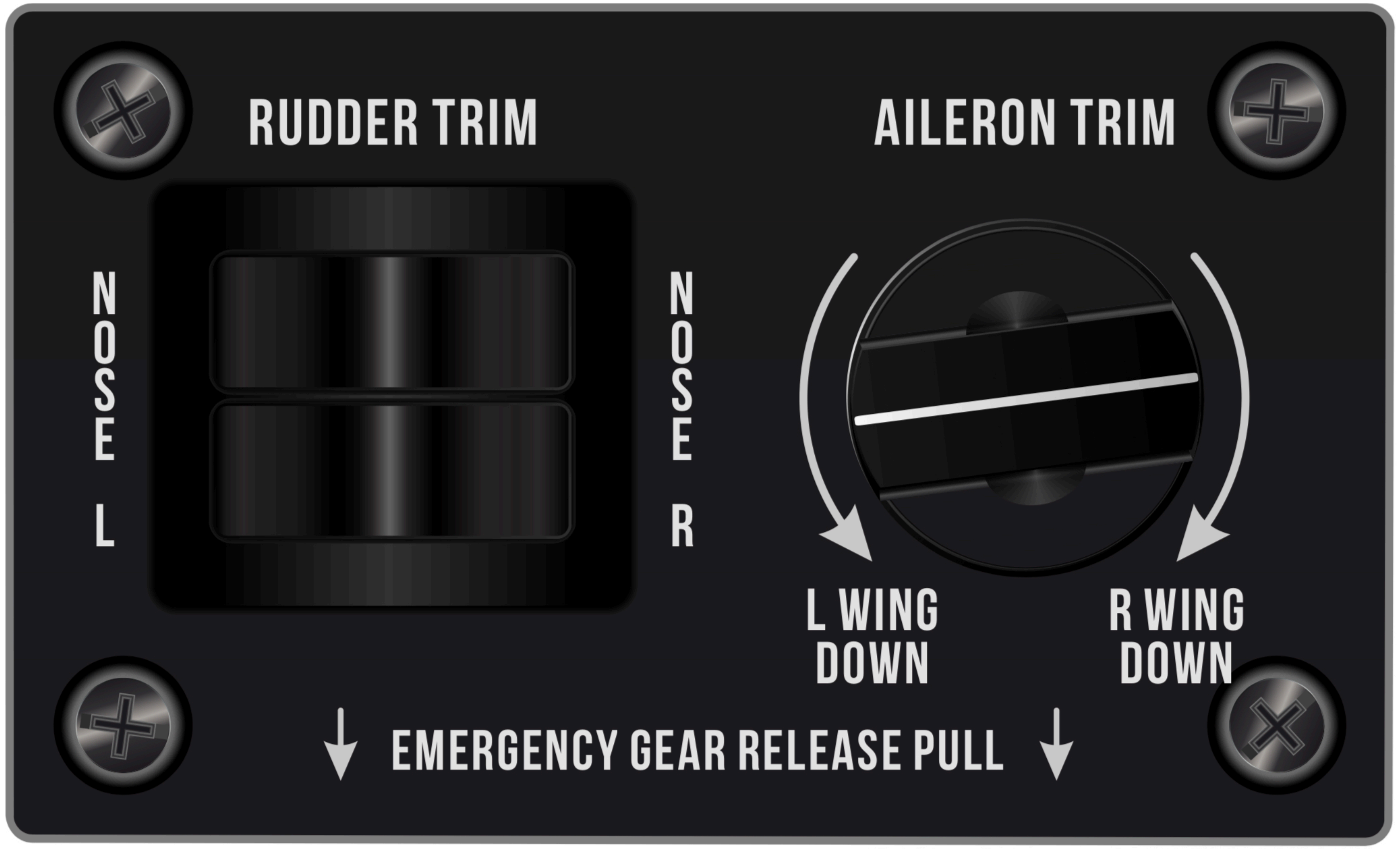
SECONDARY FLIGHT CONTROLS

- Secondary flight controls consist of trim systems for primary flight controls, and lift and drag controls (flaps and speedbrakes)
- The trim is provided by a tab on the inboard trailing edge of most flight controls.
- The trim systems are electrical on all 3 axes, with additional mechanical trim available for pitch.

AILERON AND RUDDER TRIM

A single aileron trim tab is located on the trailing edge of the left aileron. The AILERON TRIM knob controls the aileron trim through an electrical actuator. Depress the knob before rotating.

The rudder trim tab is located on the trailing edge of rudder and is driven by the electrical trim actuator. It is controlled by the RUDDER TRIM switch.



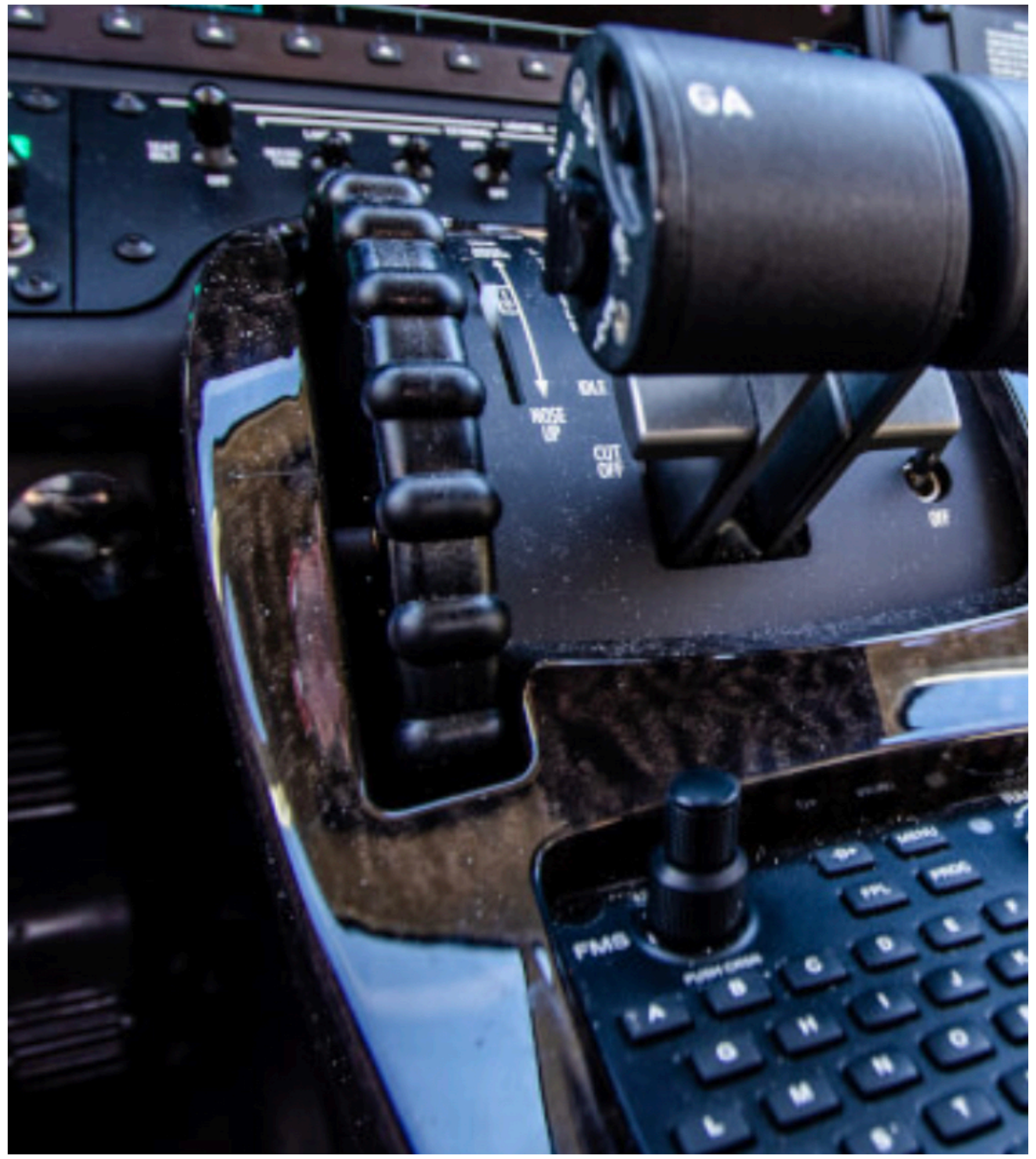
ELEVATOR TRIM

The trim tabs are located on the trailing edges of both elevator surfaces. They move together and are controlled mechanically through cables connected to a control wheel on the left side of the center pedestal.

Manual Trim: Rotating the trim wheel forward or aft causes the nose to pitch up or down.

Electric Trim is controlled by a thumb switch on the outboard side of the control yoke.

The electric trim can be overridden by the mechanical trim.

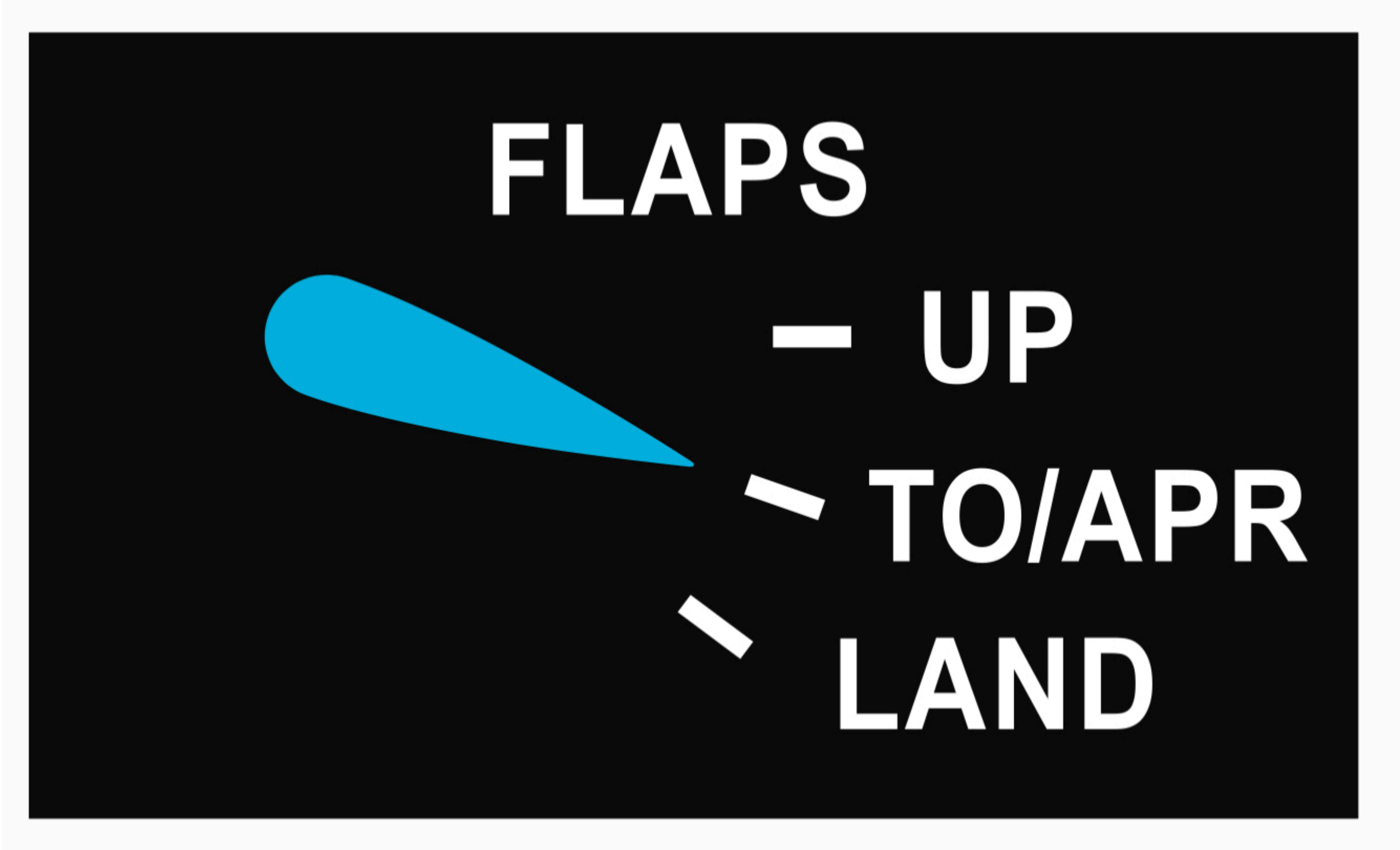


FLAPS

The flaps provide control of lift and drag. The flap panels on the inboard trailing edge of each wing are hinged for 3 positions:

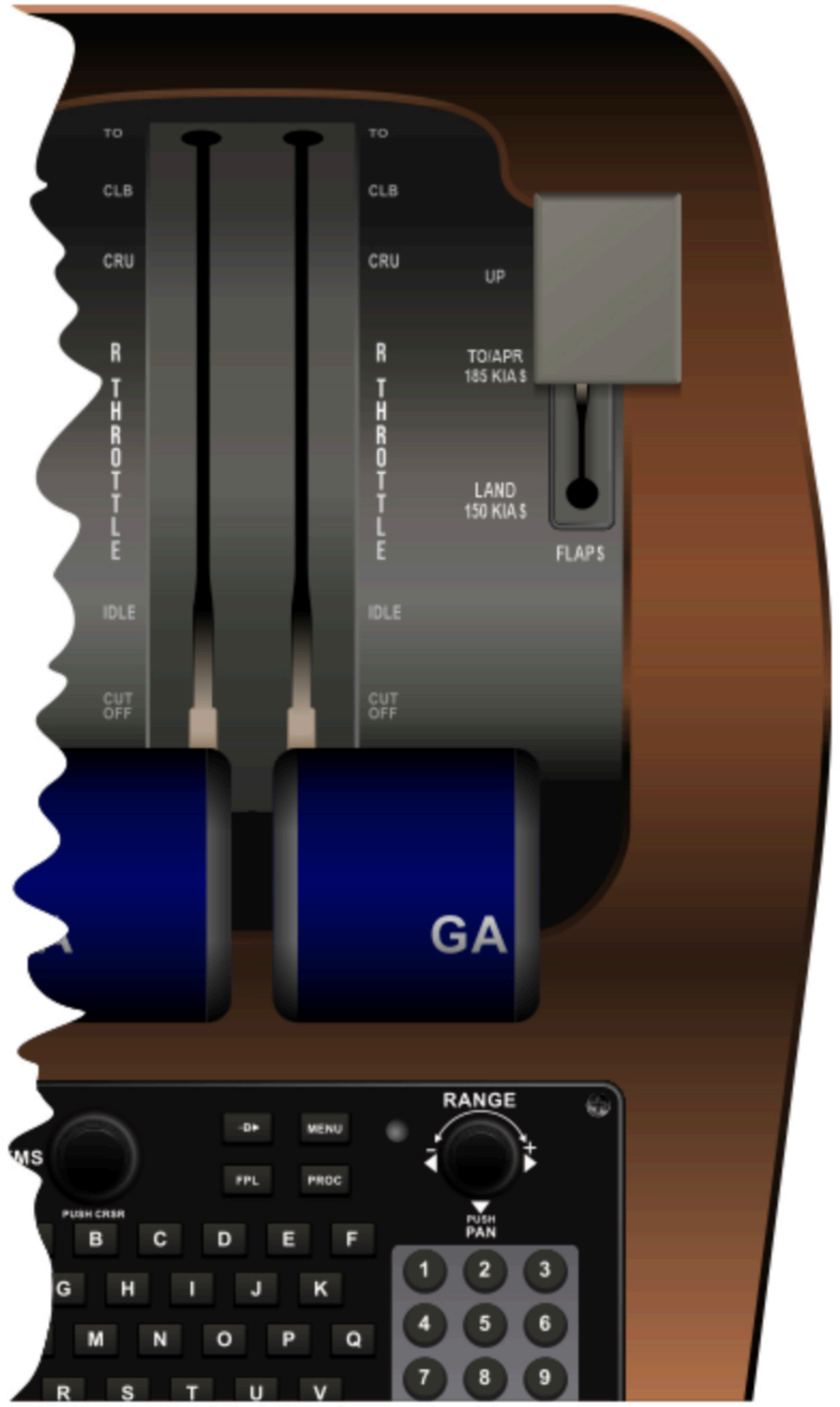
- UP (retracted),
- TO/APR (takeoff/approach)
- LAND (landing)

A mechanical interconnect system links the two flap panels together preventing asymmetrical flap positions.



FLAPS CONTROL & INDICATIONS

- The flap handle is located in the cockpit, to the right of the throttle levers on control pedestal.
- The handle has mechanical detents requiring the handle to be pushed down before selecting a new position.



