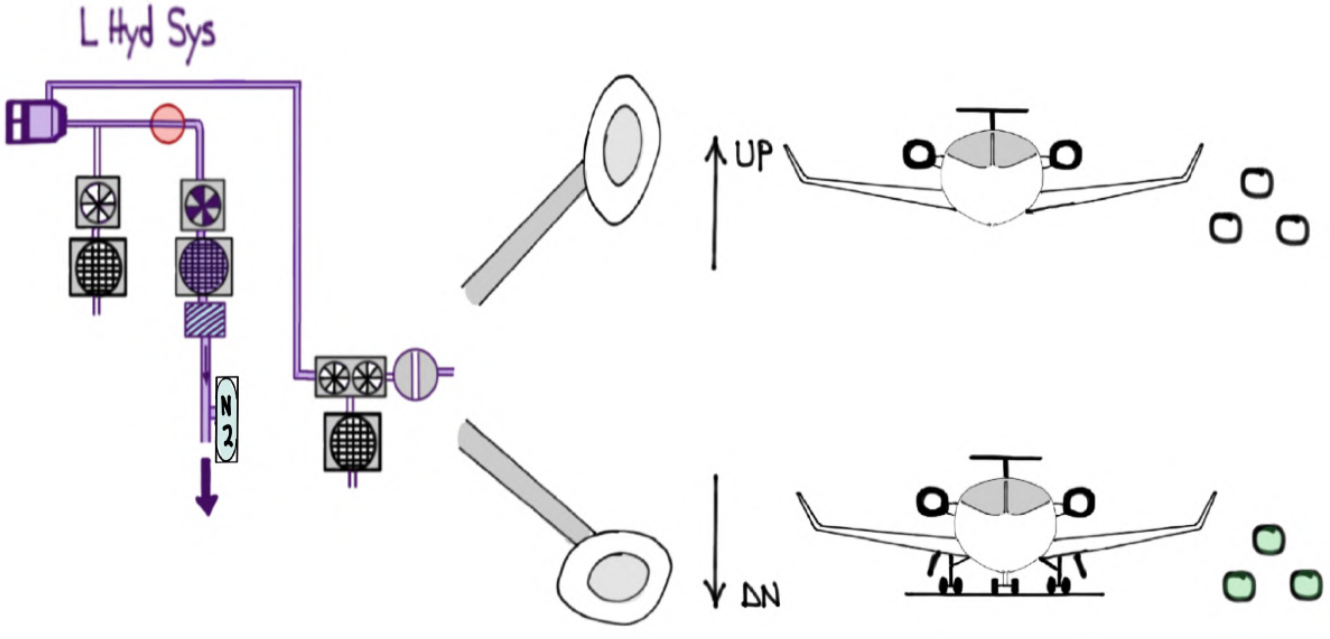
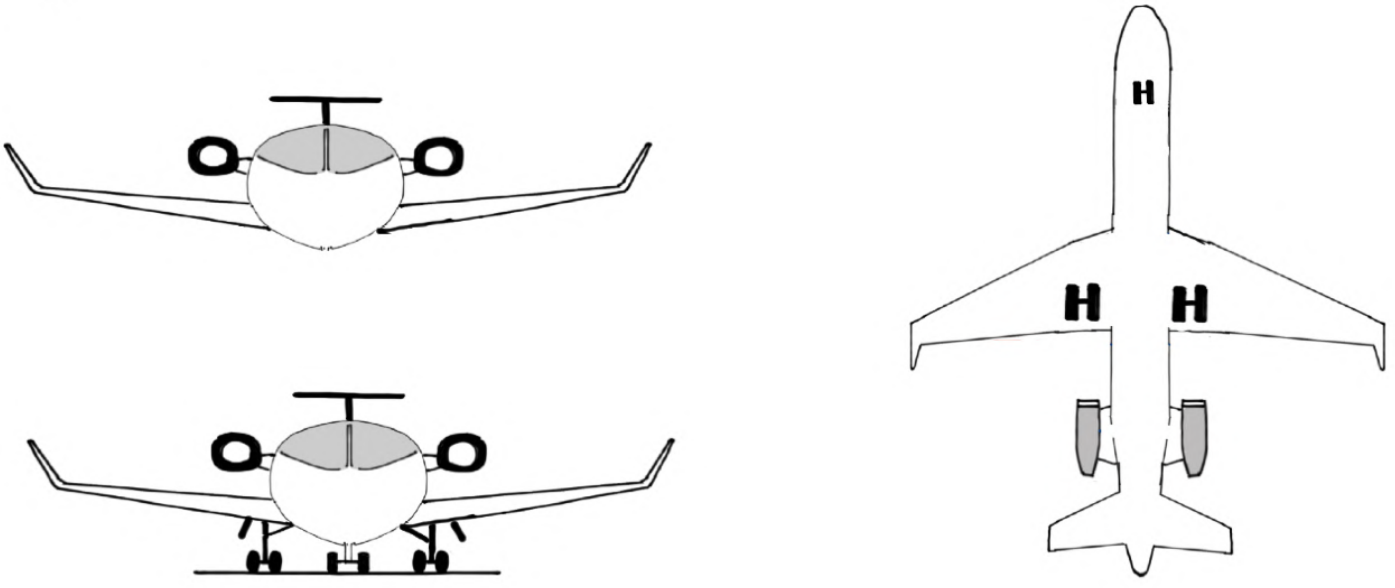
# G450
# LANDING GEAR
# &
# BRAKES
# SYSTEM

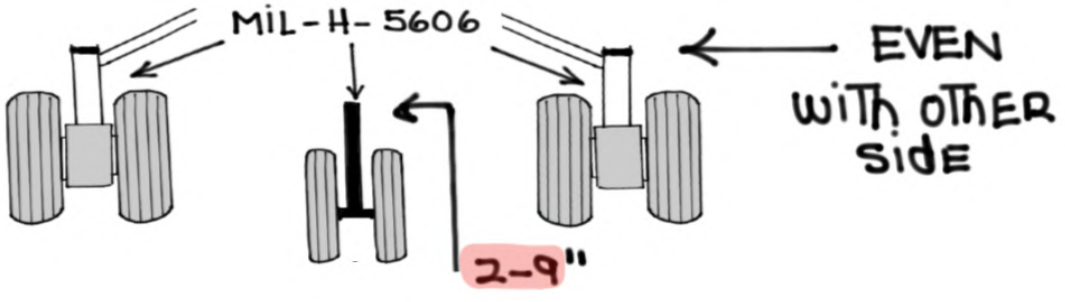




**For study purposes only**

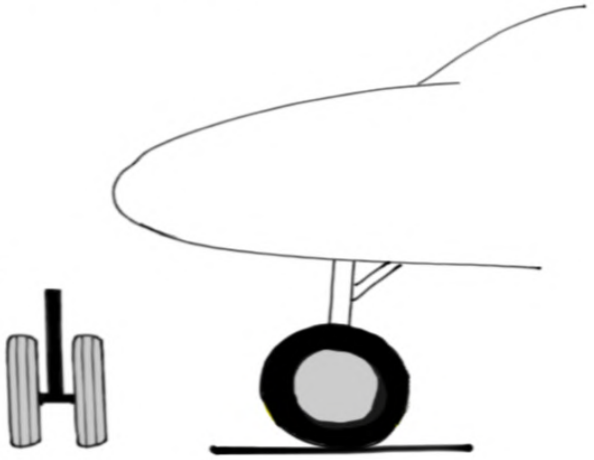
- The G450 has a fully retractable, tricycle-type landing gear



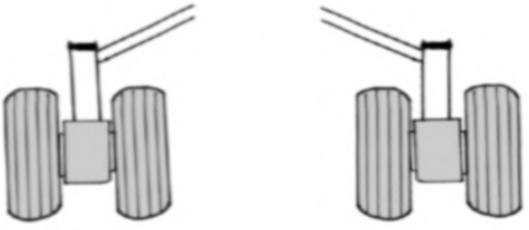

- Each gear incorporates a conventional oleo-pneumatic shock strut with dual wheels and tires
- Shock struts are filled with MIL-H-5606 Hydraulic fluid and are pressurized with dry nitrogen
- Strut extension



- One (1) set of Two (2) nosewheel Tires
- Rated at: 225 mph
- Tire pressure: 136 psi
- Tire/wheel weight: 14 pounds



- Two (2) sets of Two (2) main Tires each
- Rated at: 225 mph
- Tire pressure: 190 psi
- Tire/wheel weight: 65 pounds

