PREPAR3D GUIDE
DIGITAL AVIATION
BOMBARDIER CRJ700ER

BY CHUCK
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Special thanks to Paul "Goldwolf" Whittingham for creating the guide icons.

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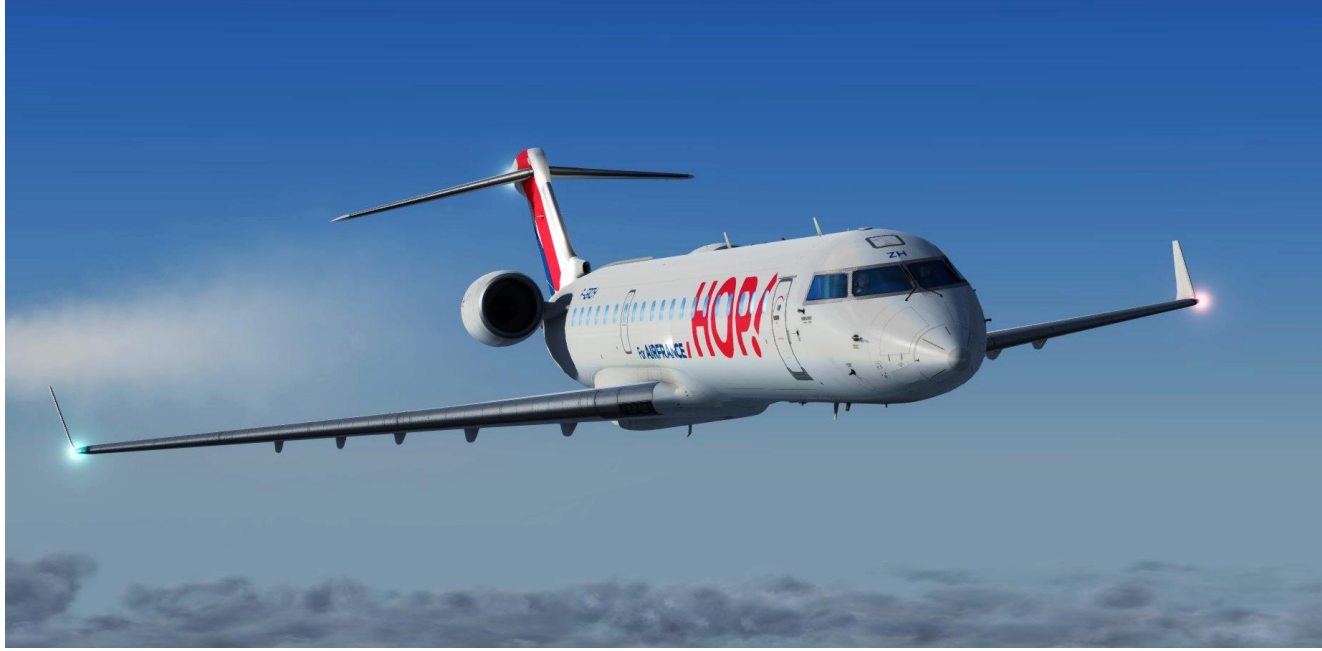
PLATFORM: PREPAR3D V 4.3