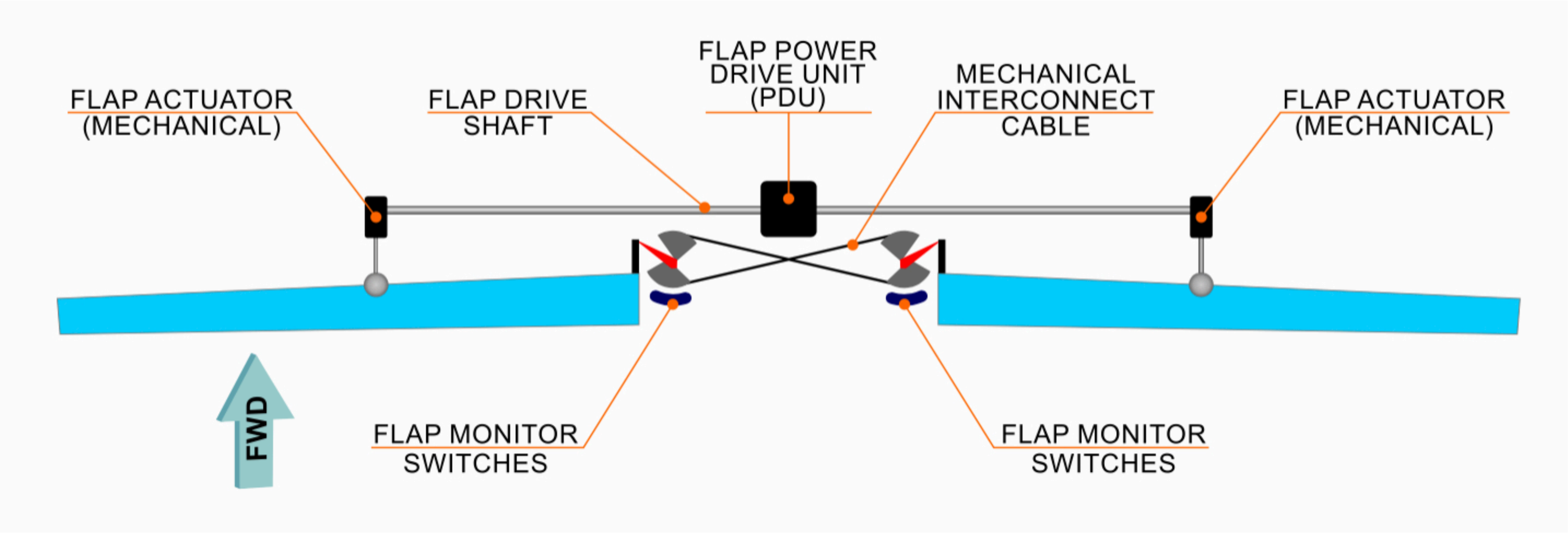
EXECUTIVE FLIGHT TRAINING

PREFLIGHT

- Visually check that the flap position indication and flap handle agree on position.
- Rotary Test – Select the FLAPS position:
  - The flap position on the MFD is replaced with red X, the amber STALL WARN FAIL message appears and the amber FLAPS FAIL messages appears for 3 seconds, then extinguishes.

NORMAL FLAP OPERATION

- To reposition the flaps, push in on handle and select desired position.
- Allow flaps to stabilize in the new position.
- Confirm that flap indication and handle position agree before selecting the next position.
  - Takeoff/approach flaps are limited to airspeed at or below 185 KIAS
  - Landing flaps are limited to airspeeds at or below 150 KIAS



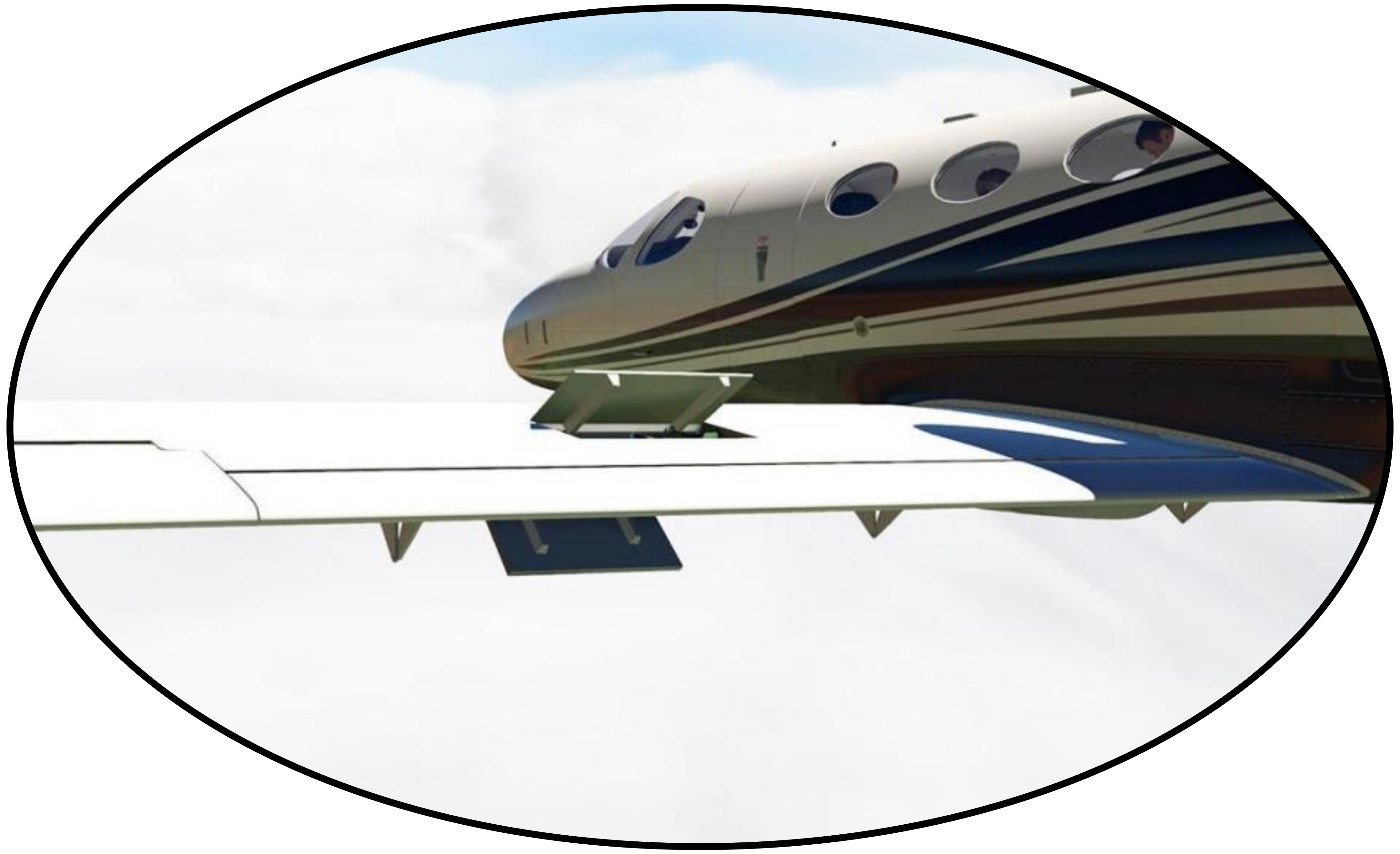
EXECUTIVE FLIGHT TRAINING

SPEEDBRAKES

- The Speedbrakes on wings provide control of lift and drag.
- On the Mustang, the flaps increase both lift and drag, while speedbrakes increase drag and slightly reduce lift.

SPEEDBRAKE COMPONENTS

- The system consists of an upper and lower panel on each wing.
- Only two positions: stowed & extended.
- The panels are commanded to either extend or retract. There is no intermediate positions.

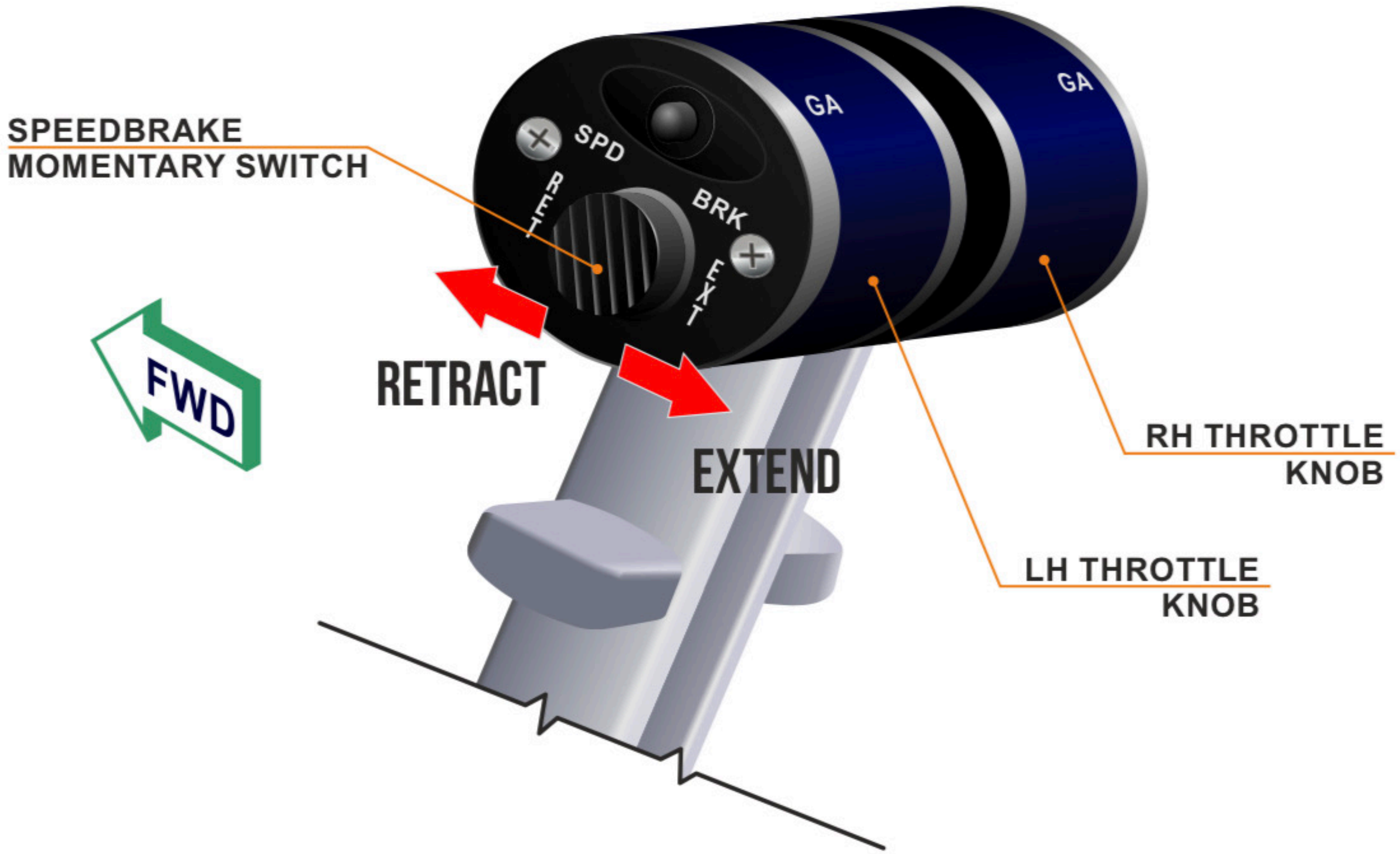


CONTROLS & INDICATIONS

- System is controlled by three-position, momentary thumb switch on outboard side of each throttle lever knob.
- Position indication is provided by white SPD BRK EXTEND message when speedbrakes are not in the stowed position.

OPERATION

- Move the switch aft to EXT (extend) and forward to RET (retract).
- The actuator moves to commanded position and remains there until commanded to move in the opposite direction.
- If DC power fails, the speedbrakes remain in current position.



EXECUTIVE FLIGHT TRAINING

Avionics

AVIONICS

The Citation Mustang utilizes the Garmin G1000 system to provide normal flight instruments and avionics. It also provides standby and backup capabilities for essential operations. Some aircraft have been upgraded to the G1000 NXi system.

EXECUTIVE
FLIGHT TRAINING

G1000 FLIGHT DECK OVERVIEW

- The two primary flight displays (PFDs) provide flight instrument indications.
- The larger multifunction display (MFD) provides a moving map display, incorporating information from navigation, terrain, weather, and traffic alerts.
- The G1000 provides automatic flight control and flight direction, as well as an integrated flight management system.

AIR DATA REFERENCE SENSORS

- The outside air data is supplied through dual pitot-static systems, outside-air probes and a stall-warning vane.

- The two pitot probes, one on each side of the airplane, supply ram-air inputs to the respective side air data computers (ADC).

EXECUTIVE
FLIGHT TRAINING

G1000 ARCHITECTURE

The G1000 is a system of individual line replaceable units (LRUs), integrated into a modular system that provides:

- Flight instrumentation
- Navigation and hazard avoidance
- Flight guidance
- Communications
- Monitoring of aircraft systems

GARMIN INTEGRATED AVIONICS UNIT

- The G1000 is regulated and coordinated by central processing computers in the two Garmin integrated avionics units (GIAs)
- The GIAs contain essential navigation and communications avionics:
  - NAV/COM
  - Instrument landing system (ILS)
  - Global positioning system (GPS)
  - Flight director (FD)

EXECUTIVE
FLIGHT TRAINING

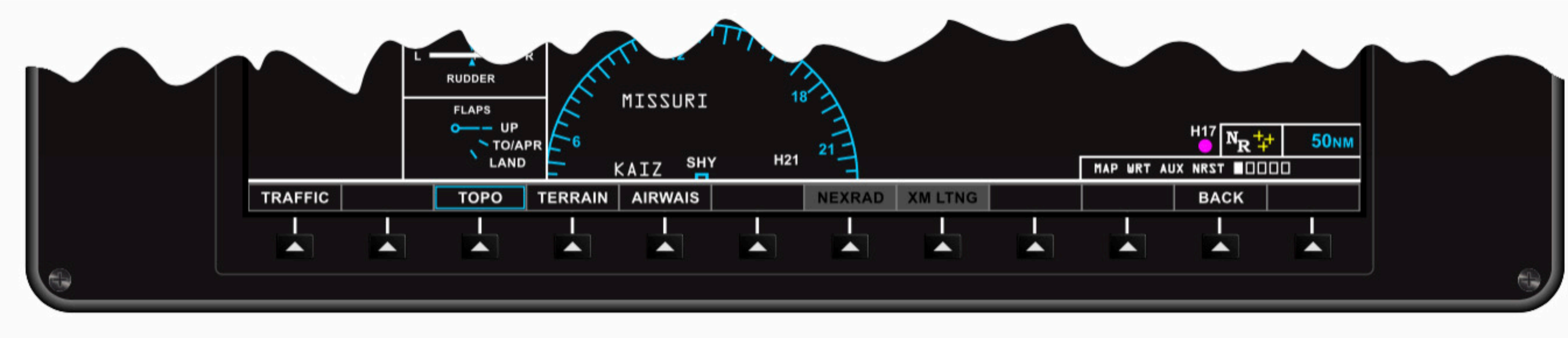
REVERSIONARY MODE

- In event of a screen failure, the essential information from the PFDs and MFD can be combined onto remaining screens by selecting the DISPLAY BACKUP button.
- This will ensure availability of adequate information for continued flight.

EXECUTIVE FLIGHT TRAINING

DISPLAY CONTROLS

- The controls on each bezels are used to change the system settings.
- At the bottom of each display, are multi-purpose “softkeys”. They have different functions at different times, depending on the flight conditions or G1000 settings.