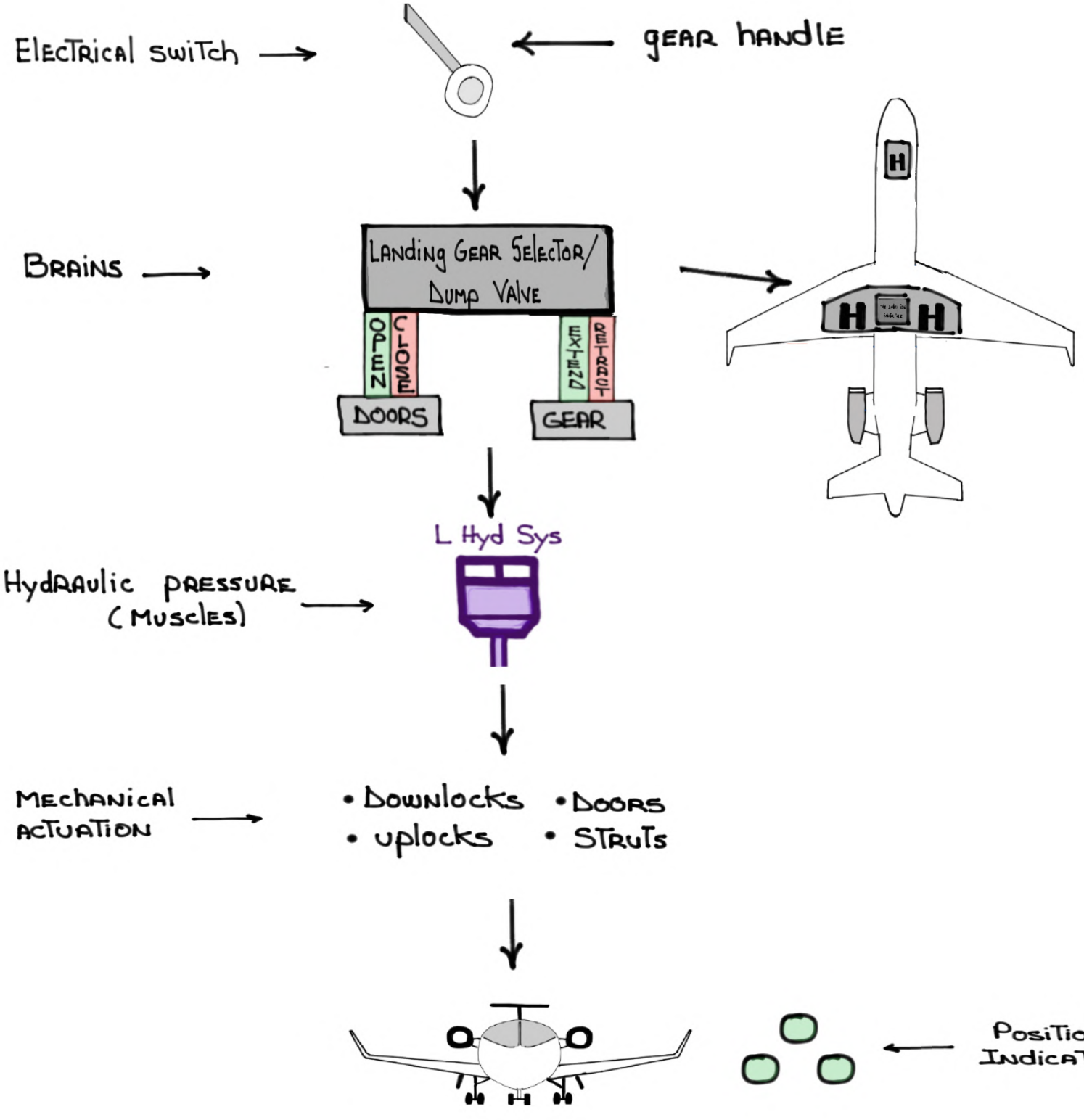


- Wheels: Four (4) fusible plugs (melt at 390°F) To release Tire pressure if the wheel overheats

  One (1) safety plug to deflate the Tire if internal pressure exceeds 550 psi

  Each of the four (4) main gear wheels has individual braking via a brake-by-wire system with anti-skid protection down to Ten (10) knots

- The Landing Gear Selector/Dump Valve is the brains of the system. It is located in the gear wheel well area in the center post

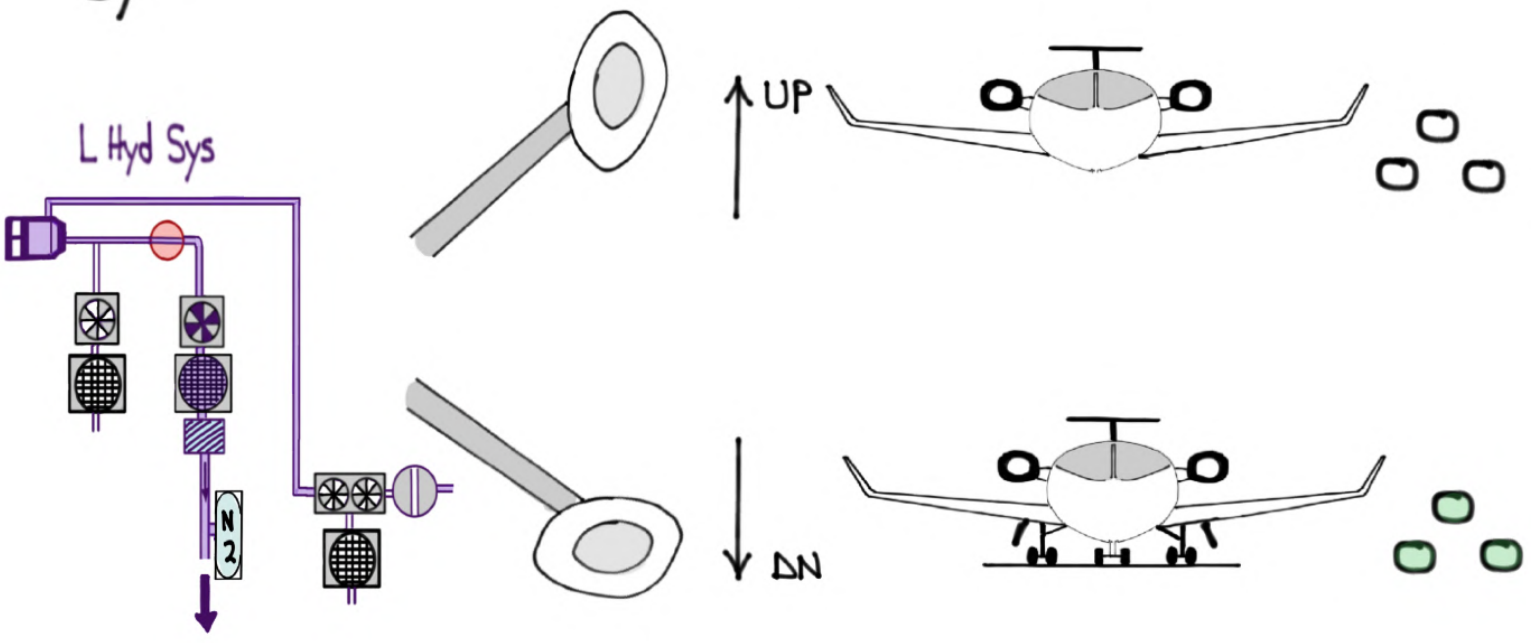


- EXTENSION AND RETRACTION REQUIRES:

① ELECTRICAL POWER TO OPERATE

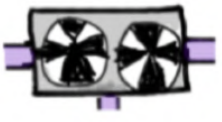

② HYDRAULIC POWER TO ACTUATE

- GEAR RETRACTION AND EXTENSION IS NORMALLY PROVIDED BY:

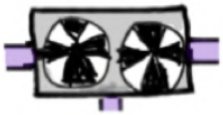


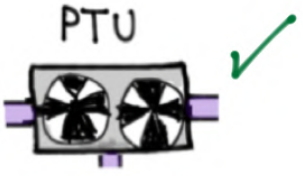

- IN THE EVENT OF A FAILURE OF THE ENGINE-DRIVEN HYDRAULIC PUMP THE GEAR CAN BE EXTENDED OR RETRACTED USING THE:

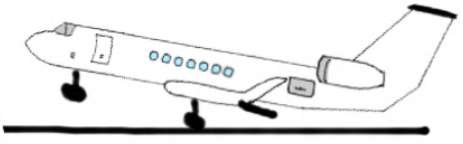
PTU



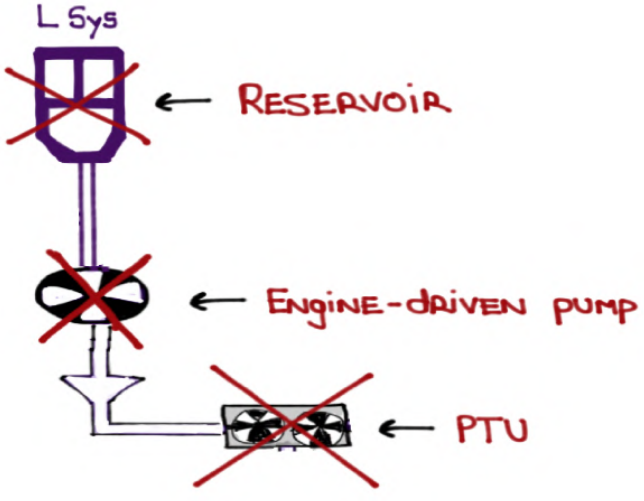
PTU

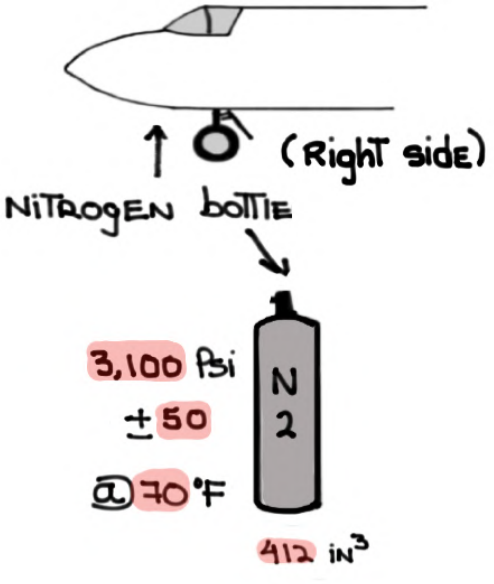
-  Helps retract the landing gear following left engine failure after V1 (regulatory purpose)

- In the event of a total failure of the left hydraulic system the landing gear can be extended via one (1) nitrogen bottle located in the nose gear wheel well



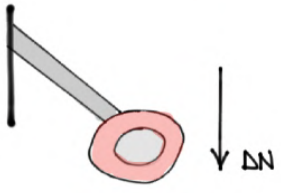




- The alternate gear extension system ports high pressure nitrogen to the gear extension system to extend the gear. The nitrogen repositions the nose gear <u>and</u> main gear dump valves to a dump position

# NORMAL Landing gear EXTENSION

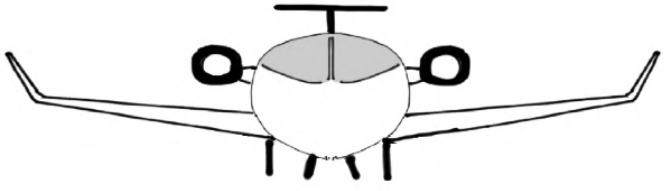
① L ESS DC  R MAIN DC  AND  L Hyd Sys  OR  PTU  AVAILABLE