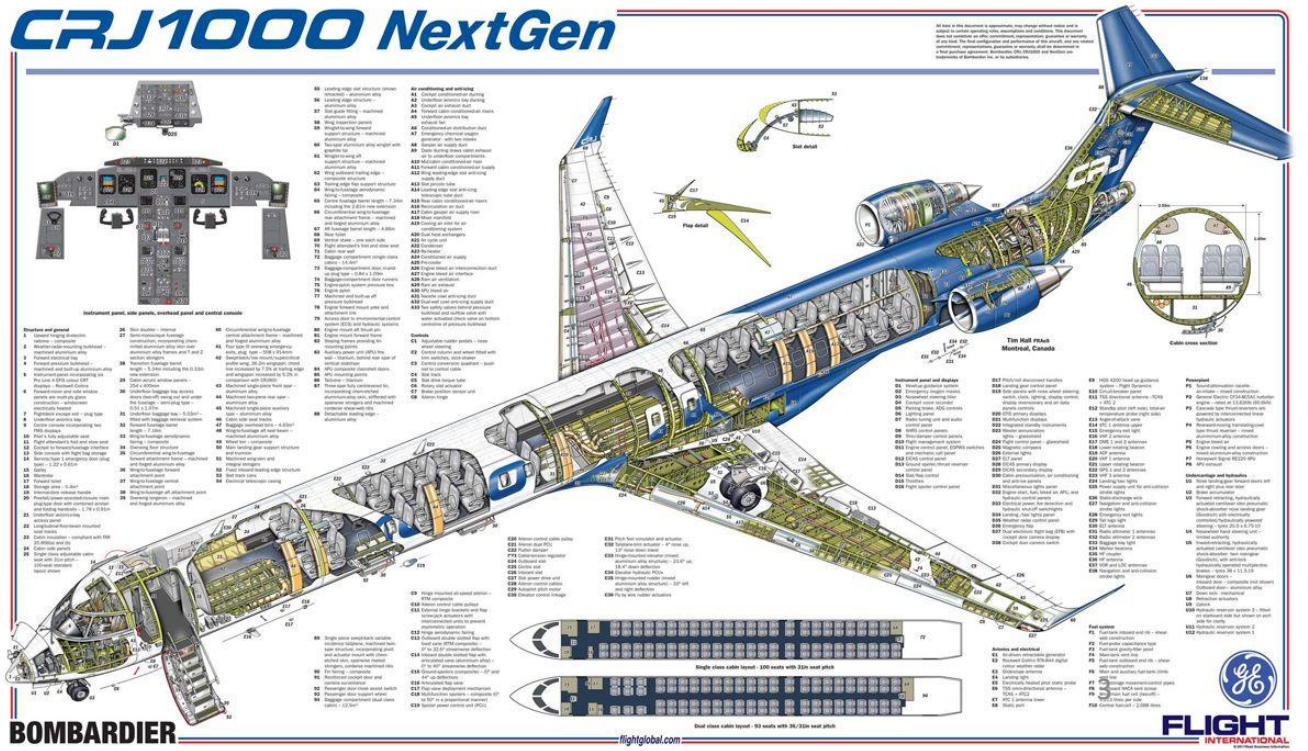
PART 1 – INTRODUCTION

The Bombardier **CRJ** (Canadair Regional Jet) is a a family of regional airliners designed and manufactured by Bombardier.

It was based on the Canadair Challenger CL-600 business jet. An initial effort to produce an enlarged 36-seat version of the aircraft, known as the Challenger 610E, was terminated during 1981. Shortly after Canadair's privatisation and sale to Bombardier, work on a stretched derivative was reinvigorated; during early 1989, the Canadair Regional Jet program was formally launched. On 10 May 1991, the first of three CRJ100 prototypes conducted its maiden flight. The type first entered service during the following year with its launch customer, German airline Lufthansa.

The initial variant, the CRJ100, was soon joined by another model, designated as the CRJ200. It was largely identical to the CRJ100, except for the installation of more efficient turbofan engines, which gave the aircraft lower fuel consumption, increased cruise altitude and cruise speed. During the 1990s, various additional versions and models of the type were developed and put into service. During the late 1990s, a substantially enlarged derivative of the airliner, referred to as the CRJ700, was developed; it was soon joined by the even larger CRJ900 and CRJ1000