EXECUTIVE
FLIGHT TRAINING

ATTITUDE AND HEADING REFERENCE SYSTEM

- The Attitude and Heading Reference System (AHRS) combines the functions of an attitude gyro, directional gyro, and the turn-and-slip instrument.
- Each AHRS is electrically stabilized by retrieving information from three other sources:

1. Magnetometer
2. ADC
3. GIAs

MAGNETOMETER

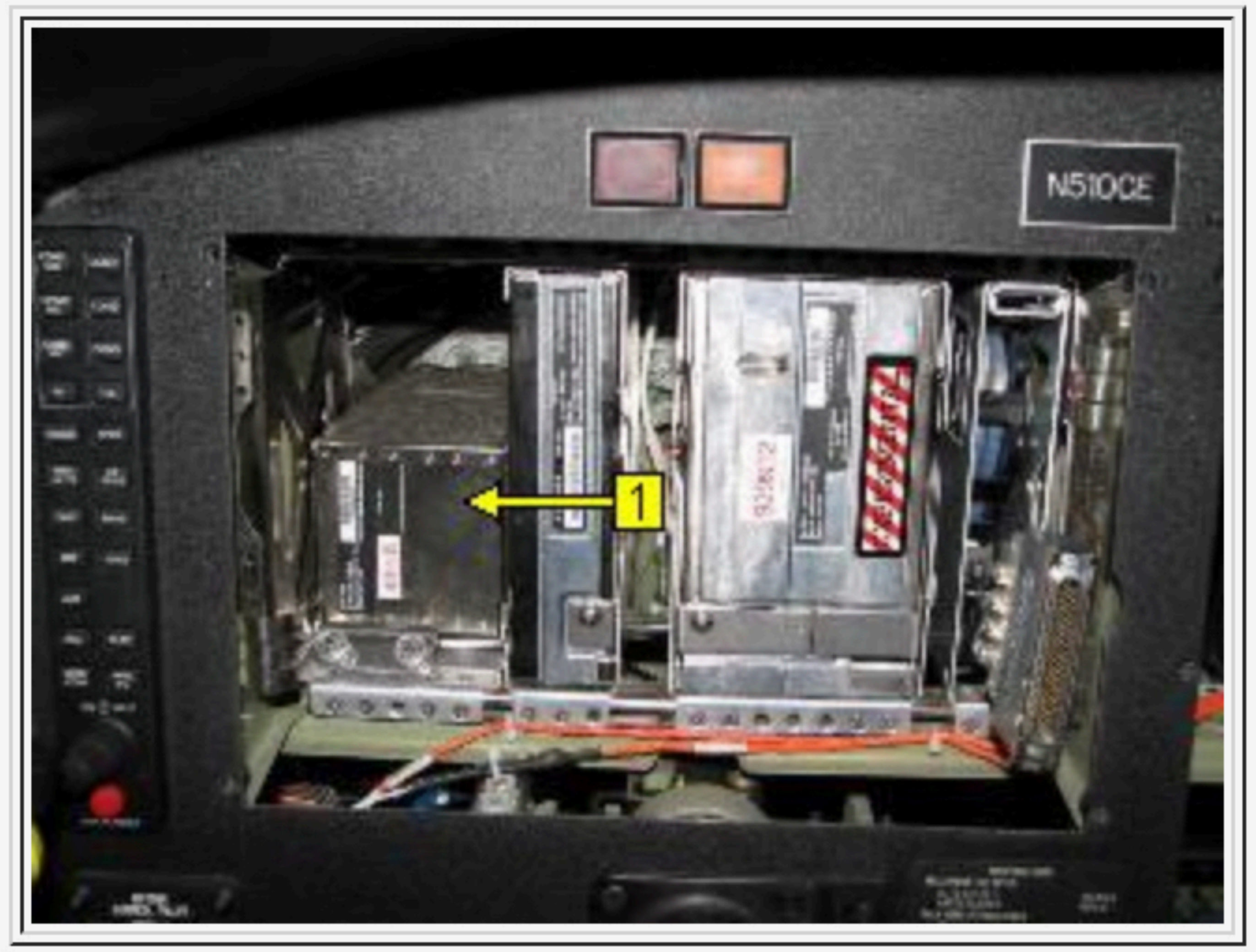
- The GMU 44 magnetometer has a magnetic sensor that provides local magnetic information, heading, tilt, and temperature data to the Garmin AHRS system.

- The magnetometer is located in the vertical tail to minimize magnetic influence from aircraft structures and contents.

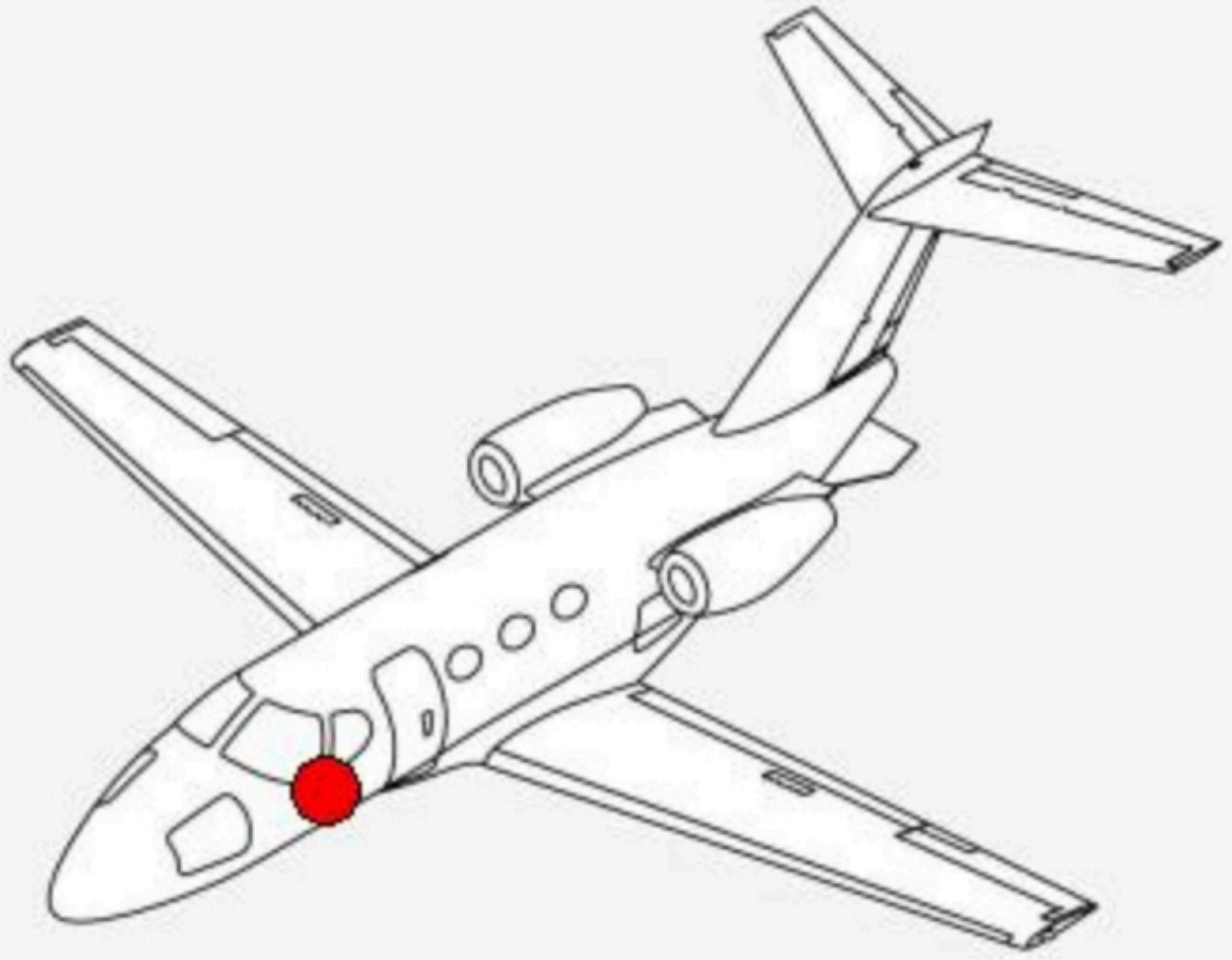
EXECUTIVE
FLIGHT TRAINING

AIR DATA COMPUTER

- Each GDC 74B (ADC1 for the pilot, ADC2 for the copilot) is a remote-mounted device that provides air data to both GIAs and PFDs:
  - Air temperature
  - Pressure altitude
  - Density altitude
  - Vertical speed
  - Indicated airspeed
  - True airspeed
  - Mach number



View looking forward at the LRU rack behind the pilots PFD


1.GDC 74B Garmin Air Data Computer

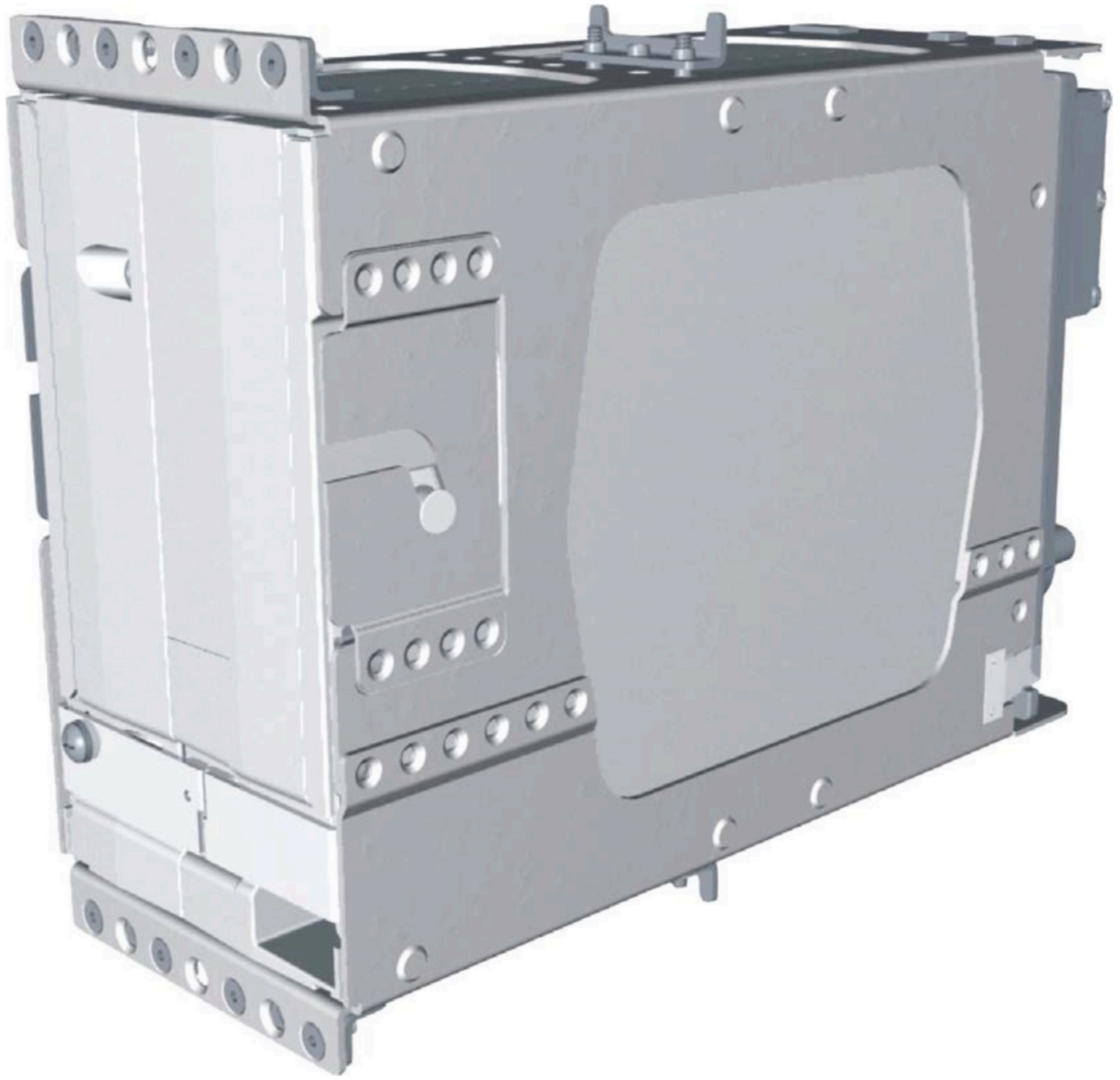
EXECUTIVE
FLIGHT TRAINING

INTEGRATED AVIONICS UNIT

Equipment Description

The GIA is a microprocessor used in the Garmin G1000.
The GIA performs the following functions:

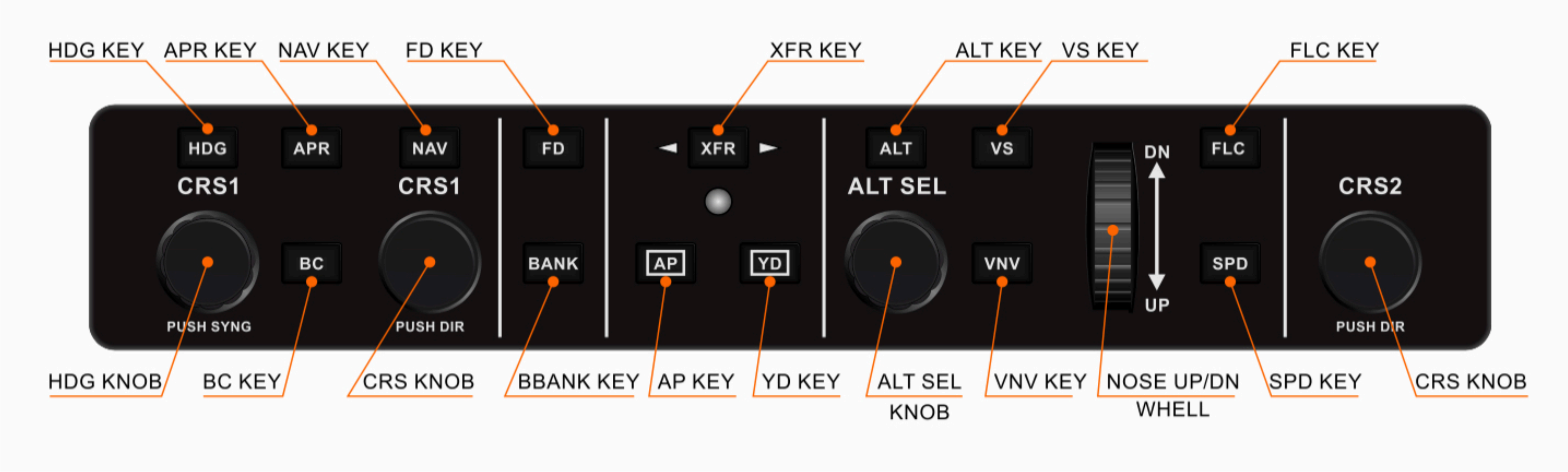
- A main processor that interfaces with the GFC 700 autopilot.
- A fifteen channel parallel WAAS GPS receiver that tracks and uses up to 15 satellites.
- A VHF COM transceiver that provides tuning from 118.00 to 136.992 MHz in 25 kHz or 8.33 kHz spacing for 760 or 2280 channel configuration respectively.
- A VOR/ILS localizer receiver.
- An ILS glideslope receiver
- The GIA GPS receiver is certified for IFR enroute, terminal, and non-precision approaches and is WAAS certified.



AUTOMATIC FLIGHT CONTROL SYSTEM

THE AIRCRAFT IS EQUIPPED WITH A GFC700 AFCS AUTOPILOT.

- The system functions are distributed across various units:
  - The AFCS controller – has mode select buttons
  - Each GIA – performs mode logic and FD computations
  - Servos – compute and monitor AP, YD, auto trim and manual pitch trim
  - PFD – display FD commands and mode annunciations
- Yoke-mounted and throttle-mounted switches complete the system control inputs:
  - CWS switch
  - AP DISC switch
  - GA switch



EXECUTIVE FLIGHT TRAINING

G1000 TRANSPONDERS

The aircraft has two transponders installed:

- A GTX33 Mode S transponder for the copilot’s side.
- A GTX33D Mode S diversity transponder for the pilot’s side.

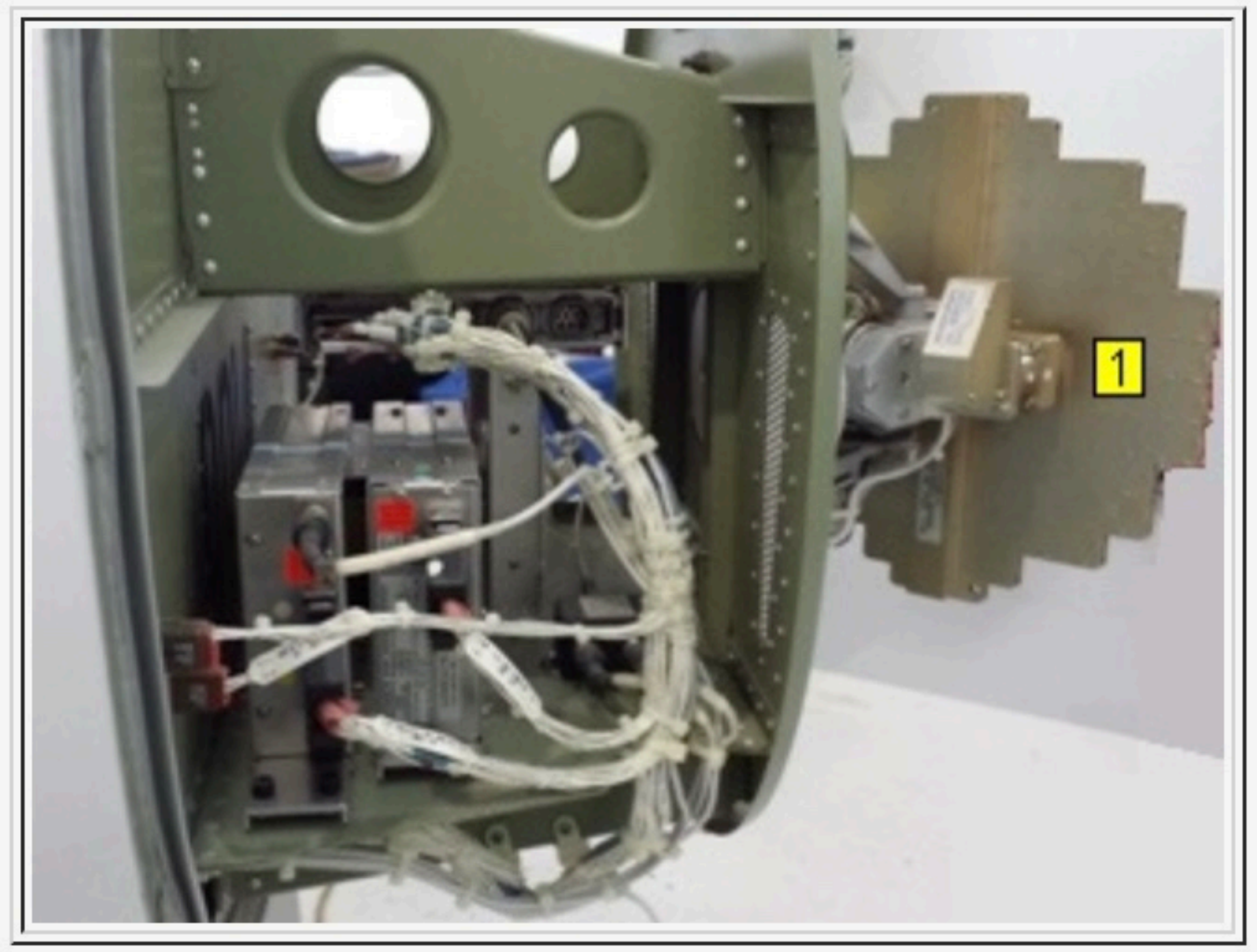
These transponders provide mode A, C, and S functions.