② ≤ VLO ( 225 KCAS/ 0.70 MT)

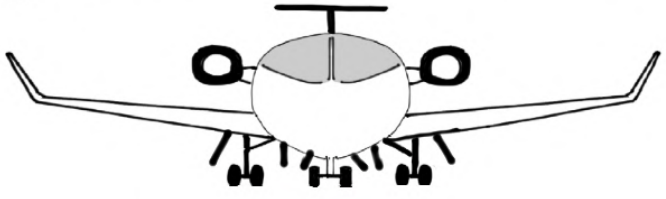
③ 


GEAR HANDLE (ELECTRICAL SWITCH) SELECTED DOWN (ILLUMINATES ●)

④ GEAR DOORS OPEN fully

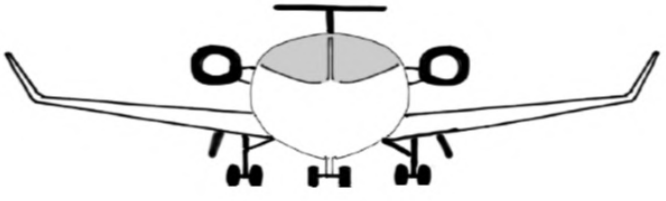


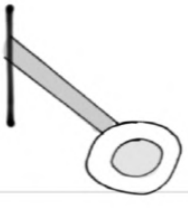
⑤ LANDING GEAR EXTENDS AND LOCKS



⑥ THREE GREEN ● ● ● (DOWN AND LOCKED)

⑦ LANDING GEAR DOORS CLOSE



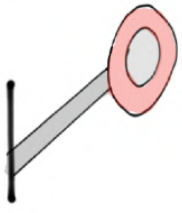
⑧ GEAR HANDLE LIGHT EXTINGUISHES 

# NORMAL

## LANDING GEAR RETRACTION

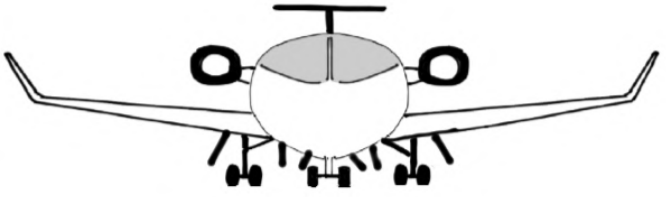
① L ESS DC  R MAIN DC AND L Hyd Sys OR PTU AVAILABLE

② ≤ VLO ( 225 KCAS/ 0.70 MT)

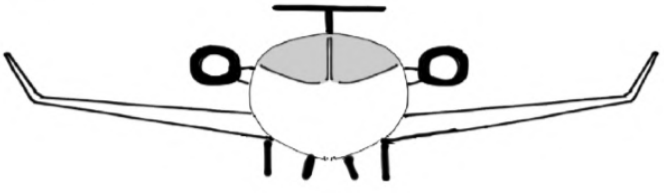
③ 


GEAR HANDLE (ELECTRICAL SWITCH) SELECTED UP (ILLUMINATES ●)

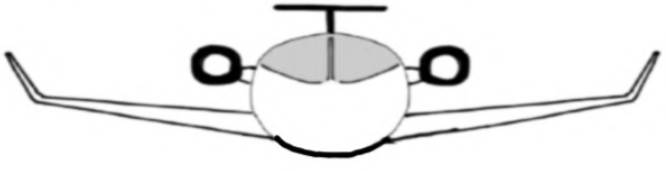
④ GEAR DOORS OPEN FULLY

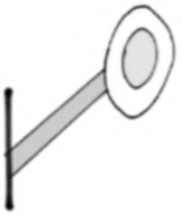


⑤ LANDING GEAR RETRACTS INTO THE UPLOCKS



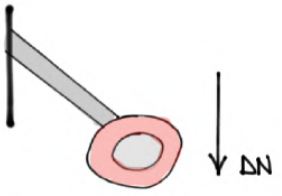
⑥ LANDING GEAR DOORS CLOSE



⑦ GEAR HANDLE LIGHT EXTINGUISHES 

# ALTERNATE Landing gear EXTENSION (NITROGEN)

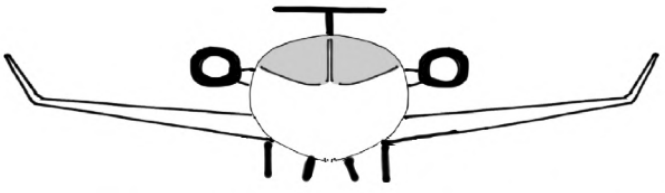
① ≤ VLO (175 KCAS)

② 

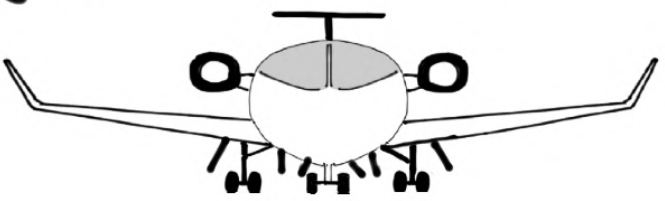

GEAR HANDLE (ELECTRICAL SWITCH) SELECTED DOWN (ILLUMINATES ●)

③ EMER LDG GEAR Pull EMER LANDING GEAR T-HANDLE

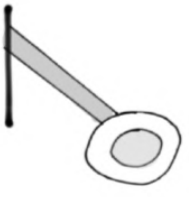
④ GEAR DOORS OPEN fully AND REMAIN OPEN



⑤ LANDING GEAR EXTENDS AND LOCKS



⑥ THREE GREEN  (DOWN AND LOCKED)

⑦ GEAR HANDLE LIGHT EXTINGUISHES 

⑧ LANDING GEAR DOORS REMAIN OPEN

# Landing Gear Warnings

< 500' AGL
AND
< 190 KCAS

"TOO LOW, GEAR"

VOICE ORIDE = Silences aural warning

GPWS ORIDE

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≤ 345' AGL
AND
PLA ≤ 5°

Gear Unsafe Warning Horn will sound (Klaxon Tone)

HORN SILENCE = Silences Warning Horn

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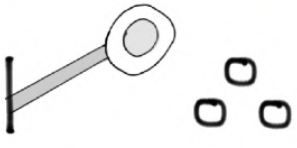
flaps > 22°



Gear Unsafe Warning Horn will sound (Klaxon Tone)

HORN SILENCE = Will NOT silence Warning Horn

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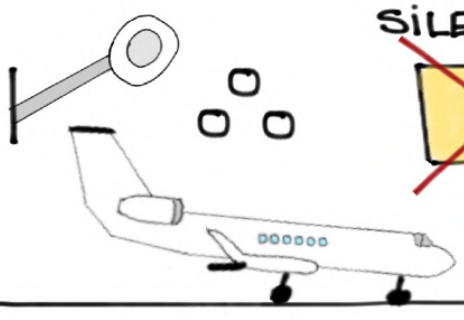

HORN SILENCE =

- WOW switches compressed
- ADS indicates < 60 kts
- Gear handle in the retract position

# LIMITATIONS

MAXIMUM ALTITUDE TO OPERATE GEAR OR FLY WITH THE GEAR EXTENDED: 20,000' MSL

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T-HANDLE

EMER LDG GEAR

VLO
175 KCAS

VLO
225 KCAS
0.70 MT

VLE
250 KCAS
0.70 MT

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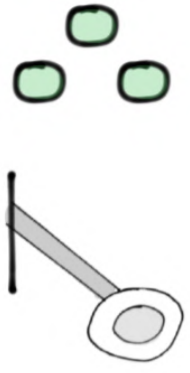
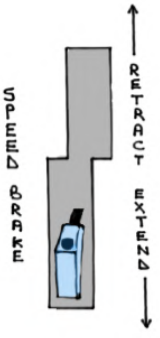
SPEED BRAKES AND GEAR DOWN INFLIGHT



PROHIBITED

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MAXIMUM TIRE SPEED: 195 KNOTS (GROUND SPEED)

# Nose wheel Steering System

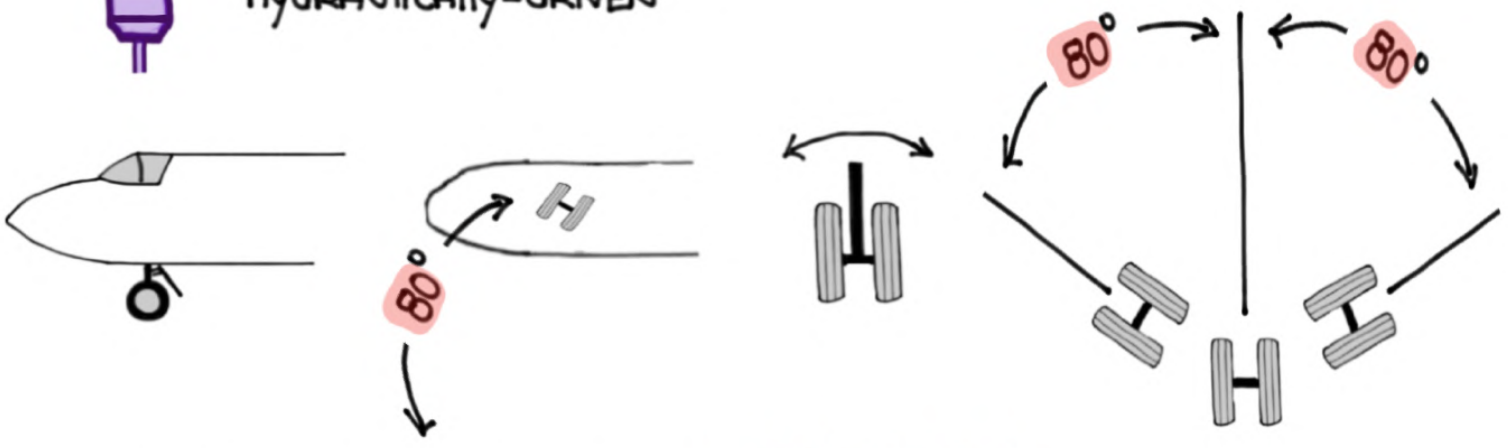
L ESS DC

Electrically-controlled

and

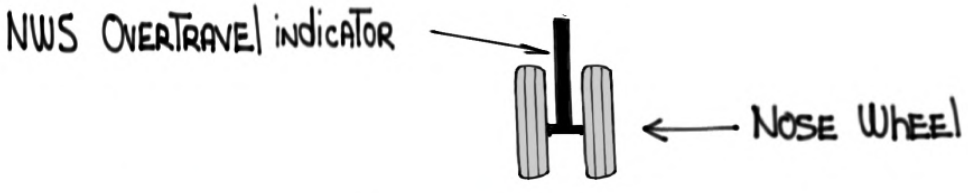
hydraulically-driven

> by a Steer-by-Wire System




Nose Wheel Steering (NWS): 80° (±2°)