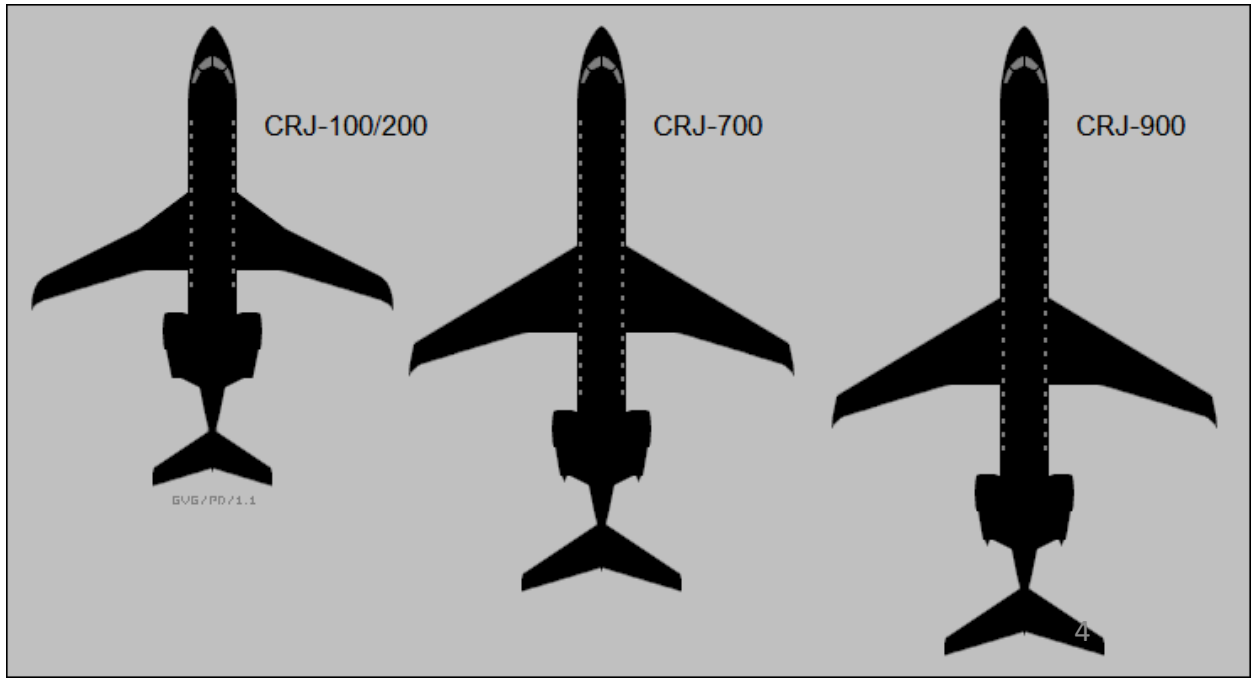




Design work on the CRJ700 by Bombardier started in 1995 and the program was officially launched in January 1997. The CRJ700 features a new wing with leading edge slats and a stretched and slightly widened fuselage, with a lowered floor. Its first flight took place on 27 May 1999. The aircraft's FAA Type Certificate designation is the CL-600-2C10. The CRJ700 first entered commercial service with Brit Air in 2001. Seating ranges from 63 to 78 passengers.

The CRJ700 comes in three versions: Series 700, Series 701, and Series 702. The Series 700 is limited to 68 passengers, the 701 to 70 passengers, and the 702 to 78 passengers. The CRJ700 also has three fuel/weight options: standard, ER (Extended Range), and LR (Long Range). The ER version has an increase in fuel capacity as well as maximum weight, which in turn increases the range. The LR increases those values further. The executive version is marketed as the Challenger 870. The CRJ700 directly competes with the Embraer 170, which typically seats 70 passengers.

The early build aircraft were equipped with two General Electric CF34-8C1 engines. However, later build aircraft are now equipped standard with the -8C5 model, which is essentially an uprated 8C1. Most airlines have replaced the older engines with the newer model, while a few have kept the older -8C1 in their fleet. Maximum speed is Mach 0.85 (903 km/h; 488 kts) at a maximum altitude of 12,500 m (41,000 ft). Depending upon payload, the CRJ700 has a range of up to 3,620 km (2,250 mi) with original engines, and a new variant with CF34-8C5 engines will have a range of up to 4,660 km (2,900 mi).



TUTORIAL STRUCTURE

Before you even step foot in your virtual cockpit, you need to know where you are, where you are going, how you will get there, what you need to get there. This document is structured like a short tutorial flight.

The flight tutorial is structured as follows:

- Familiarize yourself with the cockpit layout
- Plan your flight
  - Determine the flight route, fuel & cargo loads
  - Spawn the aircraft and set it in a Cold & Dark state
  - Provide aircraft with power
  - Program the FMC (Flight Management Computer)
- Start–up the aircraft and make it ready for flight
- Taxi
- Takeoff
- Climb and cruise
- Explore autopilot capabilities
- Explain engine and hydraulic system functionalities
- Explain the ice protection systems
- Descend, approach and land

BEST RESOURCES

DISCLAIMER: Do not use this guide for real life flying. I mean it.