The GTX-33 transponder is a radio transmitter and receiver that operates on radar frequencies. The unit receives ground radar or TCAS interrogations at 1030 MHz and transmits a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The transponder has an IDENT operation that activates the special position identification (SPI) pulse for 18 seconds.

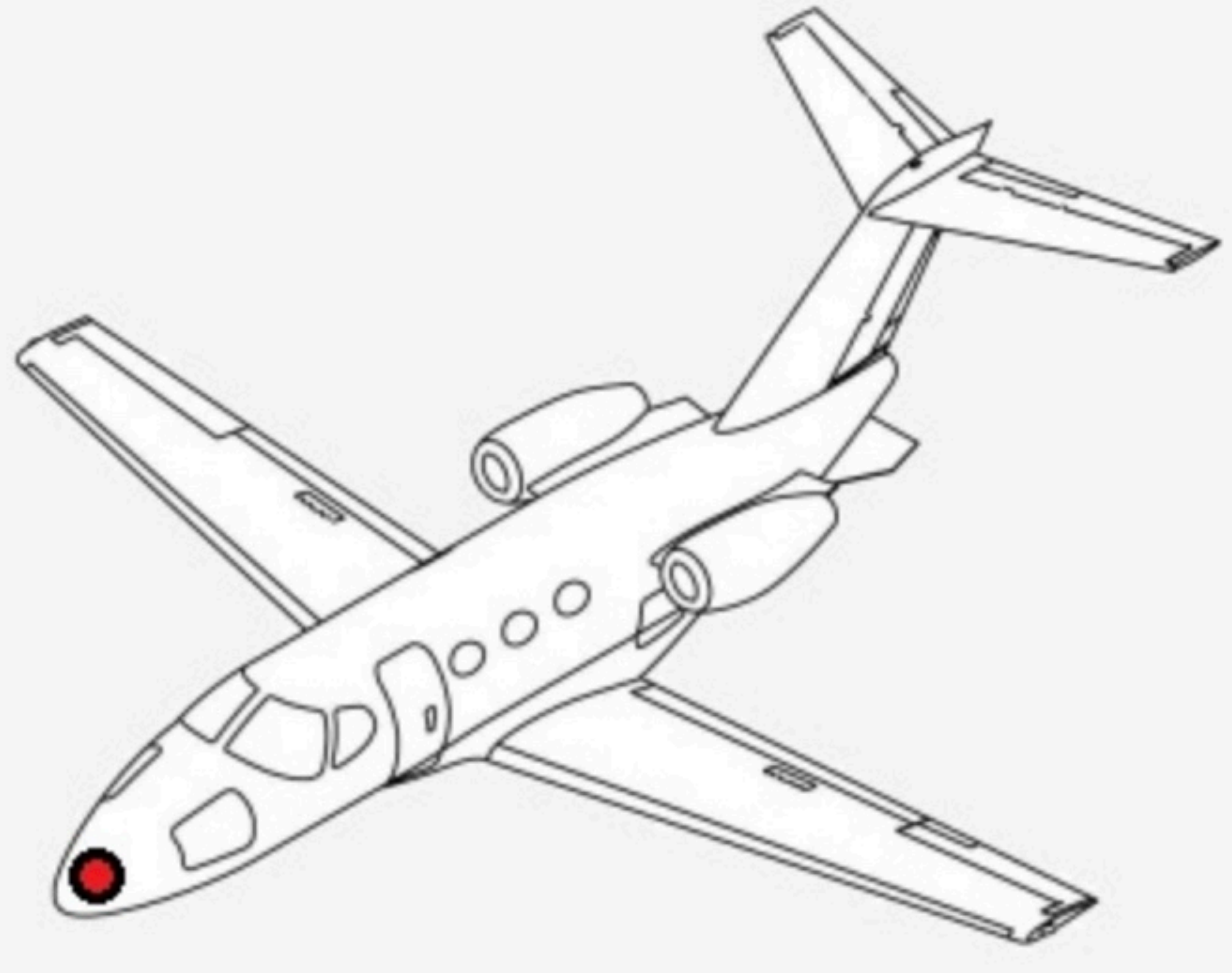
EXECUTIVE
FLIGHT TRAINING

WEATHER RADAR

- The GWX68 weather avoidance radar provides real-time radar information
- Radar Includes precipitation and ground mapping details
- Returns are displayed on the MFD



Looking at right side under the radome.

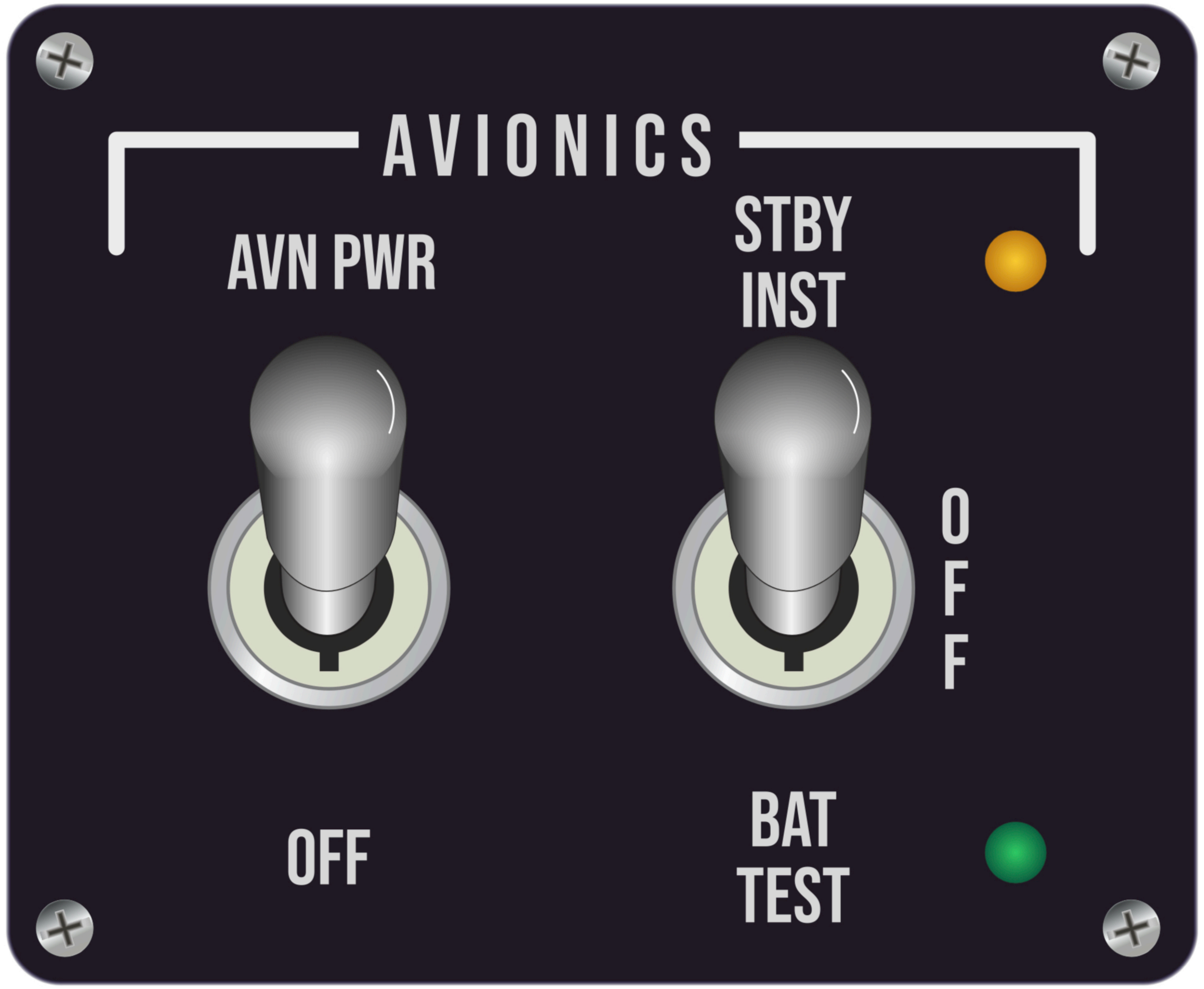


1. GWX 68 Radar

AVIONICS POWER SWITCH

Three switches control power to the avionics and instruments:

- The Battery switch
- The Avionics power switch
- The Standby instruments switch

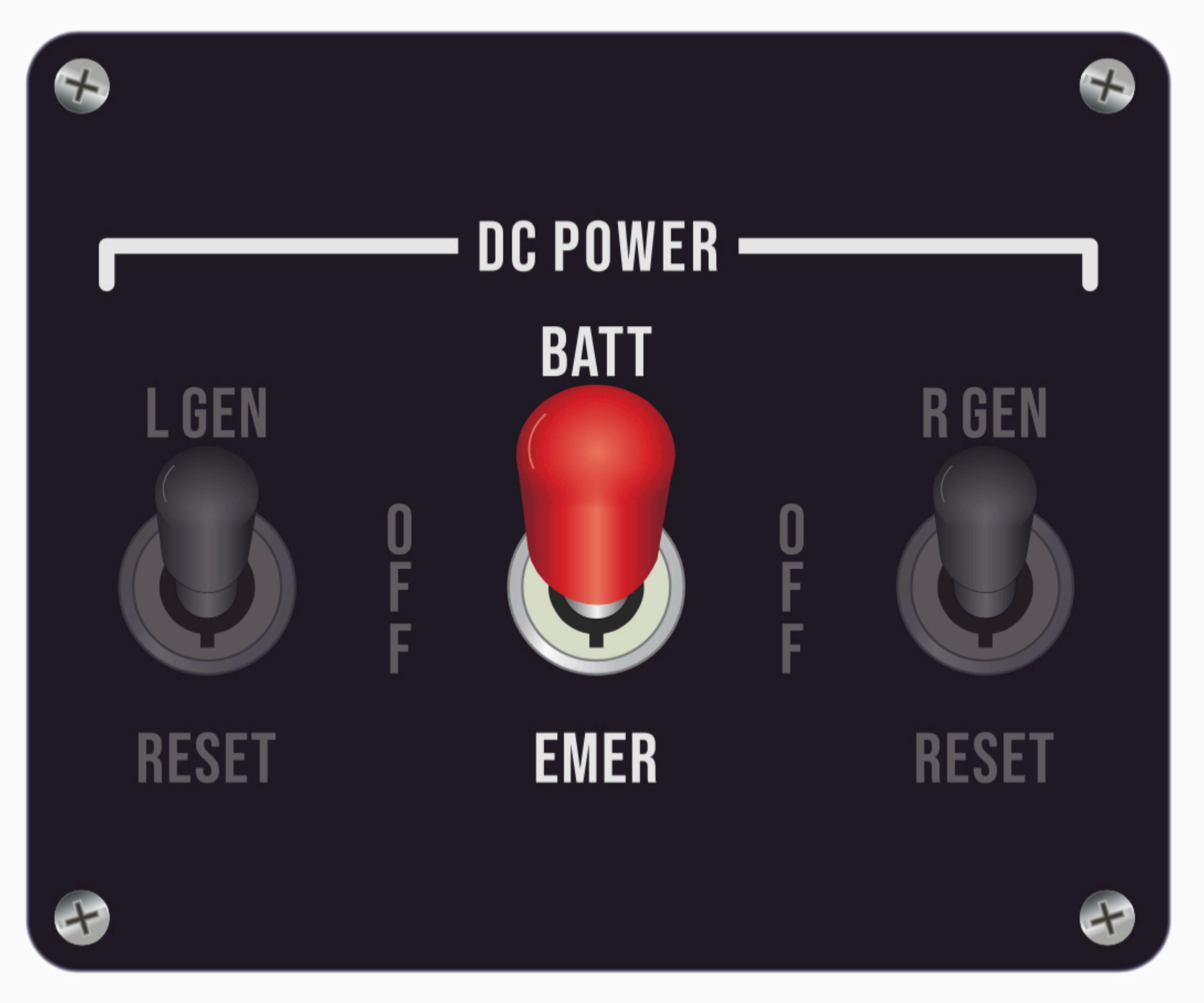


EXECUTIVE
FLIGHT TRAINING

BATTERY SWITCH

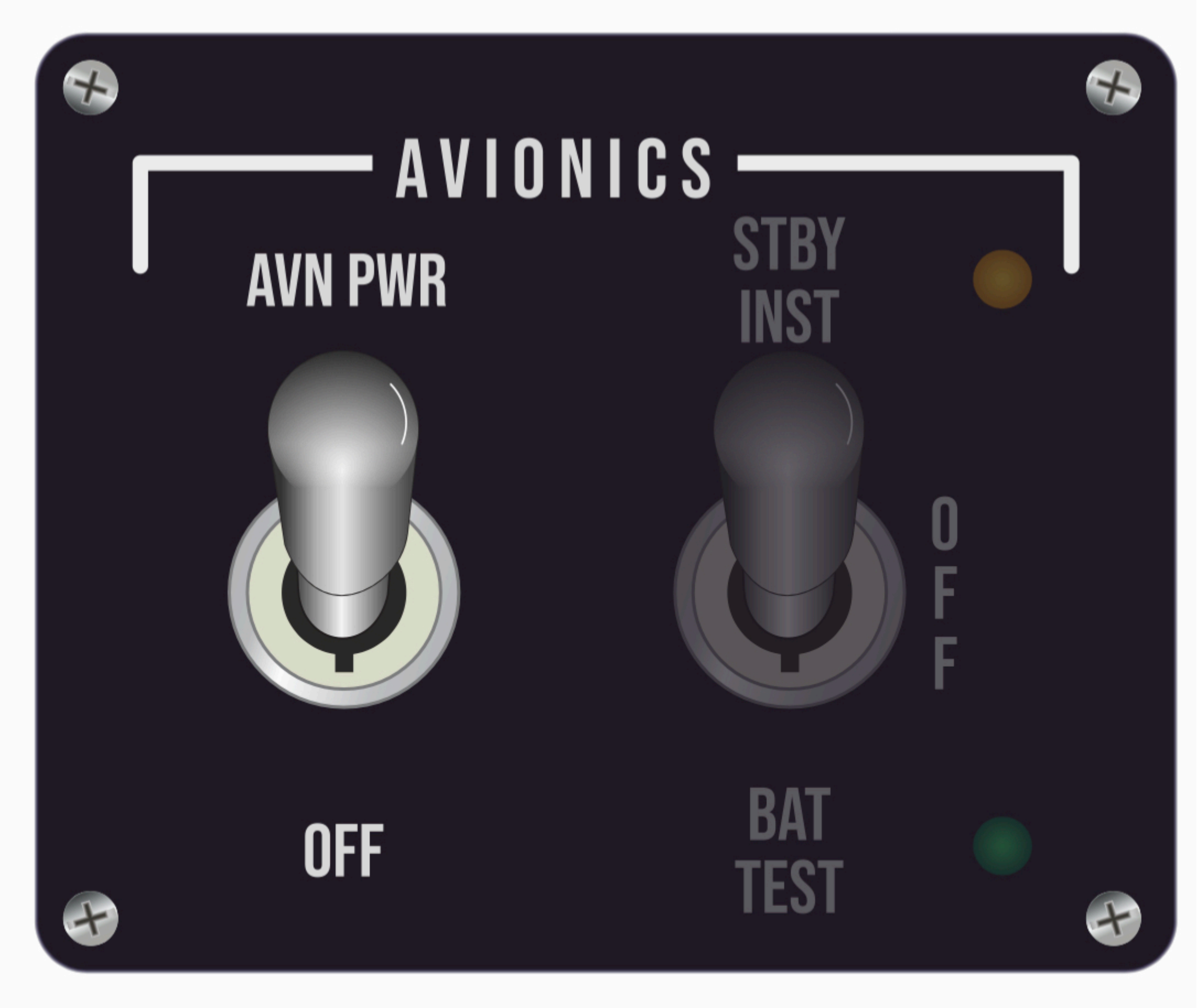
The battery switch is located on the lower left instrument panel and has three positions:

- BATT – Both PFDs, MFD, GIAs, GEAs
- OFF
- EMER – PFD1, GIA1, GEA1



AVIONICS POWER SWITCH

The Avionics power switch is located on the left lower instrument panel. It has two positions: AVN PWR and OFF



EXECUTIVE
FLIGHT TRAINING

STANDBY FLIGHT INSTRUMENTS SWITCH

The standby switch has three positions:

- STBY INST
- OFF
- BATT TEST

When the switch is in STBY INST position, a backup battery provides power to the following standby flight instruments:

- Airspeed indicator
- Attitude gyro
- Altimeter

PRIMARY FLIGHT DISPLAY

THE MAIN FLIGHT CONTROL DISPLAY UNITS FOR THE G1000 ARE THE PFDS, LOCATED IN FRONT OF THE PILOT AND COPILOT.