NWS Overtravel indicator: ≥ 84°



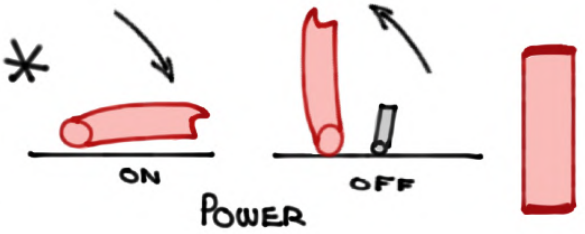

Rudder pedals: Left 7° / Right 7°

Rudder pedals (NWS failure) Left 16° / Right 16°

Rudder pedal input + NWS = nose wheel deflection

NWS = Red guarded switch

*"Clunk" = NWS valve opening



# WOW Switch System

The Weight-On-Wheels (WOW) switch system provides:

- In-Air
- On-Ground

sensing for aircraft components that operate only in specific regimes, such as:

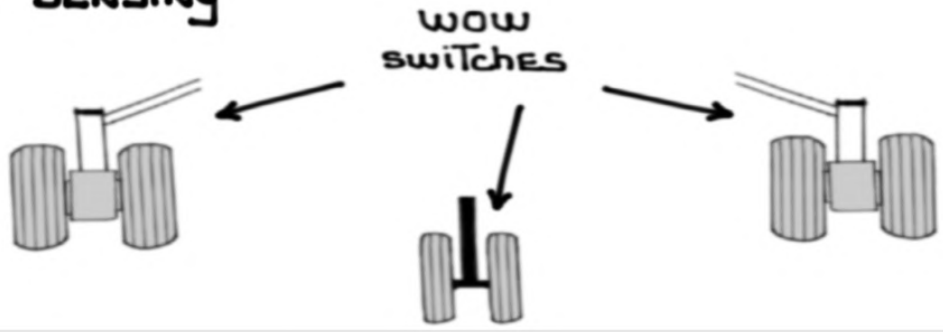
- Engine Thrust Reversers
- Ground Spoilers
- Nose Wheel Steering

> Require On-Ground WOW signal for operation

- Weather Radar
- TCAS
- Cabin Window Heat
- Landing Gear

> Require In-Air WOW signal for operation

– Three (3) WOW switches, one (1) on each gear, provide sensing

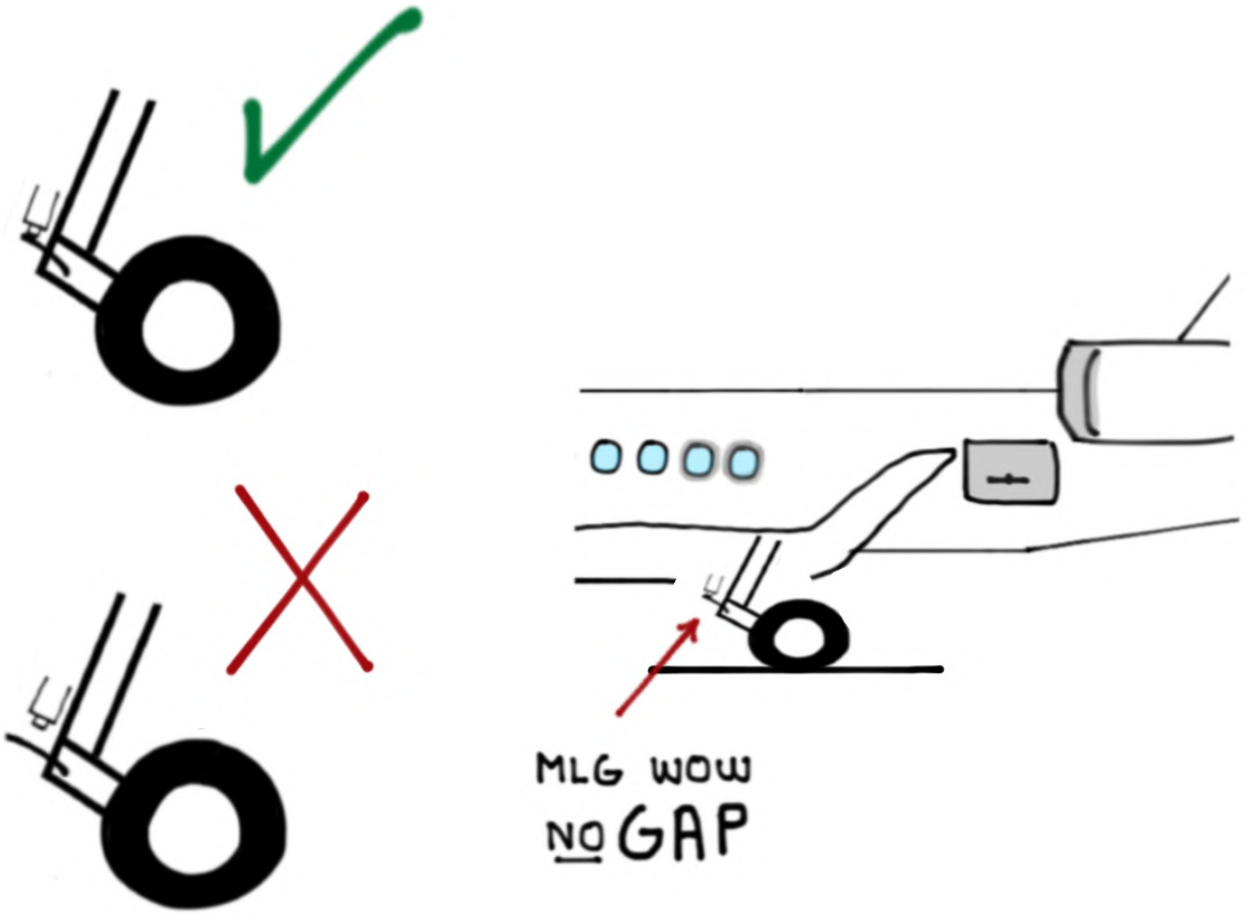


## – Main Landing Gear (MLG) WOW Switches

- MLG WOW switches have a roller on a cam. The cam rotates to a low point after takeoff which causes the switch to extend

- The MLG WOW switches "make" On-Ground. They physically make contact

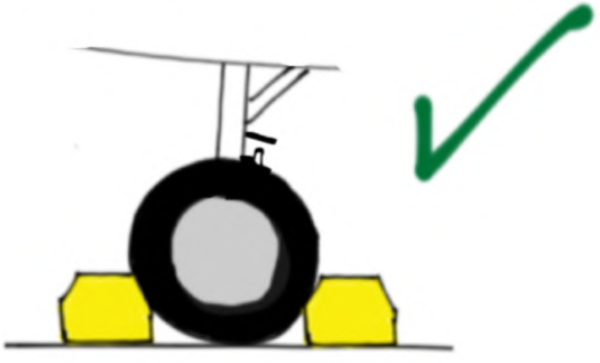
- During the exterior pre-flight inspection the crew must confirm that there is no gap between the roller and the cam



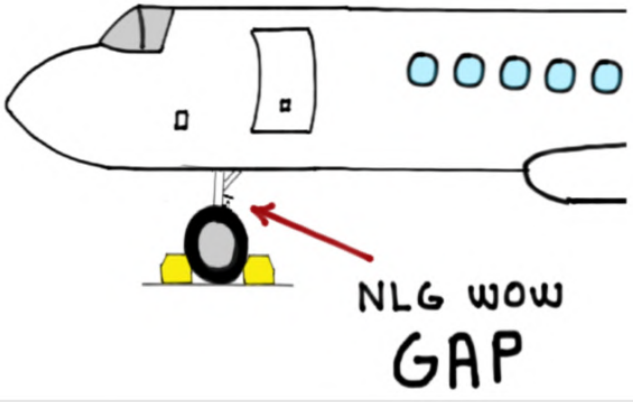
## – Nose Landing Gear (NLG) WOW Switch

- The NLG WOW switch is a microswitch that is either compressed or not


- The NLG WOW switch "breaks" on-ground. It does not make contact



- During the exterior pre-flight inspection the crew must confirm that there is a gap