The color-coding on the PFD has the following meaning:

- Cyan – Pilot adjustable
- Green – Active
- White – Armed/Standby
- Amber – Caution
- Red – Warning
- Magenta – GPS derived

EXECUTIVE FLIGHT TRAINING

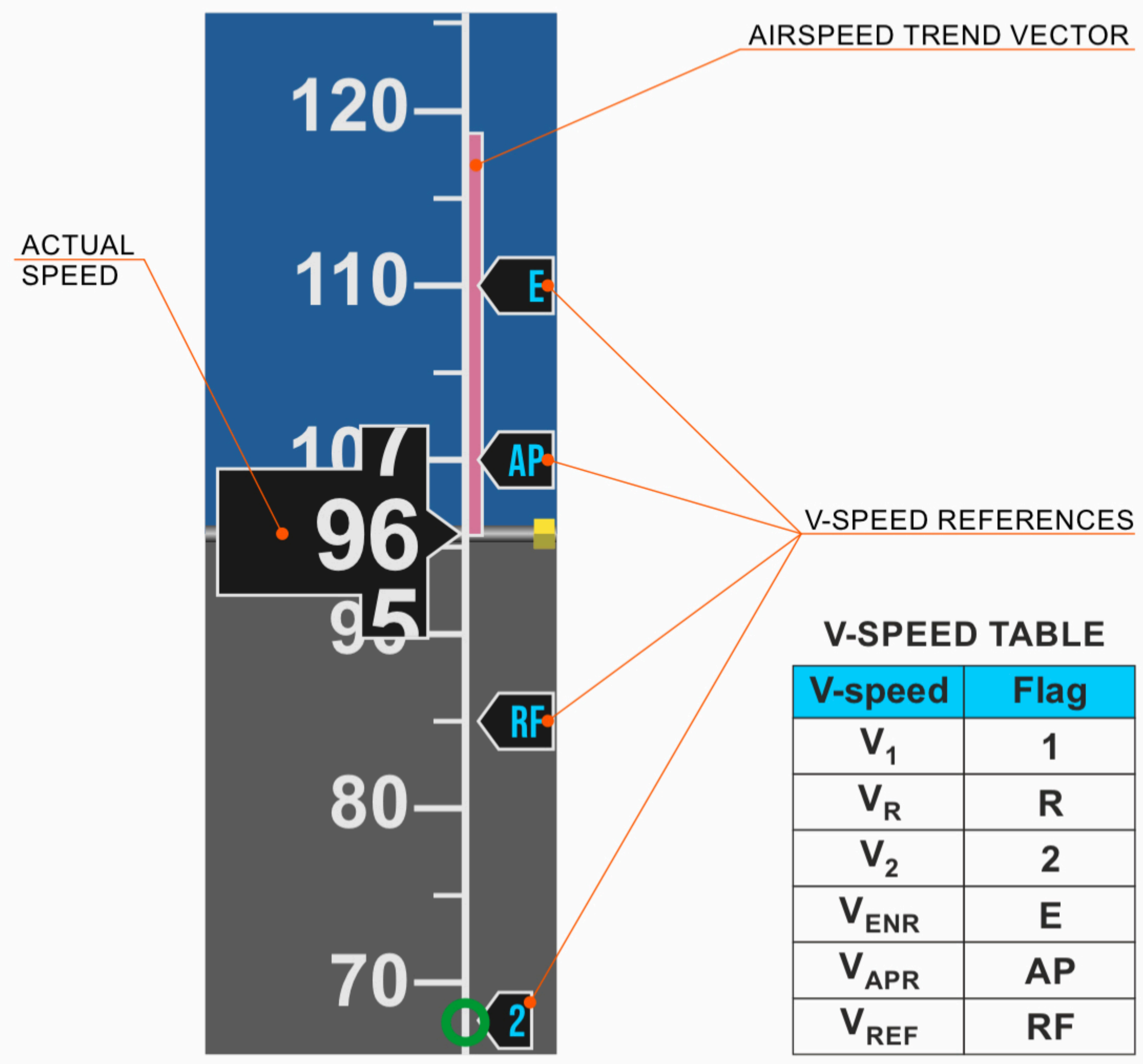
FLIGHT INSTRUMENTS

The following flight instruments are depicted on each PFD:

- Airspeed display
- Altitude
- Attitude
- Horizontal situation indicator
- Vertical Speed

AIRSPEED DISPLAY

- Airspeed is displayed on the left side of the PFD.
- The display includes predicted airspeed, V-speed references, and approach speed bugs.

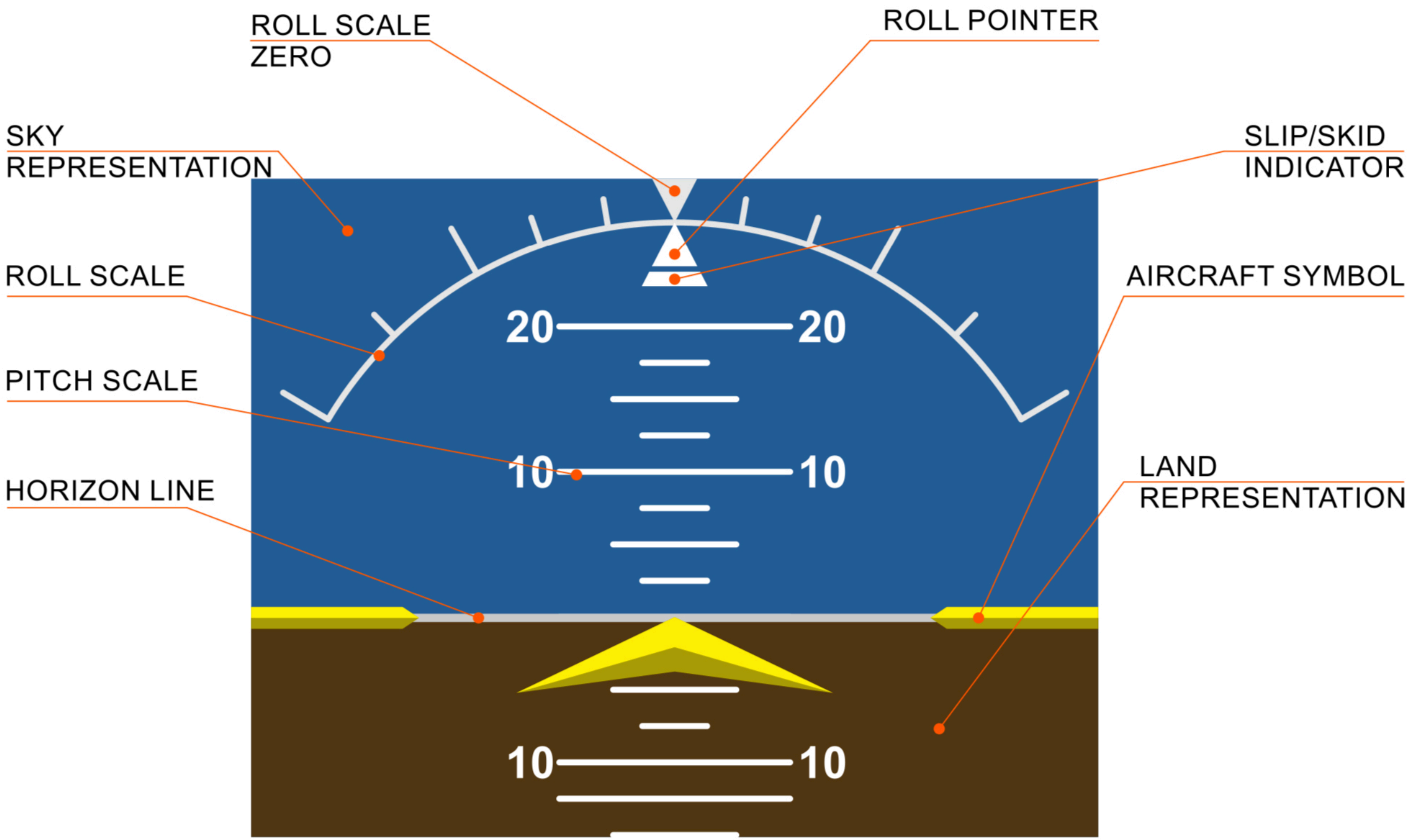


V-speed	Flag
V_1	1
V_R	R
V_2	2
V_{ENR}	E
V_{APR}	AP
V_{REF}	RF

EXECUTIVE FLIGHT TRAINING

ATTITUDE AND TURN COORDINATION

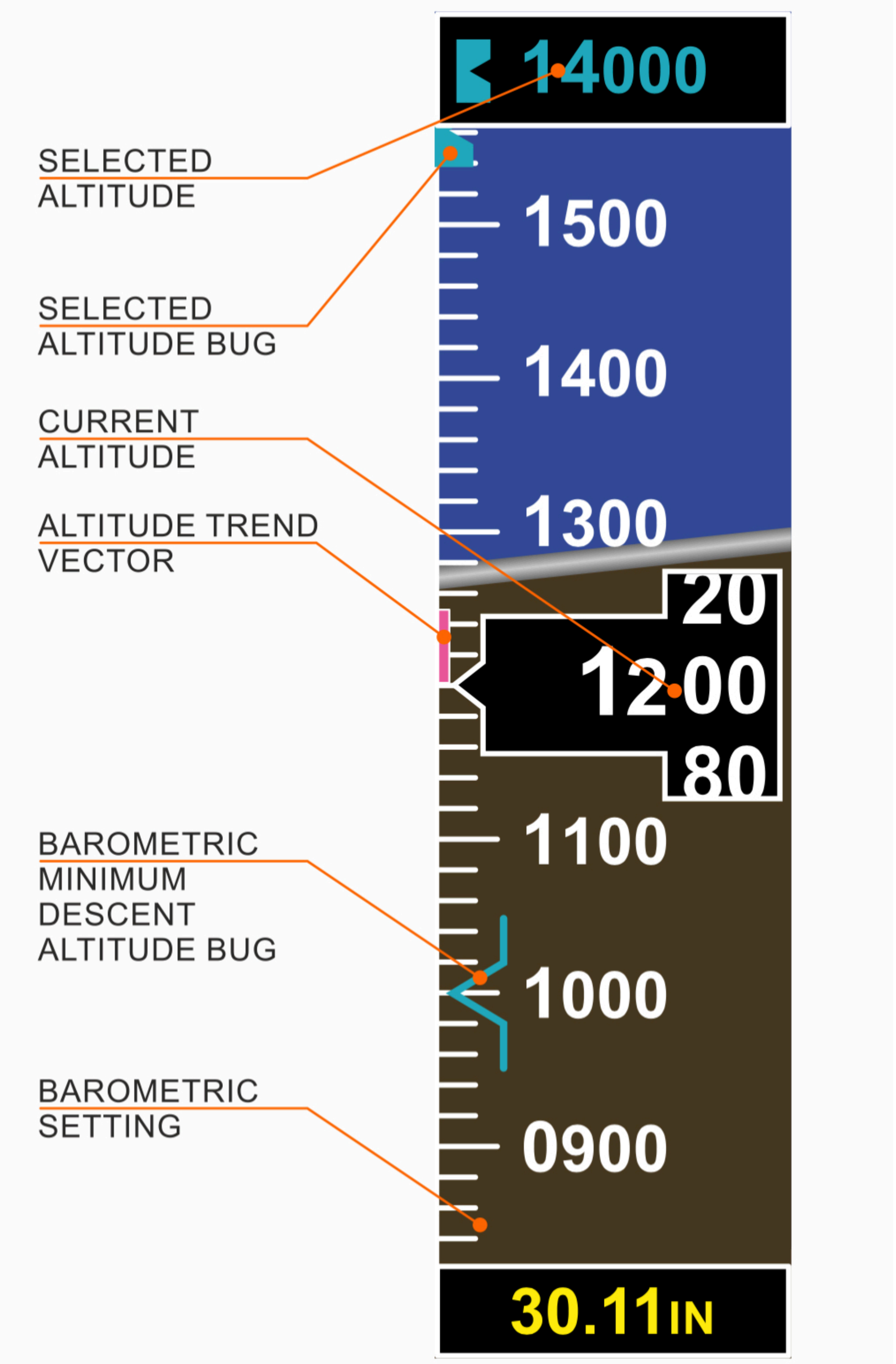
ATTITUDE INDICATOR



EXECUTIVE FLIGHT TRAINING

ALTIMETER

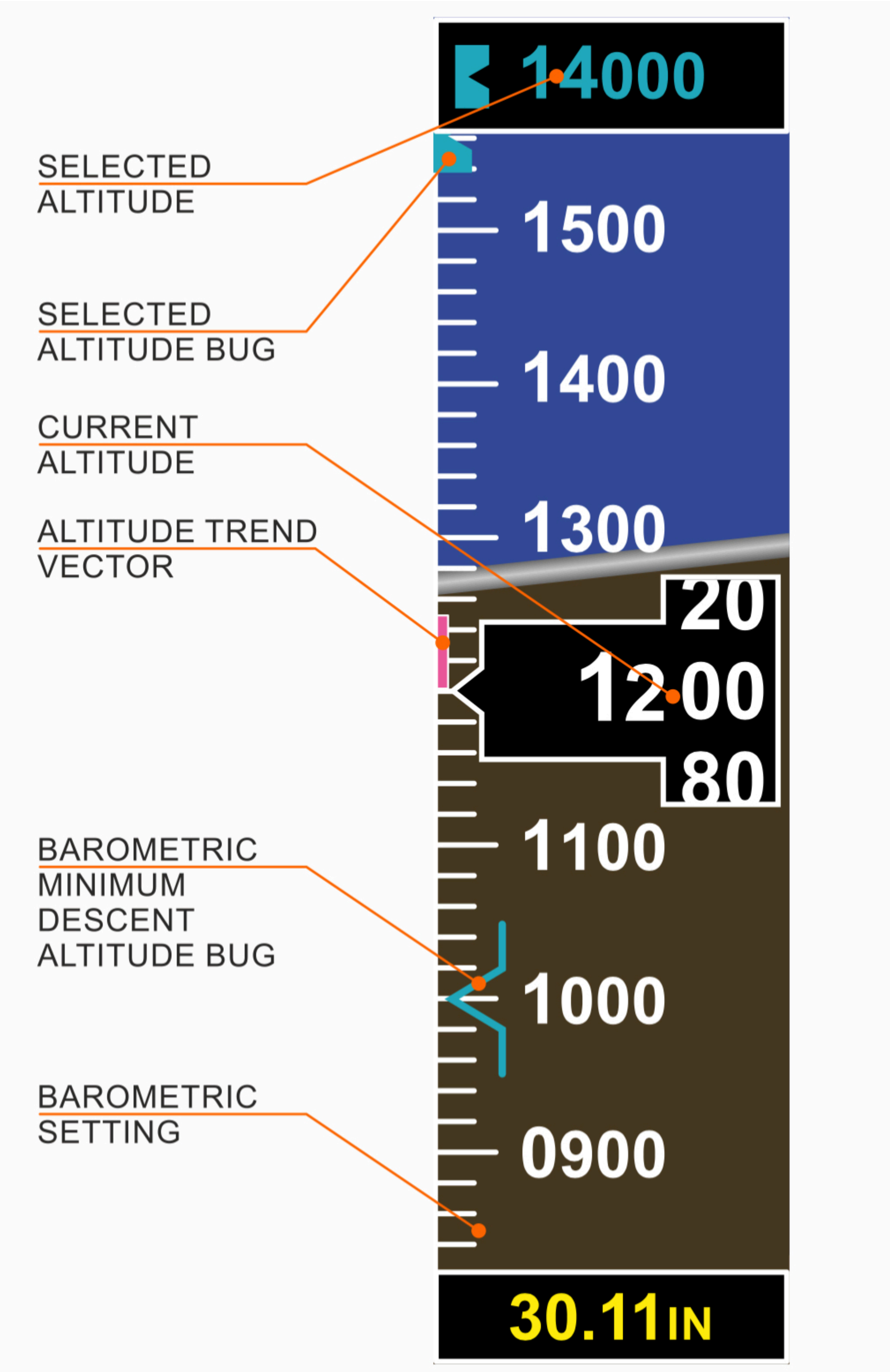
- The altimeter includes altitude alerting.
- The altimeter includes altitude alerting when the aircraft is either above or below the selected altitude.



EXECUTIVE
FLIGHT TRAINING

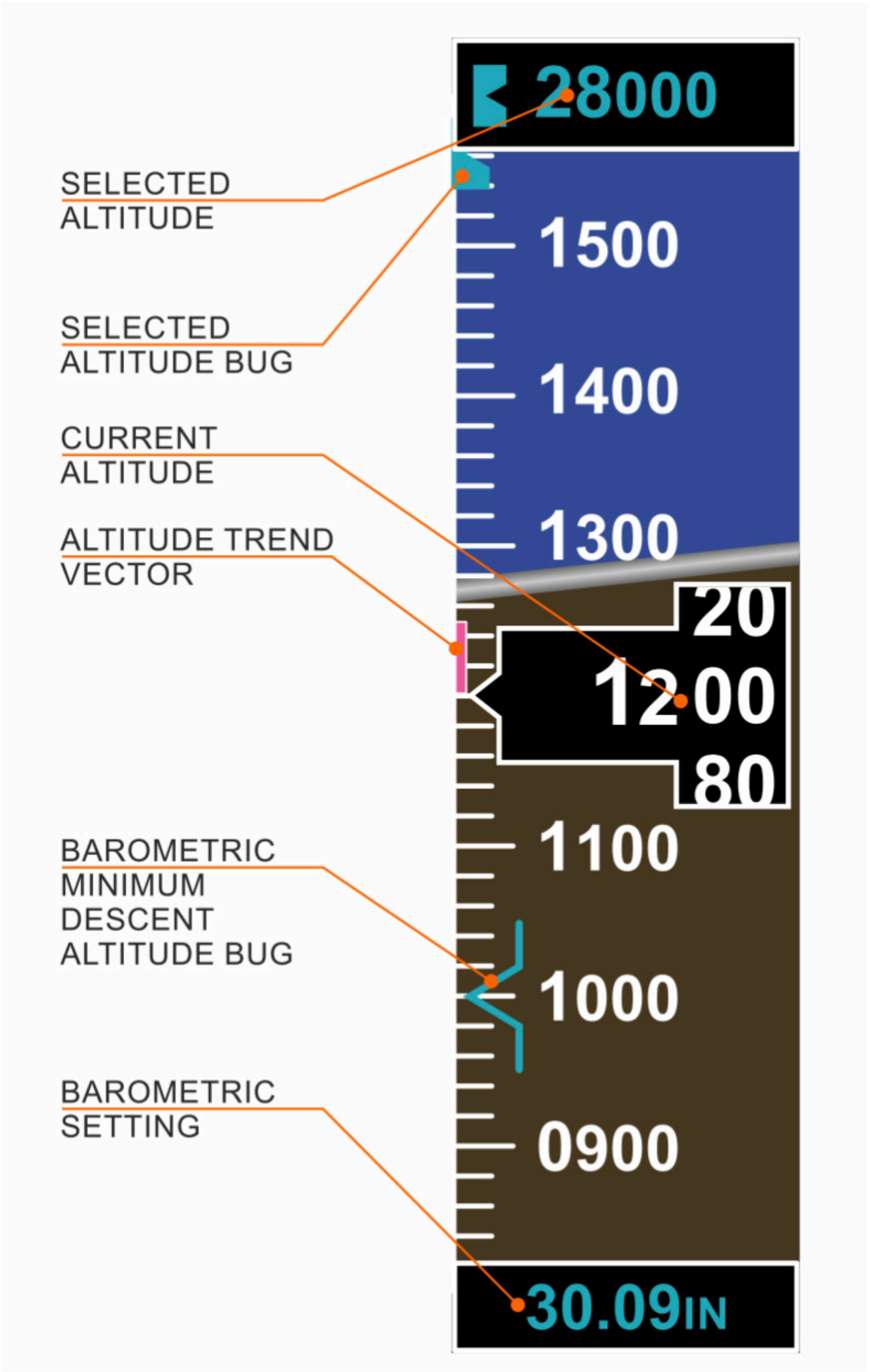
BAROMETRIC SETTING

- A box at the bottom of the altitude tape indicates the current altimeter setting in inches of mercury.
- If the pilot and copilot PFD barometric settings differ by more than .02 inches (of mercury), the barometric setting boxes on both displays appear with amber digits.



BAROMETRIC ALTITUDE MINIMUMS & ALERTING

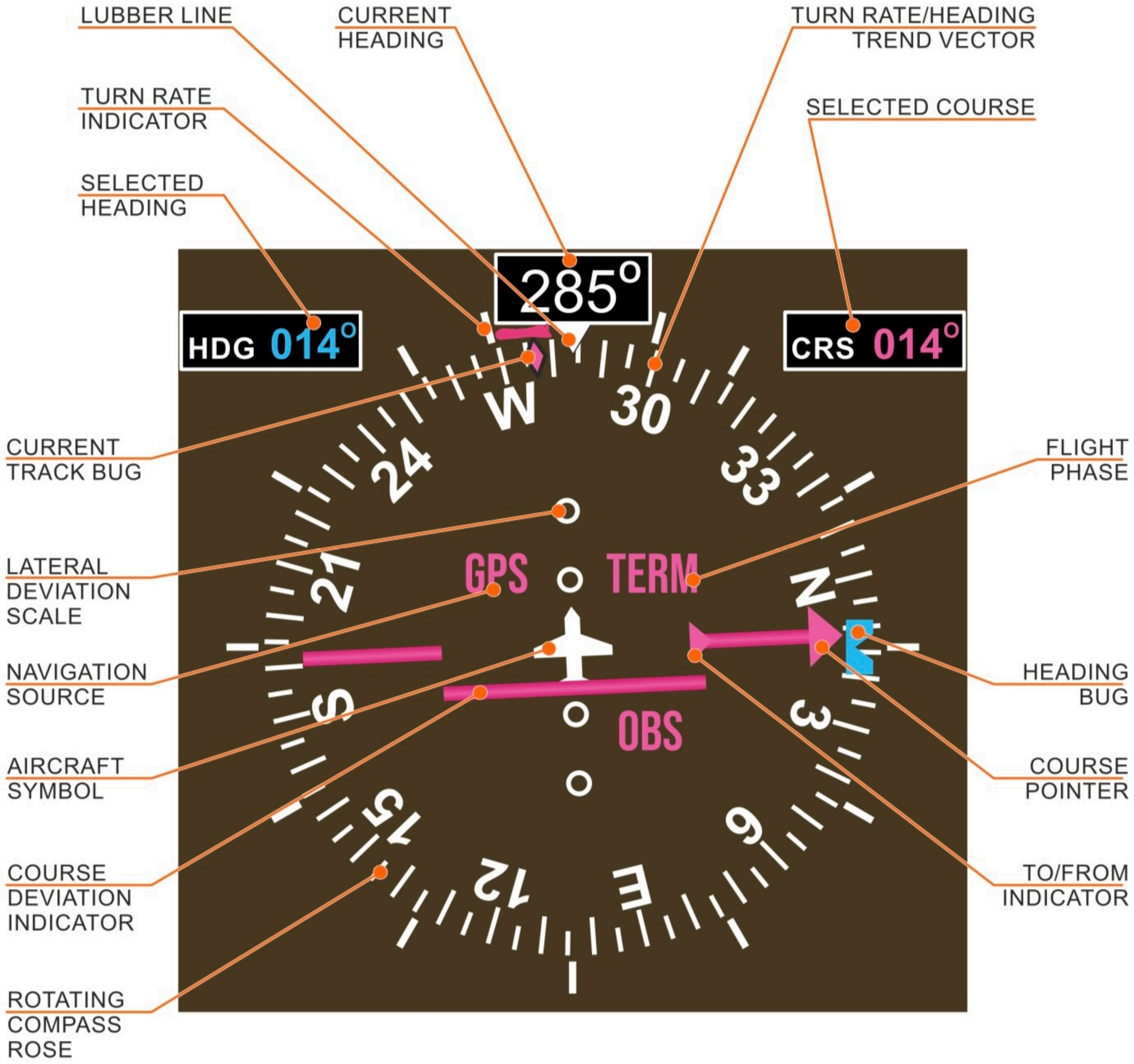
- A barometric minimum descent altitude (MDA) can be set for altitude awareness.
- When active, the MDA is displayed in a box labeled “BARO MIN” found to the lower left of the altimeter.



EXECUTIVE FLIGHT TRAINING

HORIZONTAL SITUATION INDICATOR

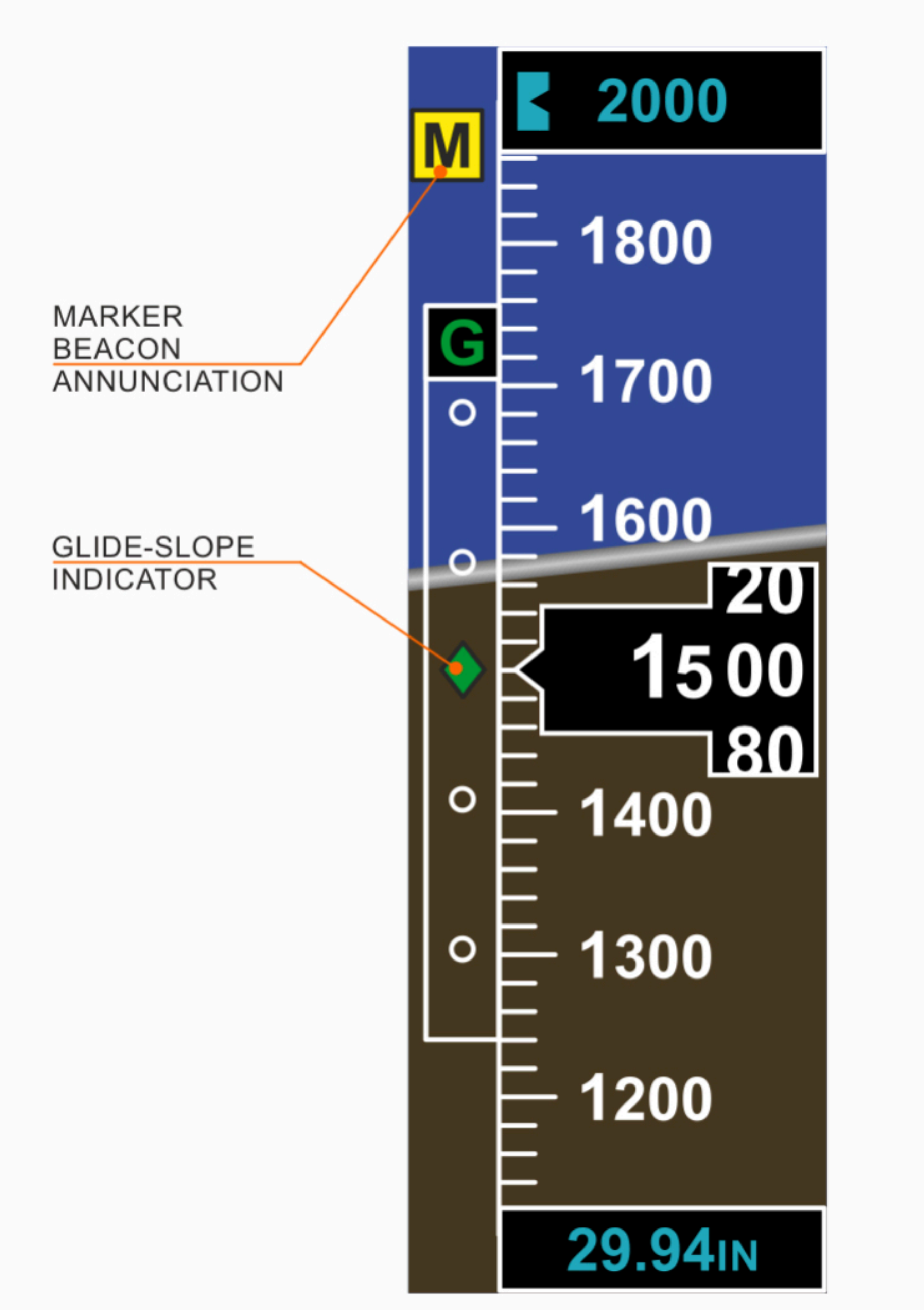
- The compass card shows the current aircraft magnetic heading under the white pointer at top of the card.
- The rate of turn indicators are displayed in a magenta arc extending from the center pointer.



EXECUTIVE FLIGHT TRAINING

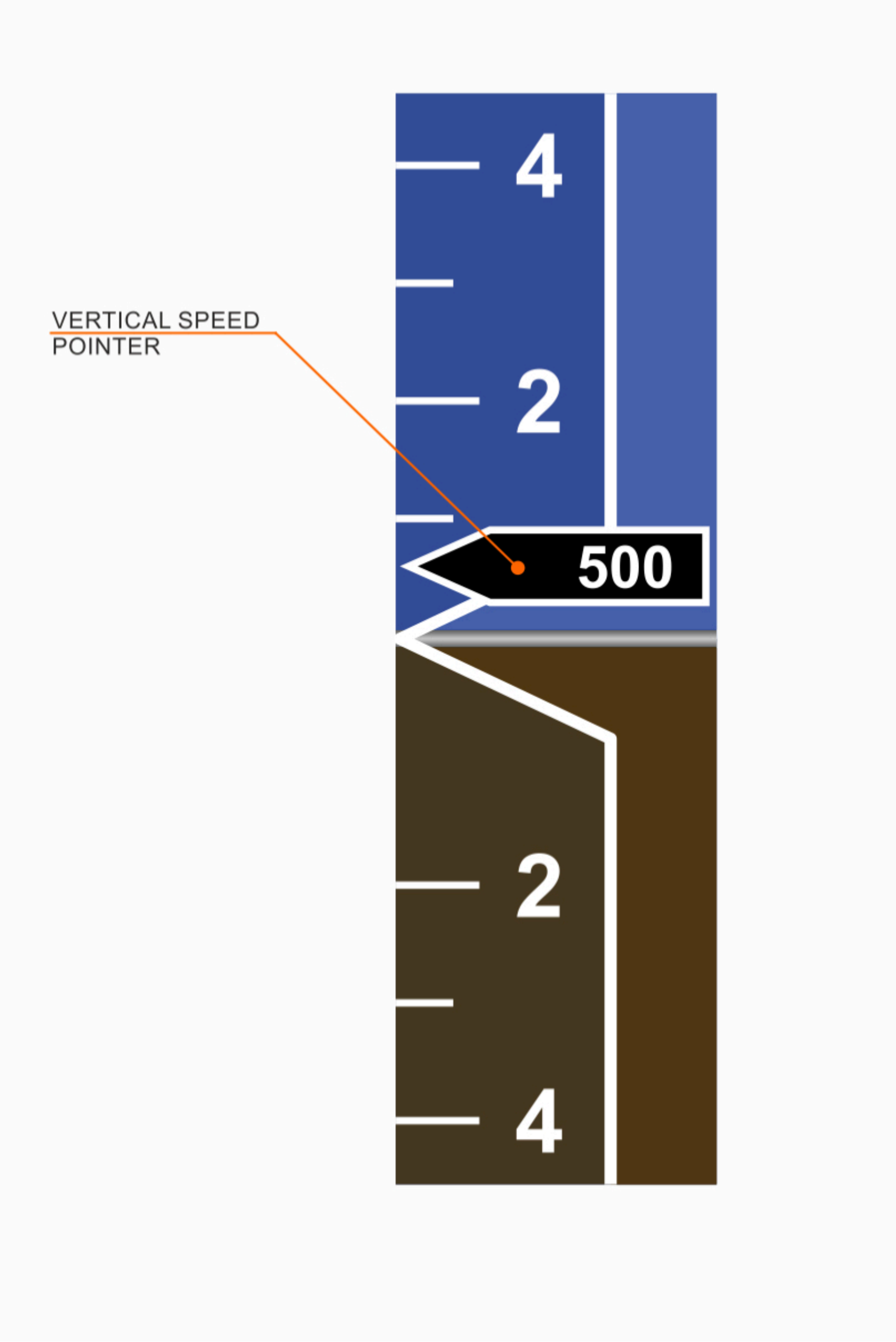
GLIDE SLOPE

During a precision instrument approach procedure, the glide slope position is indicated by a diamond on a glide-slope scale.



VERTICAL SPEED

The vertical speed indication is shown a index scale on the right side of the altitude scale. The vertical speed indication displays in 50-foot increments.



EXECUTIVE
FLIGHT TRAINING

REVERSIONARY MODE

In order to provide emergency backup of the MFD and PFDs, the reversionary mode causes both PFD and MFD to display essential information for continued flight.