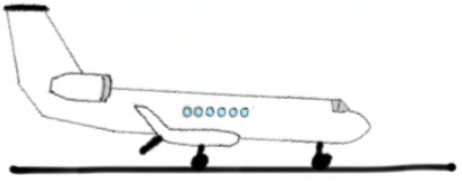
AIR mode

DE-ENERGIZE

MLG + NLG WOW SWITCHES

ENERGIZE

GROUND mode



## DEDICATED WOW SIGNAL OUTPUTS:

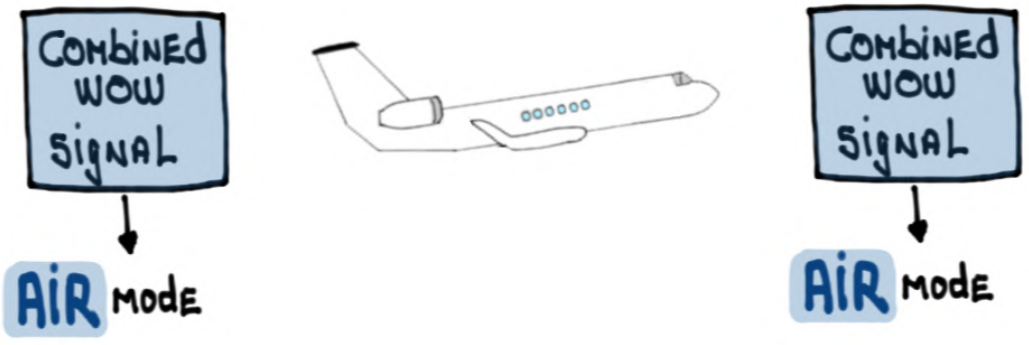
NWS WOW SWITCH → NWS AUX PUMP

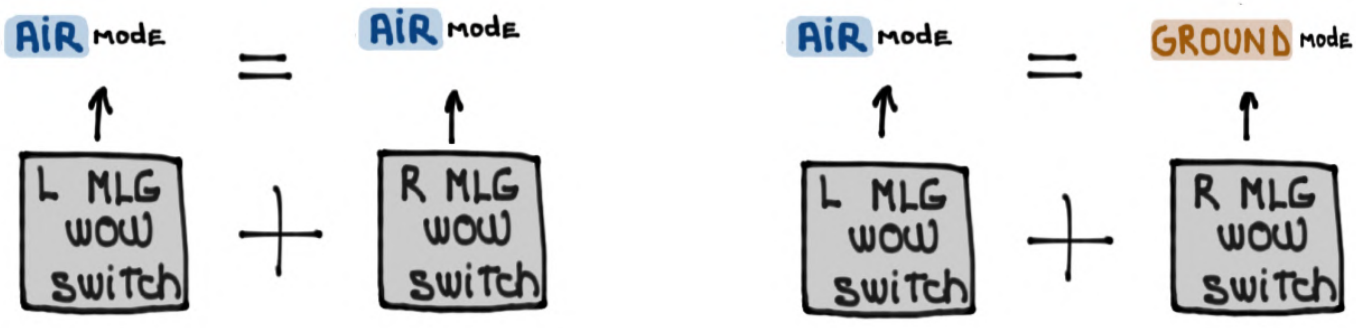
LEFT BUS POWER CONTROL UNIT (BPCU) ← L MLG WOW SWITCH

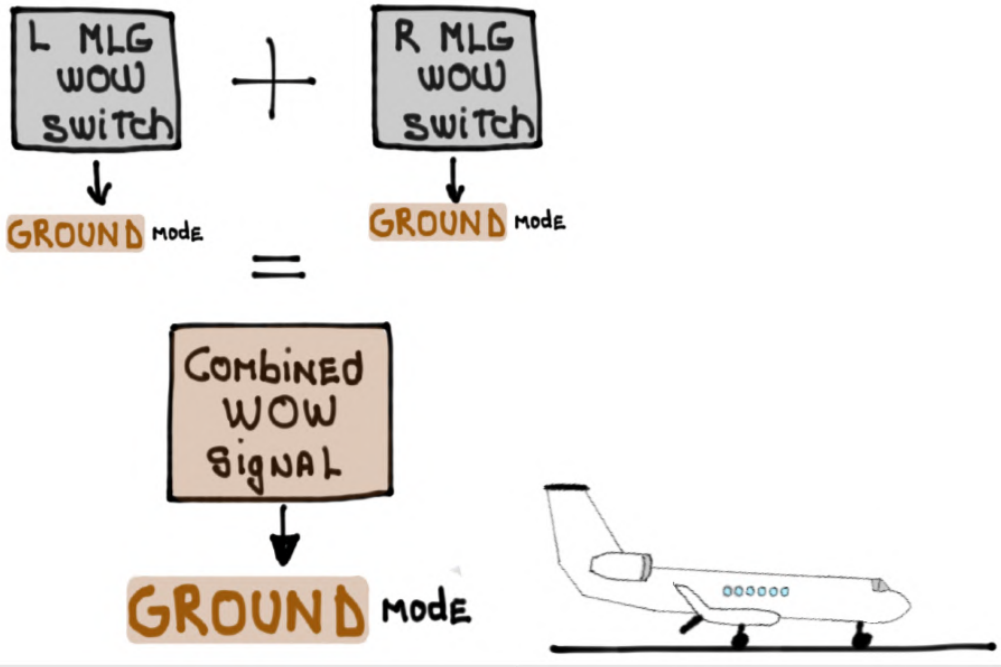
R MLG WOW SWITCH → GROUND SERVICE BUS (GSB)

- ON-SIDE BRAKE CONTROL AND INDICATION
- ON-SIDE THRUST REVERSER
- GROUND SPOILERS
- COMBINED WOW (THROUGH MAU #1 AND 2)