- PFD1 failure – MFD enters reversionary mode, PFD2 remains in normal mode
- MFD failure – PFD1 and 2 enter reversionary
- PFD2 failure – PFD1 and MFD remain in normal mode

MULTIFUNCTION DISPLAY

The G1000 includes a single 15” MFD in the center of the instrument panel. This provides indications for:

- EICAS
- Moving-map displays
- Information pages on waypoints
- Flight planning
- Navigation status indications
- System status indications

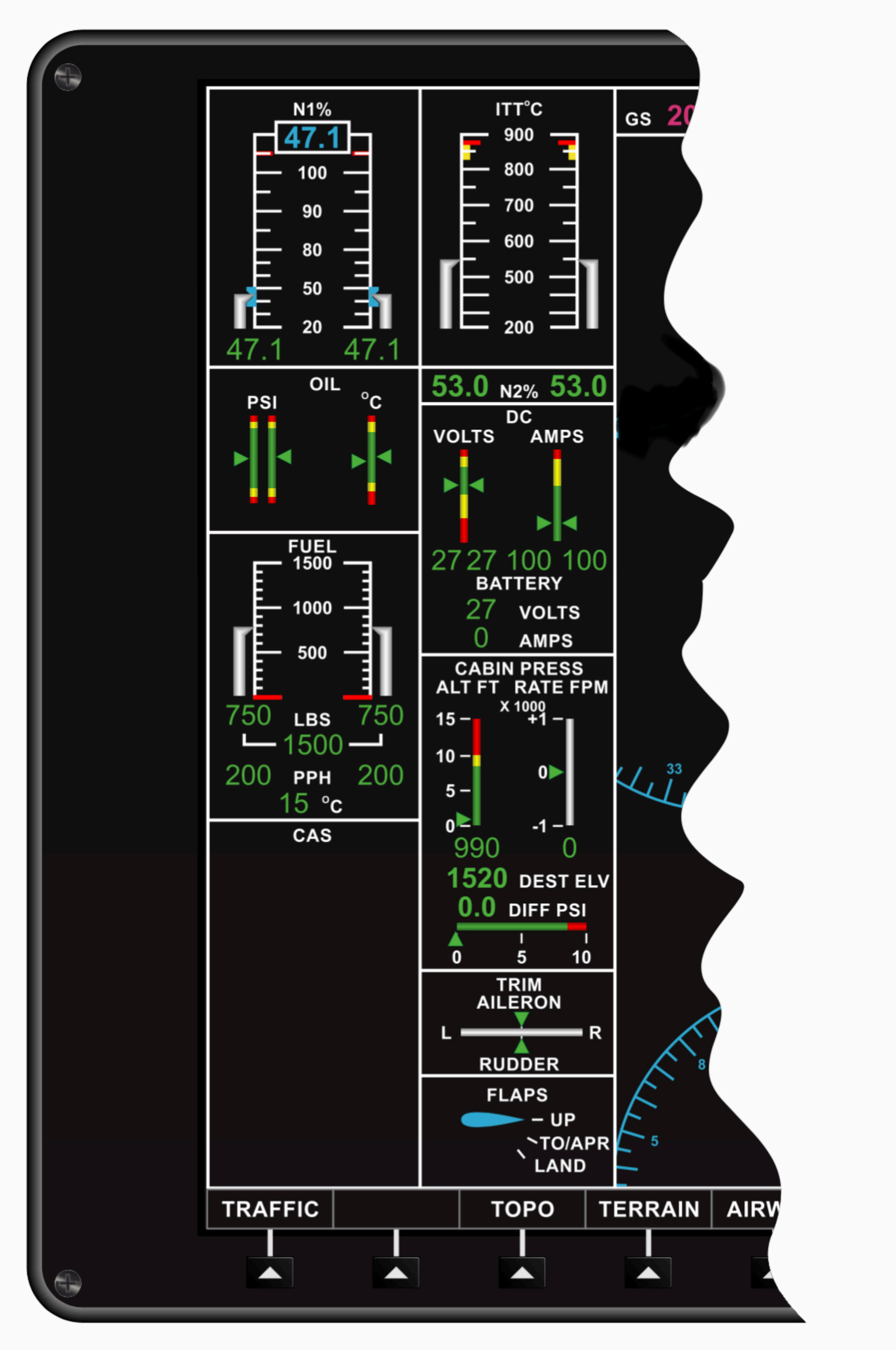
EXECUTIVE
FLIGHT TRAINING

MFD EICAS

The left side of the MFD displays the two column EICAS display.

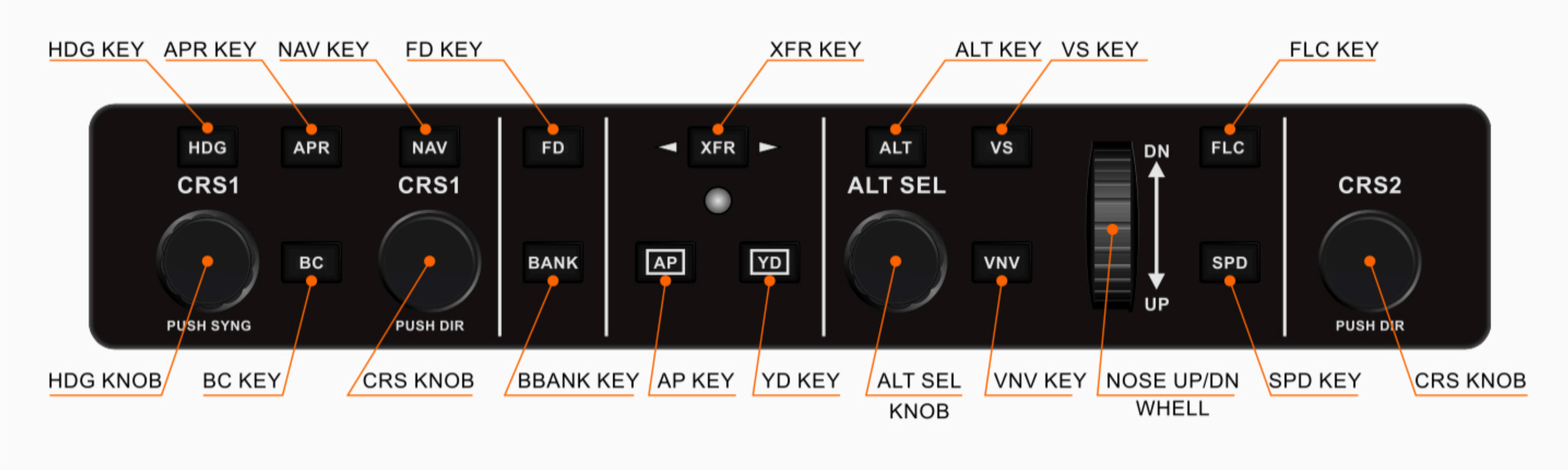
The main MFD area presents 4 different page groups:

- MAP – Moving-map displays
- WPT – Waypoint information
- AUX – Auxiliary information pages
- NRST – Nearest facilities



EXECUTIVE
FLIGHT TRAINING

AUTOMATIC FLIGHT CONTROL SYSTEM



THE AFCS INCLUDES 4 PRIMARY FUNCTIONS:

- Flight director
- Autopilot
- Yaw damper
- Manual electric pitch trim

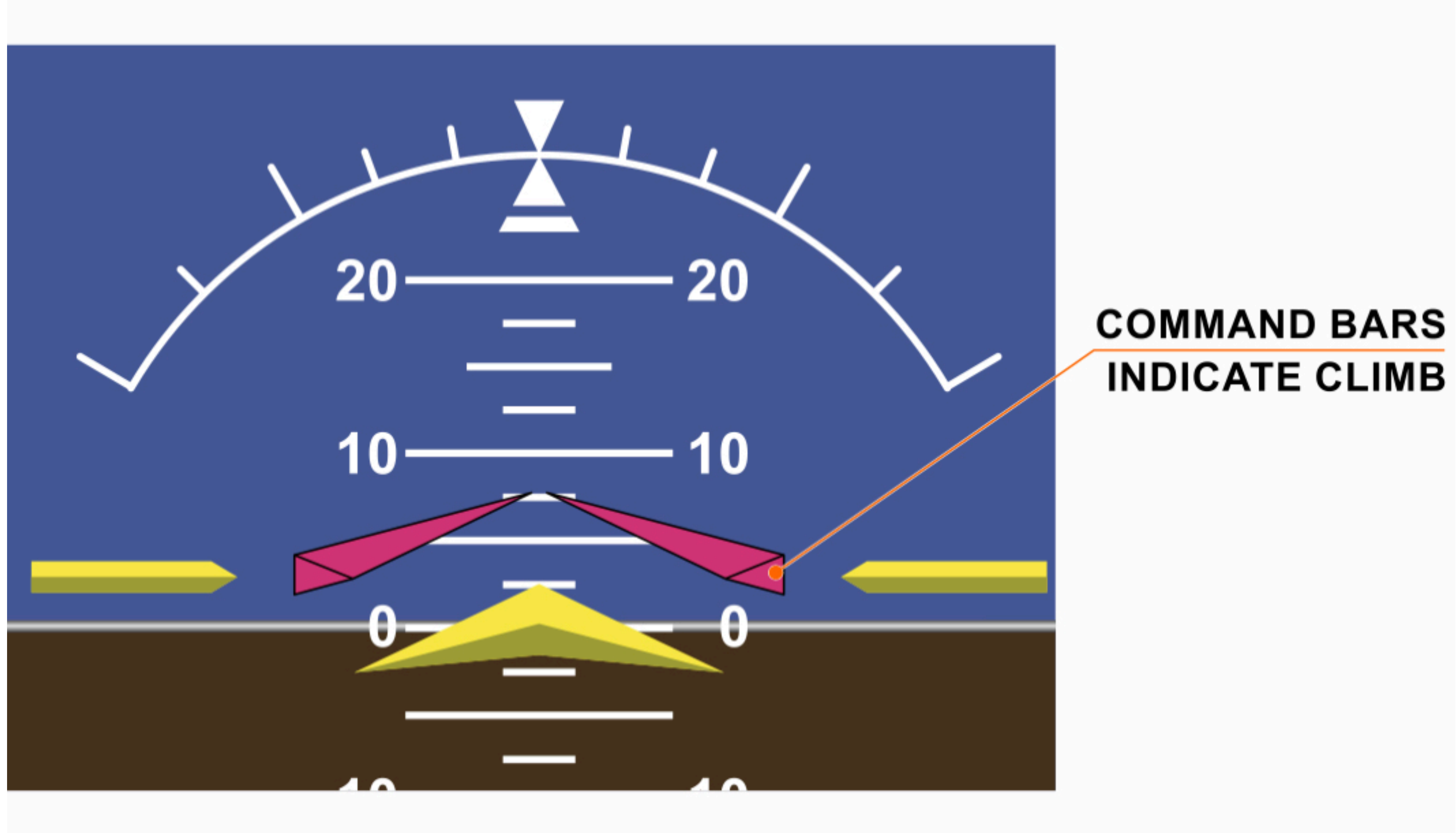
The AFCS controller (above MFD) provides control of these four functions.

FLIGHT DIRECTOR

The AFCS FD function causes magenta command bars to appear on the PFDs, which indicate attitude required to navigate the flight path.

FD COMMANDS ARE LIMITED TO:

- Pitch - ±20°
- Vertical acceleration – 0.1g
- Bank angle – 30°
- Bank rate – 5°/sec



EXECUTIVE
FLIGHT TRAINING

CONTROL YOKE SWITCHES

The switches control various AFCS functions, including disabling AP.

- DOWN-UP trim switches – adjust pitch, trim disengages the AP
- AP TRIM DISC – Immediately disconnects AP and YD
- CWS – Momentarily disengages AP and synchronizes FD command bars with current pitch attitude.

EXECUTIVE
FLIGHT TRAINING

COMMUNICATION RADIO

The G1000 includes two COM radios:

- COM1 is in GIA#1, COM2 in GIA#2

EXECUTIVE
FLIGHT TRAINING

STANDBY FLIGHT INSTRUMENTS

The standby flight instruments are independent of the main electrical system and include:

- Standby attitude indicator
- Standby airspeed indicator
- Standby altimeter
- Standby magnetic compass

Each instrument is a self-contained, independent unit. Electrical power for these instruments comes through the STBY INST switch and is connected to normal DC power. If ship's power is lost, a dedicated 1.2 ampere-hour standby battery is available. The pneumatic instruments (airspeed and altitude) bypass both ADCs and are directly connected (pneumatically) to the pilot-side pitot-static system. The magnetic compass operates without external input.

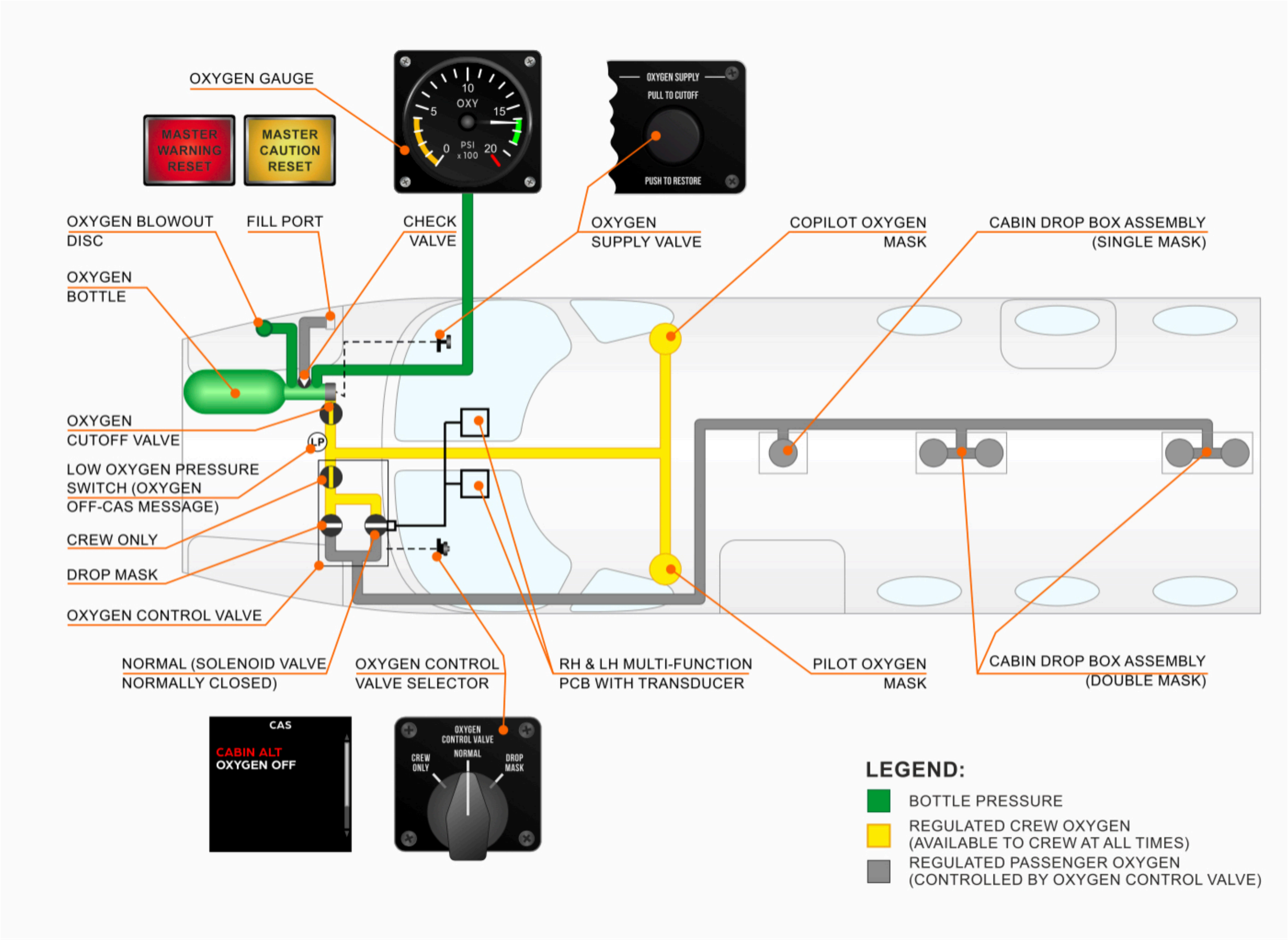
Oxygen System

GENERAL

- Oxygen is available to the passengers during pressurization system malfunctions or when manually selected by the pilot. Oxygen is automatically available above ***14,800*** feet or manually at any altitude.
- Oxygen is available to the crew at all times.