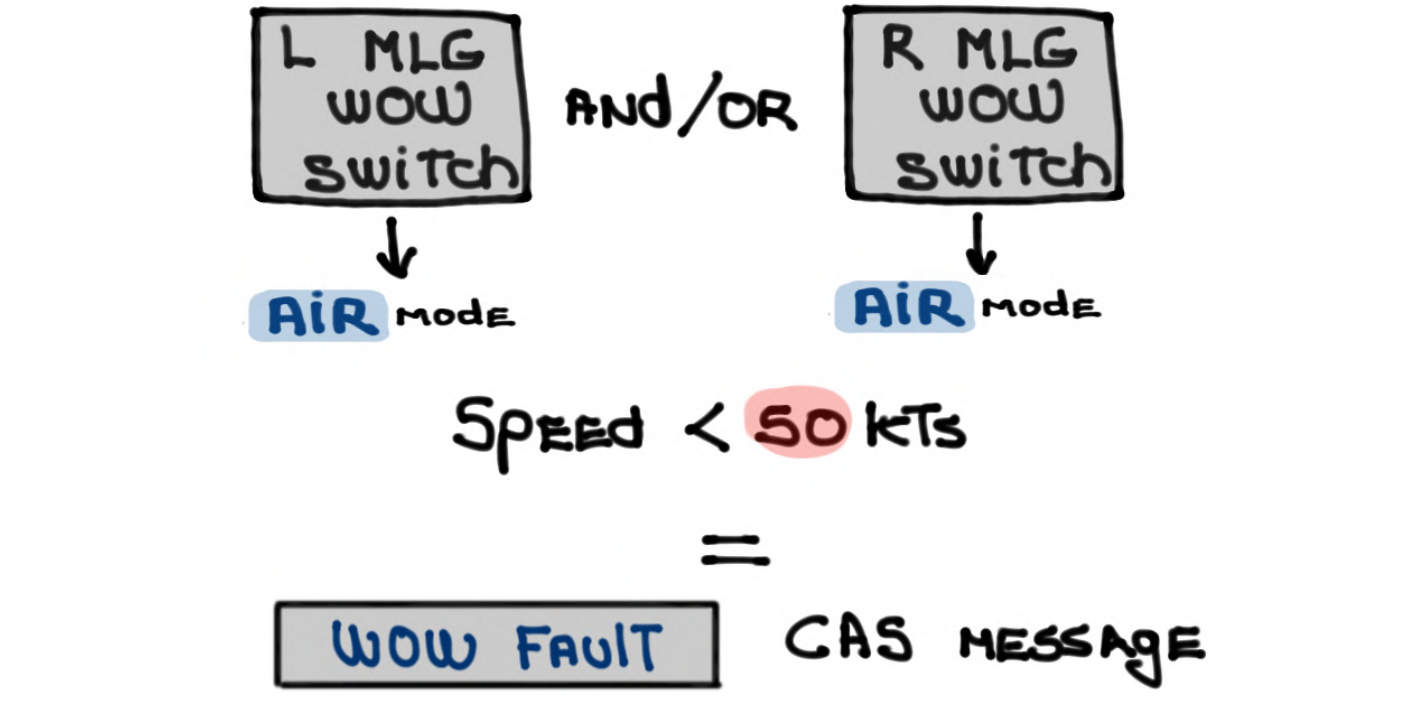
# Combined WOW Signal

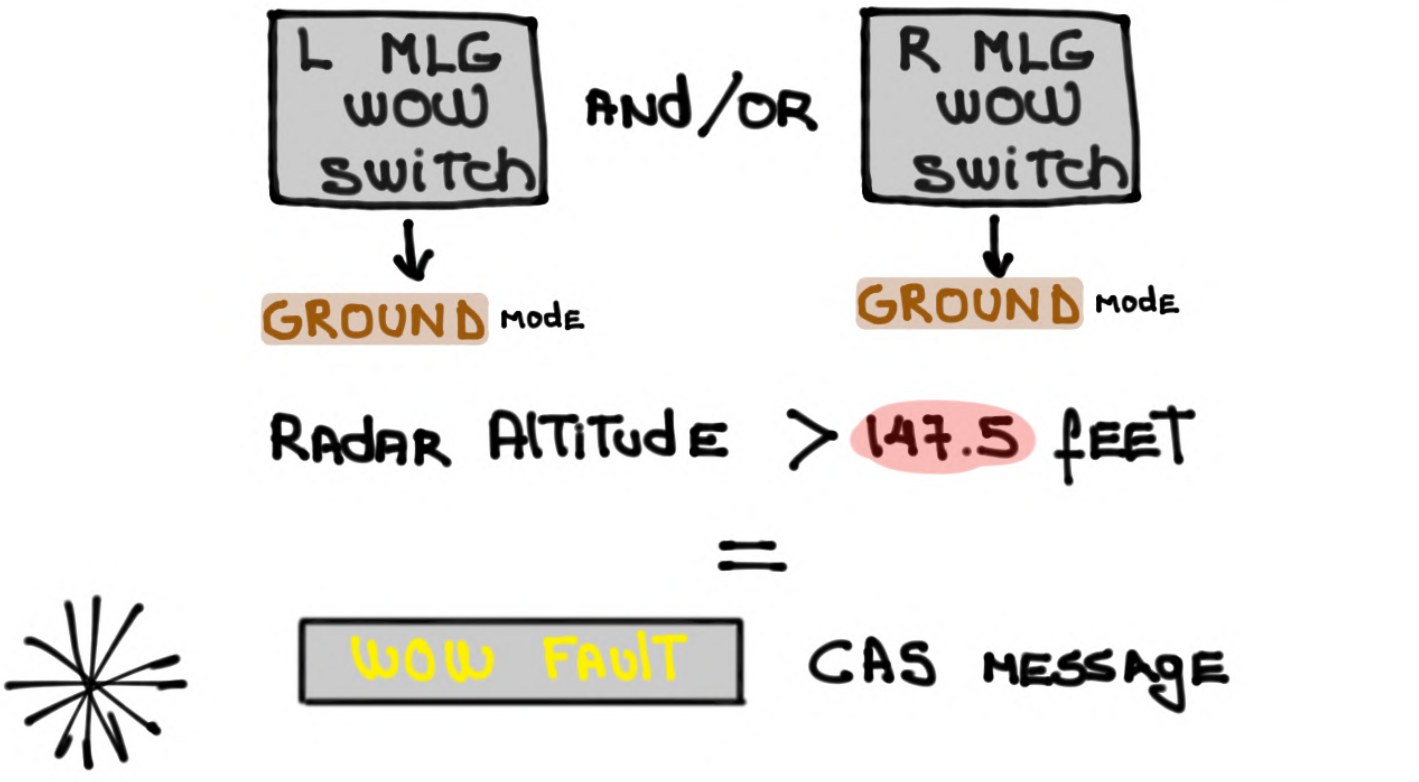


# WOW FAULT WARNINGS



Combined WOW does not have anything to do with the ground spoilers

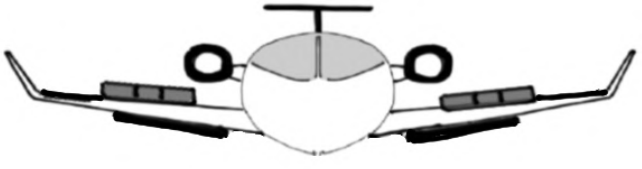
Combined WOW does not prevent the ground spoilers from deploying in the event of a WOW FAULT

Combined WOW simply advises the crew that there is a problem. Therefore if:

① WOW FAULT CAS message after takeoff

② Disarm the ground spoilers before retarding the thrust levers to idle

Otherwise the ground spoilers, three (3) panels per wing, will deploy, destroy all lift... and kill you!



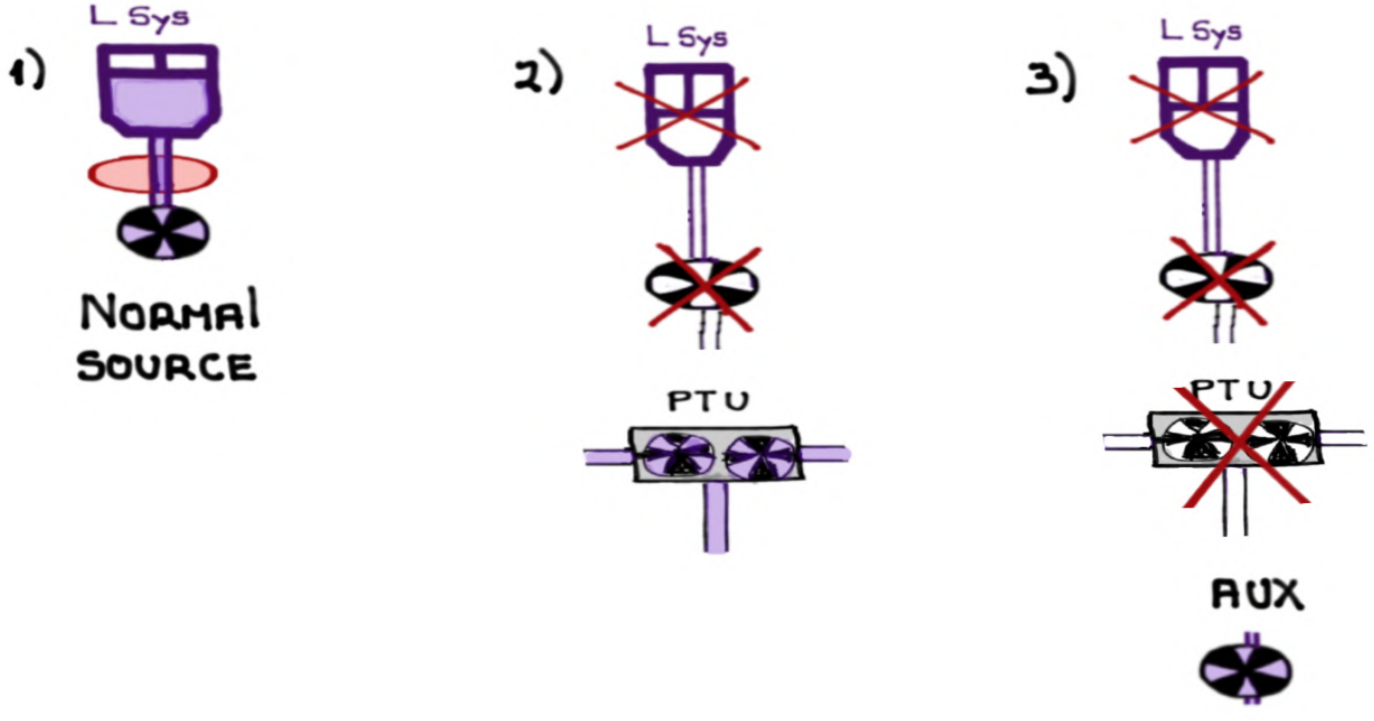
# Brakes

The main landing gear brakes are air-cooled, multiple carbon-fiber discs with anti-skid protection

- Overheat protection for tires and wheels is provided by fusible plugs in the wheels that melt, releasing tire pressure, if high temperature thresholds are exceeded

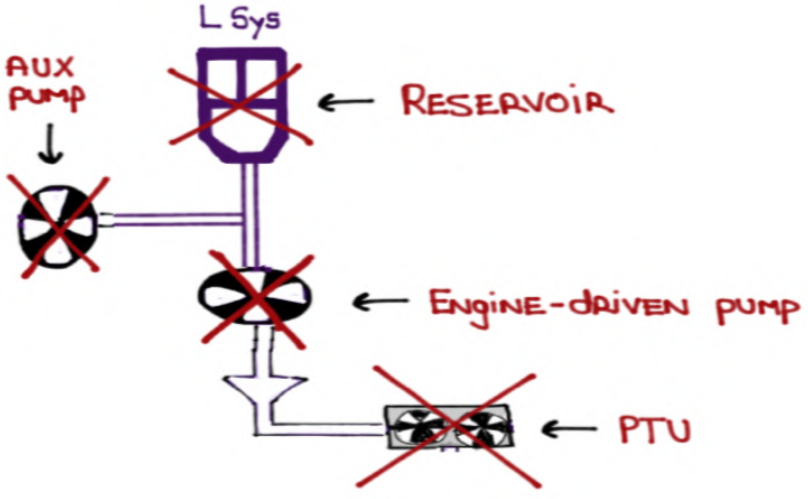
- A Brake Temperature Monitoring System (BTMS) monitors and displays brake temperatures

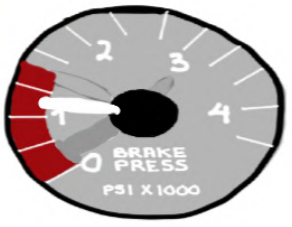
- Hydraulic pressure (3,000 psi) is provided by:

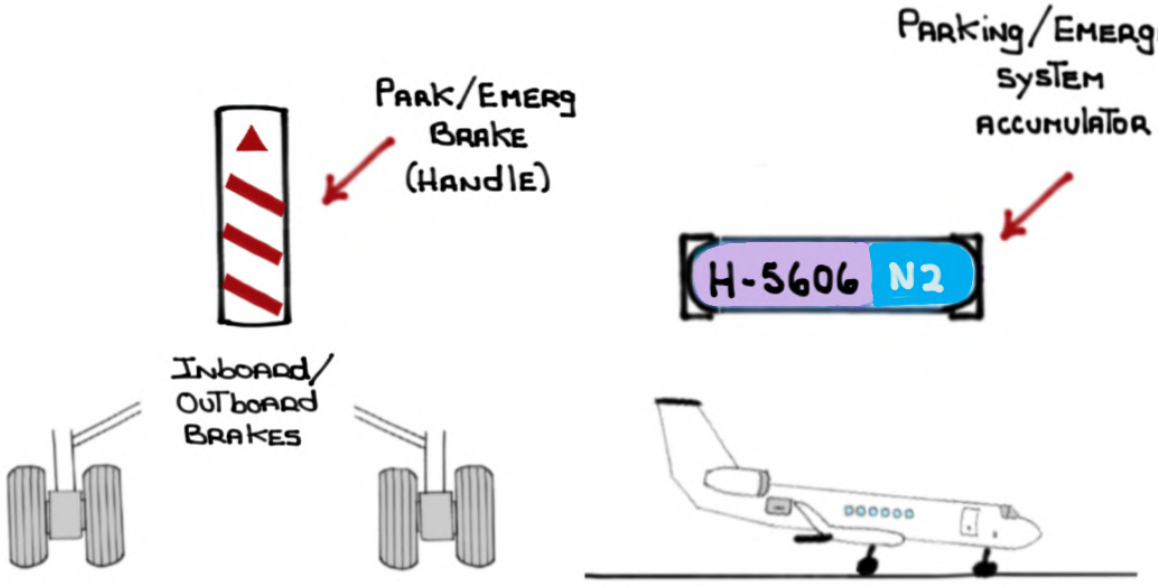


- If no hydraulic pressure/fluid is available from the **L** Hydraulic System:

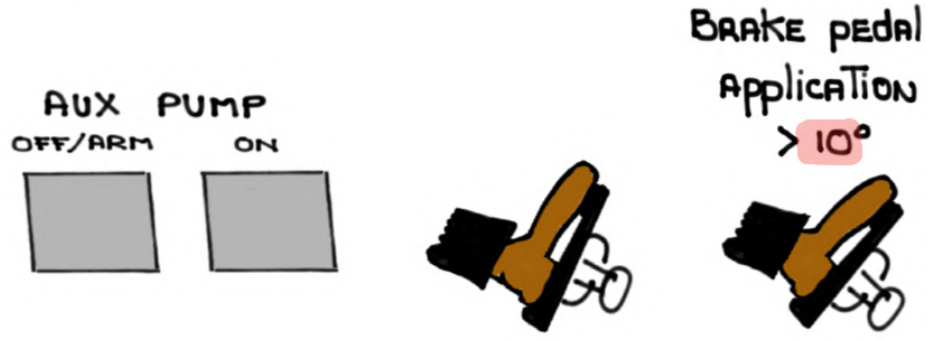
- Accumulator pressure from the Parking/Emergency brake system will provide ≥ 6 brake applications
- Braking is applied simultaneously to all four (4) wheel brakes
- No Anti-skid protection capability



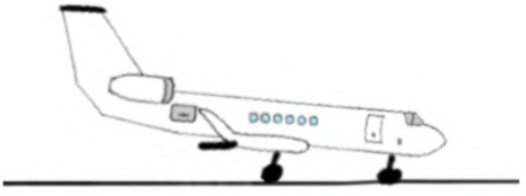



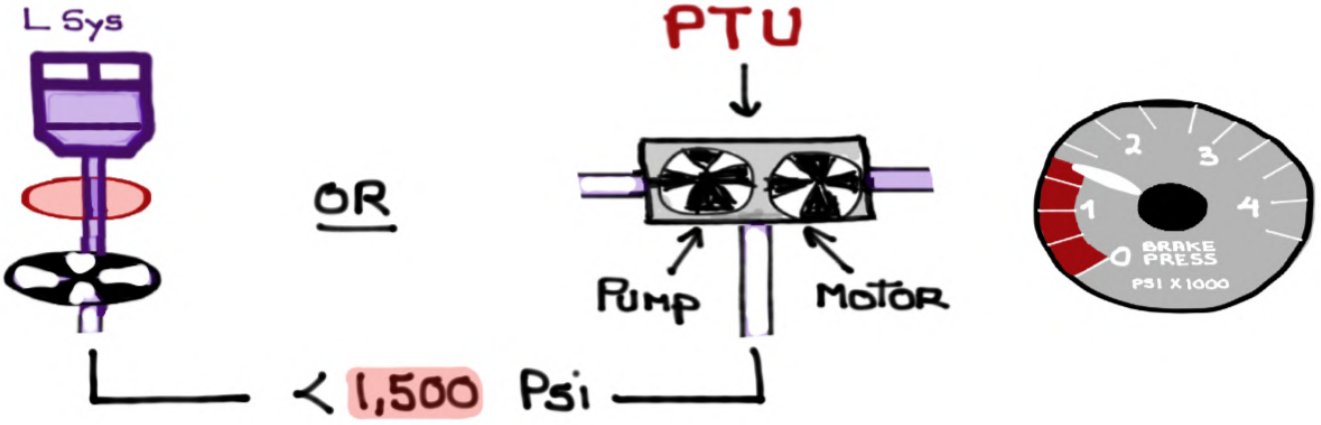



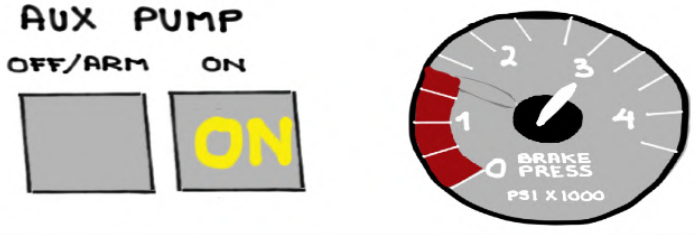
- If the brake pedals are applied (>10°) and Left Hydraulic System pressure is <1,500 Psi the AUX pump Auto Latch feature will command the AUX pump, if ARMED, to come **ON**




① WOW **GROUND** And brake pedal application >10°



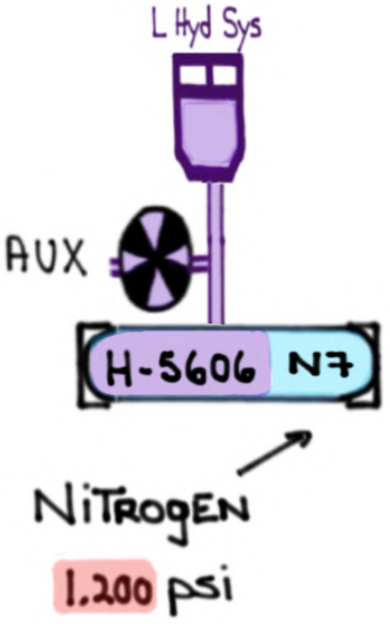
② 


③ 

## – Parking Brake System

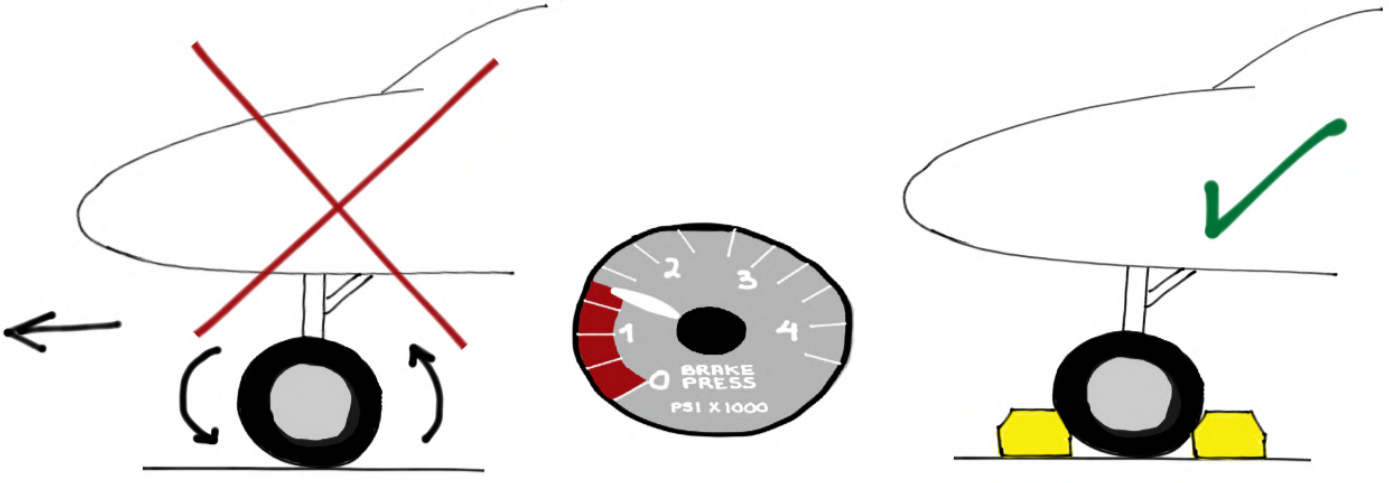
The Parking Brake System has an accumulator pre-charged to 1,200 psi with nitrogen and hydraulically charged to 3,000 psi

Hydraulically charged by:
( 3,000 psi )




Parking brake must be set prior to checking the brake wear indicators – "life remaining"

PARKING BRAKE ACCUMULATOR PRESSURE WILL DECREASE CONTINUOUSLY OVER A SHORT TIME. ALWAYS CHOCK AIRCRAFT UNTIL READY FOR ENGINE START. OTHERWISE IT MAY ROLL... AWAY