EXECUTIVE
FLIGHT TRAINING

OXYGEN SYSTEM



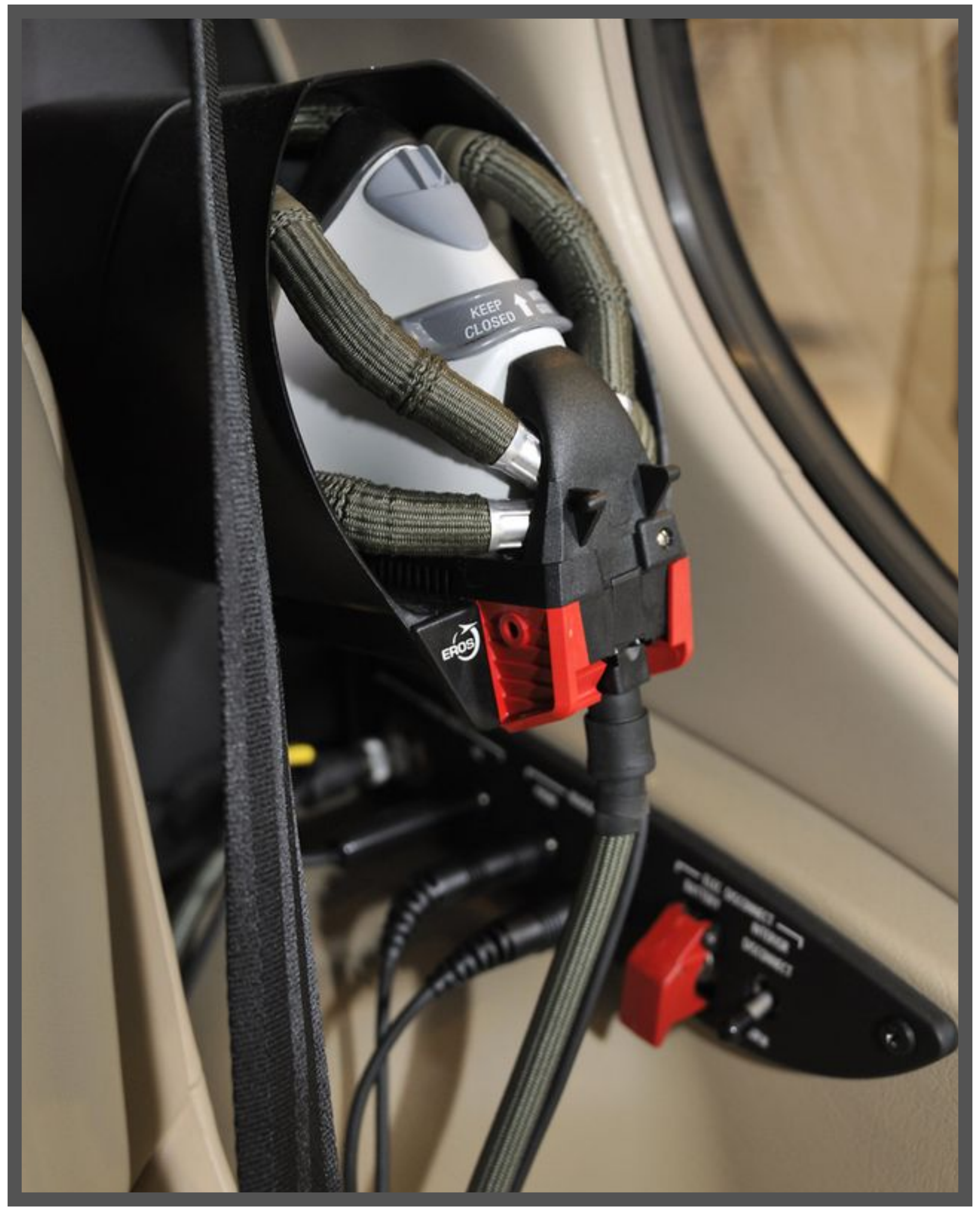
- Oxygen system is for emergency use, but also allows for limited-duration nonemergency use
- Oxygen system uses a single bottle of compressed oxygen to supply both crew and passenger masks.
- The regulator controls pressure and the shutoff valve enables or disables the system
- The oxygen gauge indicates pressure of oxygen in the bottle.
- If oxygen supply is shut off or pressure in system is too low, an amber OXYGEN OFF message will appear.

OXYGEN BOTTLE

- A single oxygen bottle holds compressed oxygen for system.
- It is located on right side of the nose storage compartment.
- The bottle has a 623-liter useable capacity.
- Oxygen is stored at a pressure between 1,600-1,800 psi.
- The shutoff valve and the pressure regulator control flow of oxygen to the distribution system
- The regulator reduces pressure to 70psi downstream.

CREW OXYGEN MASKS

The aircraft is equipped with two quick-donning oxygen masks that incorporates a built-in microphone and regulator. The masks are quick donning and stowed above each pilot. The crew masks plug into OXYGEN MASK receptacles and the mask microphone plugs into the MIC jack. If the aircraft is parked outside with a temperature below 0°C, the masks should be removed and stored inside to keep the masks warm.



PASSENGER OXYGEN MASKS

- Passenger masks are located in the cabin overhead and can be dropped automatically or manually.
- Pulling the lanyard attached to the mask starts oxygen flowing to the mask.

OXYGEN CUTOFF KNOB

The OXYGEN CUTOFF knob is located on the copilot's lower-right corner of the instrument panel, below the OXYGEN pressure gauge. When pulled, it closes the regulator at the oxygen bottle cutting off oxygen to the crew and passengers.

When the knob is pulled in the CUTOFF position, any oxygen pressure in the line is vented overboard.

EXECUTIVE
FLIGHT TRAINING

OXYGEN CONTROL VALVE

The OXYGEN CONTROL VALVE knob is located on the pilot's left edge of the instrument panel. It controls the flow of oxygen and has three positions:

- CREW ONLY
- NORMAL
- DROP MASK

When the the OXYGEN CONTROL VALVE knob is in NORMAL, the passenger oxygen masks will automatically drop anytime the cabin pressure altitude exceeds 14,800 feet. A cabin altitude sensor detects excessive cabin altitude and releases latches on the compartment doors, dropping the passenger masks. The altitude sensor can be bypassed by selecting the OXYGEN CONTROL VALVE to DROP MASK.

CREW ONLY MODE

When the control knob is placed in the CREW ONLY position, oxygen is not available to the passengers. After donning the mask, set the lever under each mask to NORMAL or 100%. The crew oxygen masks are only certified to 40,000 feet cabin altitude.

EXECUTIVE
FLIGHT TRAINING

DROP MASK MODE

Oxygen can be supplied to the passengers at any cabin altitude by placing the selector to the DROP MASK position. This mode will operate regardless of DC power. Oxygen flow to the passengers masks can be turned off by selecting the CREW ONLY or NORM position when below 11,500 feet

EXECUTIVE
FLIGHT TRAINING

MIC SWITCHES (L AND R)

- Mic switches are located near the control yoke.
- Each switch has two positions: OXY MASK and HEADSET
- Normally, the switches are set to HEADSET
- Selecting OXY MASK selects input from mic in crew oxygen mask, while disabling input from crewmember headset.

EXECUTIVE
FLIGHT TRAINING

OXYGEN PRESSURE GAUGE

The OXYGEN pressure gauge is located on the right side of the copilot instrument panel.

- Range markings are as follows:
  - Yellow arc – 0-400 psi
  - Redline – 2,000 psi

EXECUTIVE
FLIGHT TRAINING

OXYGEN OFF MESSAGE

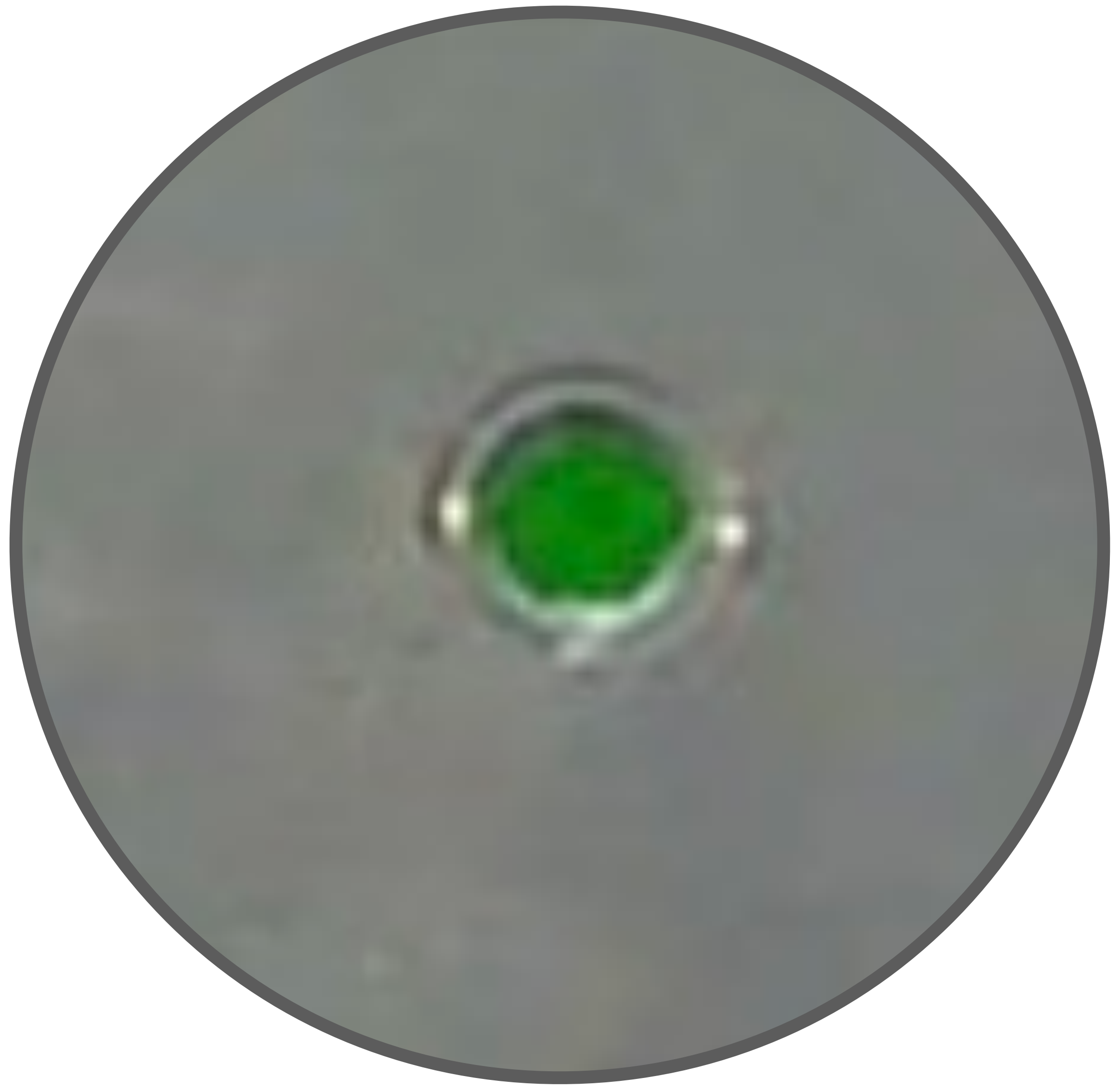
- The OXYGEN OFF message illuminates when oxygen system pressure is below approximately 45-50 psig.
- The message also illuminates when the OXYGEN SUPPLY knob is in the PULL TO CUTOFF position.

EXECUTIVE FLIGHT TRAINING

OVERBOARD DISCHARGE INDICATOR

- The green overboard discharge indicator (disc) is located on the right side of the nose section directly below the nose access door

- If the disc is ruptured or missing, the oxygen bottle has experienced overpressure and is discharged.



CREW OXYGEN MASK CONTROLS

The crew mask has the following controls:

- Harness inflation plate
- N-100% diluter rocker switch
- Emergency select knob
- PRESS to TEST button
- Vent valve
- Flow indicator

100% Mode

- This mode is used during the stowage and the donning.
- It allows the user to breathe 100% oxygen.
- To activate the 100% mode, turn the rotating knob to the "100%" position.

Normal Mode

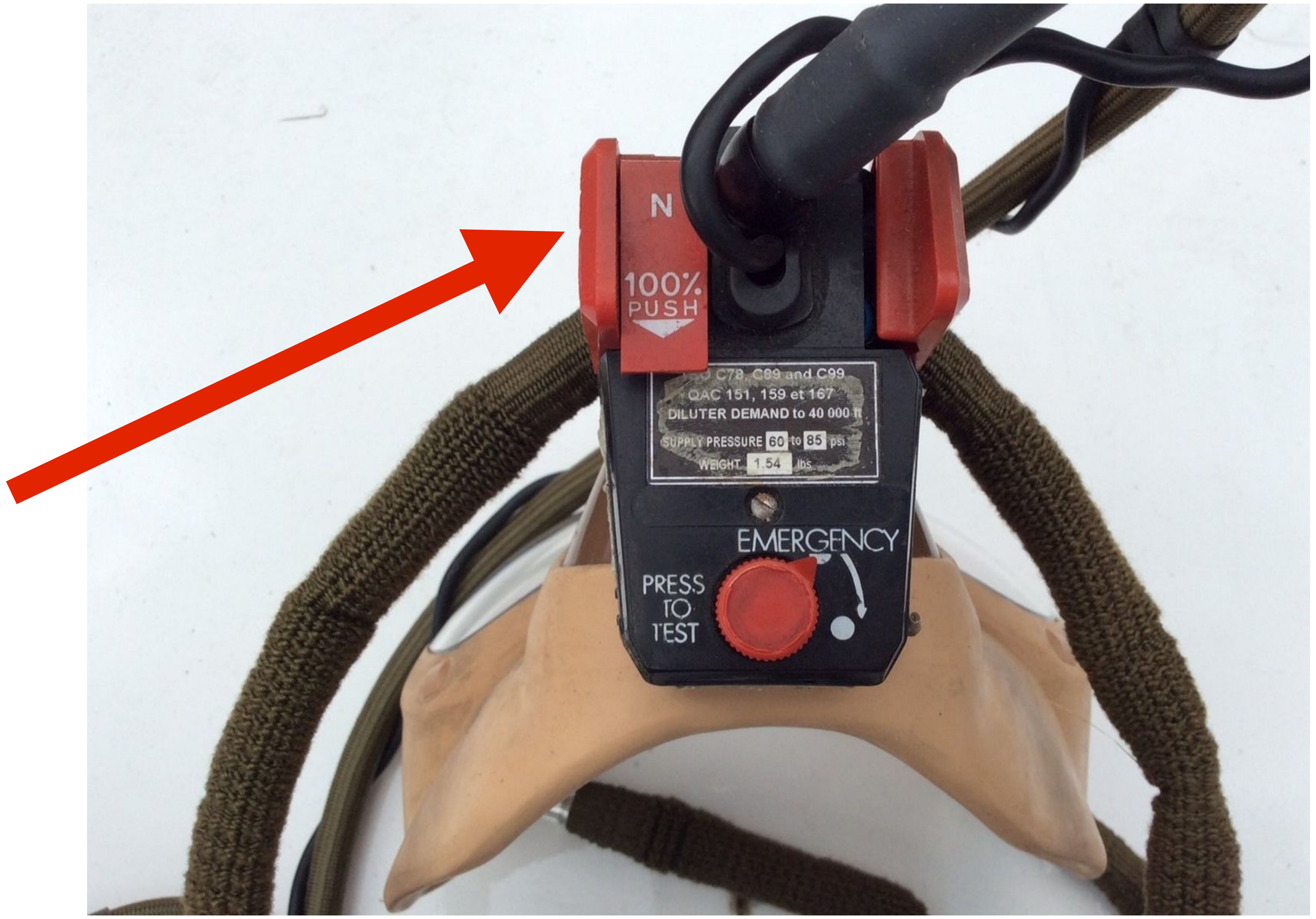
- This mode must be used when pre-breathing is performed or after emergency descent, when diversion altitude is reached.
- It allows the user to breathe a mixture of ambient air and oxygen.
- To activate the Normal mode, turn the rotating knob to the "N" position.

Emergency Mode

- In Emergency mode the regulator supplies an oxygen overpressure.
- It prevents smoke and harmful gases from entering into the mask, allowing the user to breathe safely.
- To use the Emergency mode, turn the rotating knob to the "EMGCY" position.

HARNESS INFLATION PLATE

- The red harness inflation plate allows inflation of the harness.
- Squeezing the plate against the mask causes a momentary flow of pressurized oxygen into the harness for inflation.
- When the plate is released, the pressure is released from the harness holding the mask in place.



N-100% DILUTER ROCKER SWITCH

- The red N-100% diluter rocker switch is a valve that controls dilution of oxygen supplied by mask to crewmember.
- N (normal diluted oxygen) – Forward switch position, reduces rate of oxygen by mixing the oxygen with normal cockpit air.
- 100% (pure oxygen) – aft position, provides pure oxygen only.

EXECUTIVE FLIGHT TRAINING

EMERGENCY-PRESS TO TEST KNOB

- The red EMERGENCY-PRESS TO TEST knob/button is mechanical valve found on the underside of mask.
- The knob controls the pressure of oxygen supplied by mask to crewmember.
- The button is pressed to test and check if oxygen is available.

VENT VALVE

- When smoke goggles are worn, they fit over the vent on top of the mask.
- The vent valve control on front of the mask slides forward to open vent to allow oxygen to enter.
- Only open the vent valve if pressure breathing has been selected.
  - If the vent is opened when the mask is in demand breathing, smoke may be drawn into the mask.

FLOW INDICATOR

- The flow indicator (slide in the mask hose near connector to oxygen panel) shows clear when oxygen is available to mask and is flowing.
- The flow indicator will show black when there is no flow.

PREFLIGHT

- During preflight, ensure the OXYGEN SUPPLY knob is fully pushed forward to open shutoff valve on bottle.
- Make sure proper pressure is indicated on the OXYGEN gauge.
- Test each crew mask using PRESS TO TEST button to ensure it is receiving oxygen from system.

LIMITATIONS

- Due to human physiological limitations, the passenger oxygen system is not satisfactory for continual operation above 25,000 feet cabin altitude.
- The crew oxygen system is not satisfactory for continual operation above 40,000 feet cabin altitude.

Squat Switches

SQUAT SWITCHES SYSTEM

Squat switches on the landing gear activate or deactivate numerous aircraft systems. Some systems are connected to one or both squat switches.
The following systems require squat switch information for normal functioning:

- External doors
- Engine/FADEC
- Pneumatics
- Windshield anti-ice
- Air conditioning
- Pressurization
- Landing gear
- Brakes (antiskid)
- Avionics
- Stall warning

EXECUTIVE
FLIGHT TRAINING

WOW MISCOMPARE MESSAGE

- Amber WOW MISCOMPARE squat system indicates different status of the two switches
- The message will not display until MISCOMPARE has continued for 2 seconds allowing for momentary differences during takeoff and/or landing


QUIZ