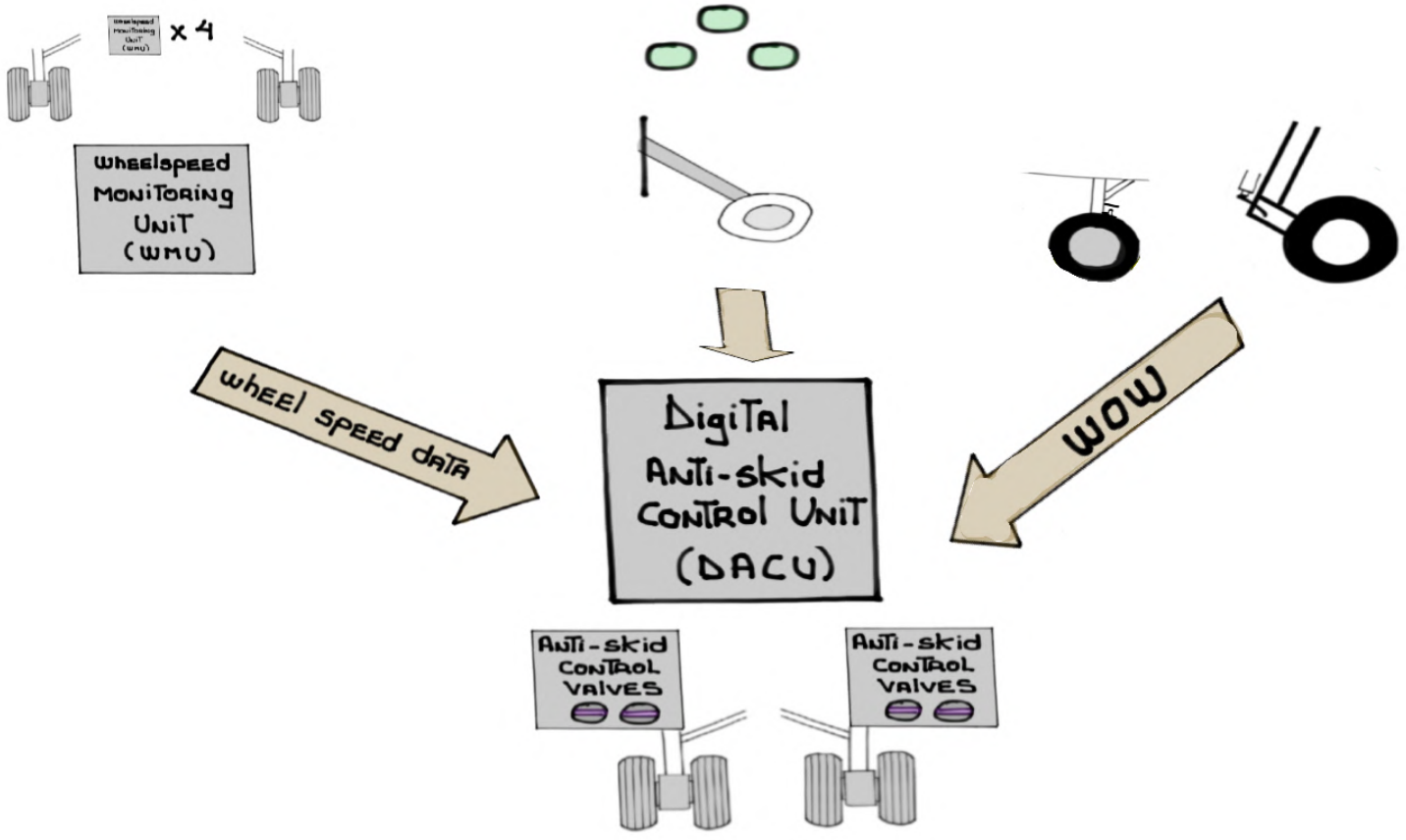
# Anti-skid Protection

Anti-skid protection for the main landing gear brakes is provided from 200 down to ten (10) knots

Below this speed the main wheels brakes can be locked in order to allow tight turns while taxiing

The Digital Anti-skid Control Unit (DACU) is the brains of the system

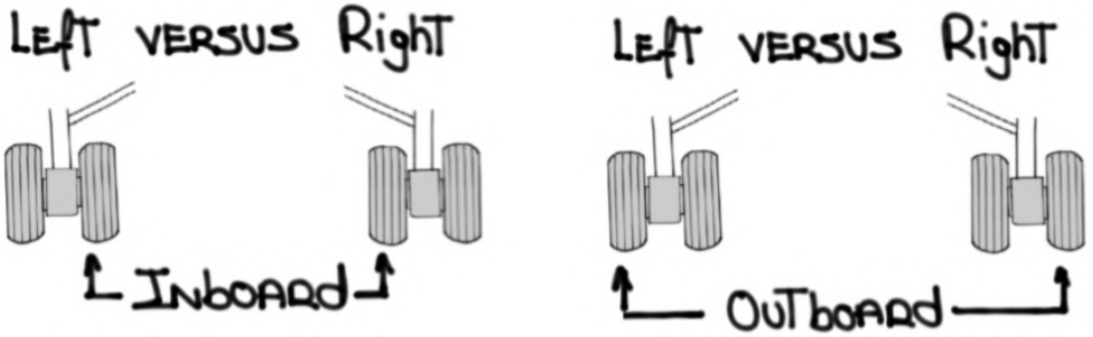
The DACU is located in the AEER



Touch down Protection: prevents landing with brakes ON

Brakes available
- WOW GROUND
- wheel speed > 30 kts

Locked wheel Protection: compares wheel speeds



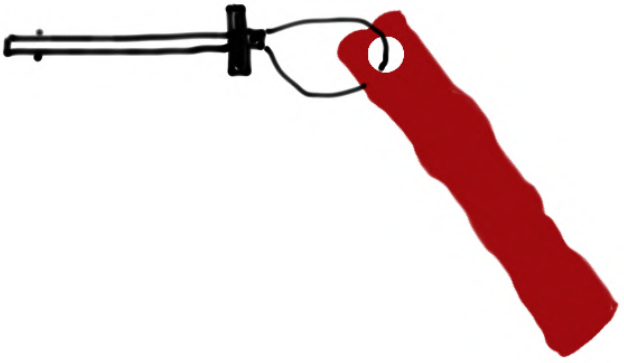

① if 70% < its paired wheel = brake pressure released

② if a wheel is decelating faster than reference value (25 fpm/sec²) brake pressure is released to that wheel

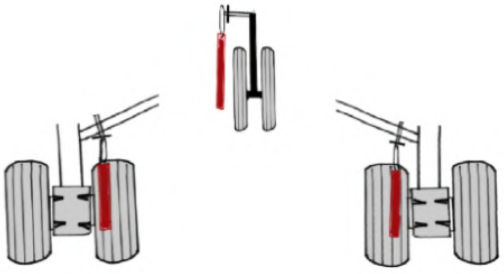
Wheel Spin Down: decelerates main gear wheels prior to entering the wheelwells

# Safety Pins (6)

To make them more visible there is a "Remove Before flight" red flag



- Three (3) gear pins are installed during post-flight inspection. The pins are removed during the **Exterior** pre-flight inspection in preparation for departure

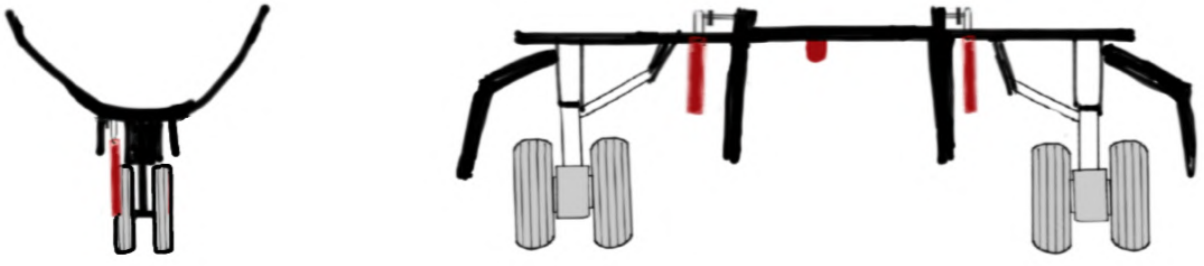


One pilot removes/stores the pins. The other pilot confirms that all pins have been removed and announces it. Failure to remove the pins will prevent the landing gear from retracting after takeoff

The QRH addresses landing gear pins mistakenly left in.

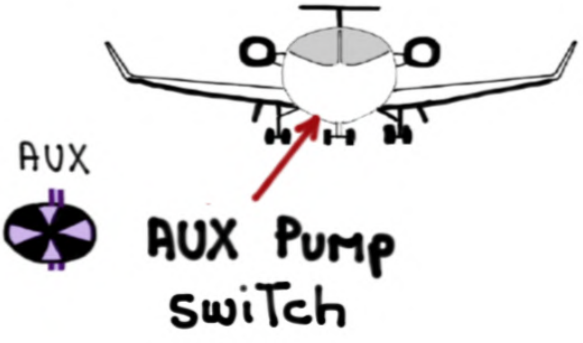
Refer To: ATTEMPTED LANDING GEAR RETRACTION With Safety Pins Installed

- One (1) nose gear and Two (2) main gear door pins are installed **before** opening the gear doors



AUX

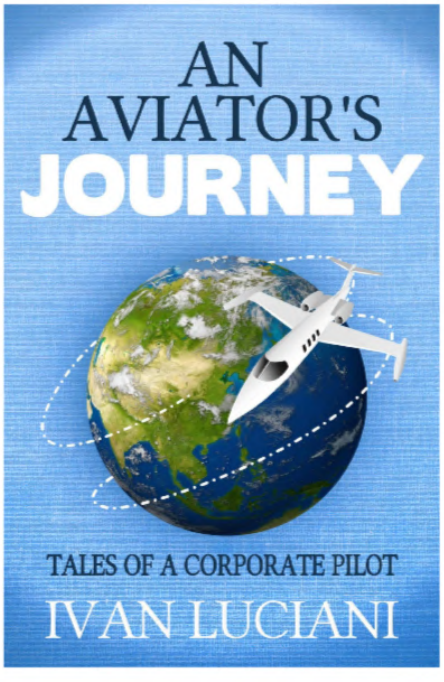
The  pump is used To open The gear doors

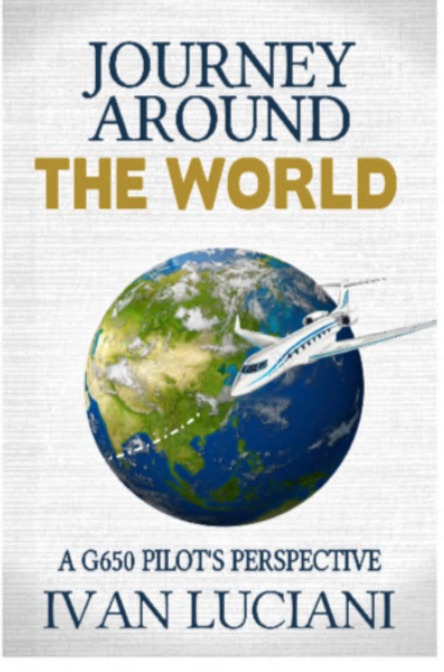


REMINDER: these system notes are intended for study purposes only. Always refer to official Gulfstream manuals and other approved references when operating your aircraft.

NOTE: these system notes are updated from time to time and what is posted on Code450.com will always be the most recent version.

Questions, comments or errors...please do send me an email: ivan@code7700.com




Thank you!