Digital Aviation / Aerosoft CRJ700/900 Documentation

Smart Cockpit CRJ 700-900 Series
http://www.smartcockpit.com/plane/BOMBARDIER/CRJ-700-900-SERIES.html

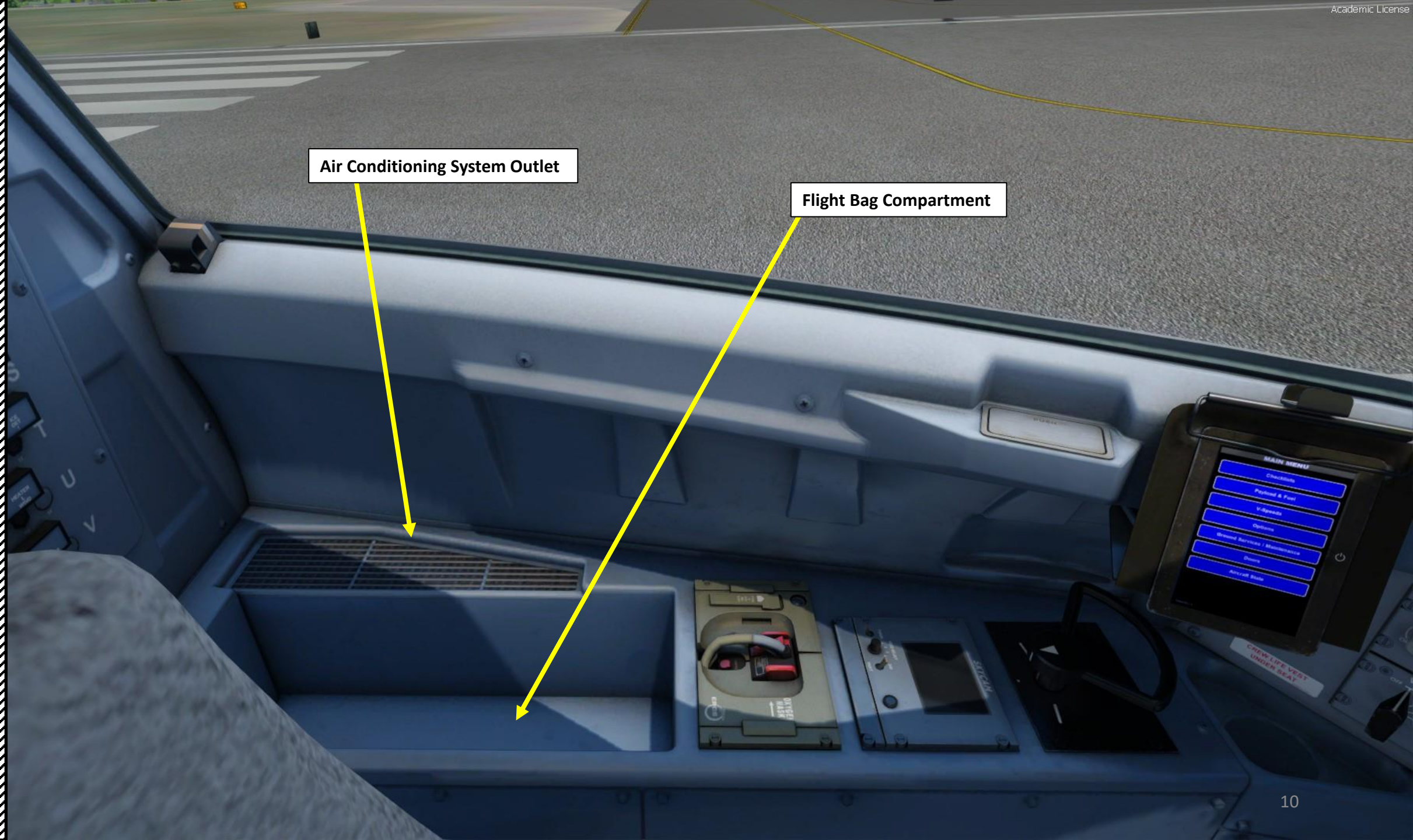
Froogle Sims CRJ Fully Loaded Playlist (Youtube)
PART 1 – Cold & Dark Start: https://youtu.be/Ds05B0IRuv8
PART 2 – Cleared for Takeoff: https://youtu.be/pTE0bW-f2ZU
PART 3 – Cleared to Land: https://youtu.be/GjGM-54gbVA

CRH 700 Aircraft Systems Study Guide by Aaron Boone
https://books.google.ca/books?id=oJHNHhR36n0C&printsec=frontcover&hl=fr&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Tips and Tricks from a real CRJ Pilot
https://forums.x-plane.org/index.php?/forums/topic/62939-tips-and-profiles-from-a-real-crj-pilot/

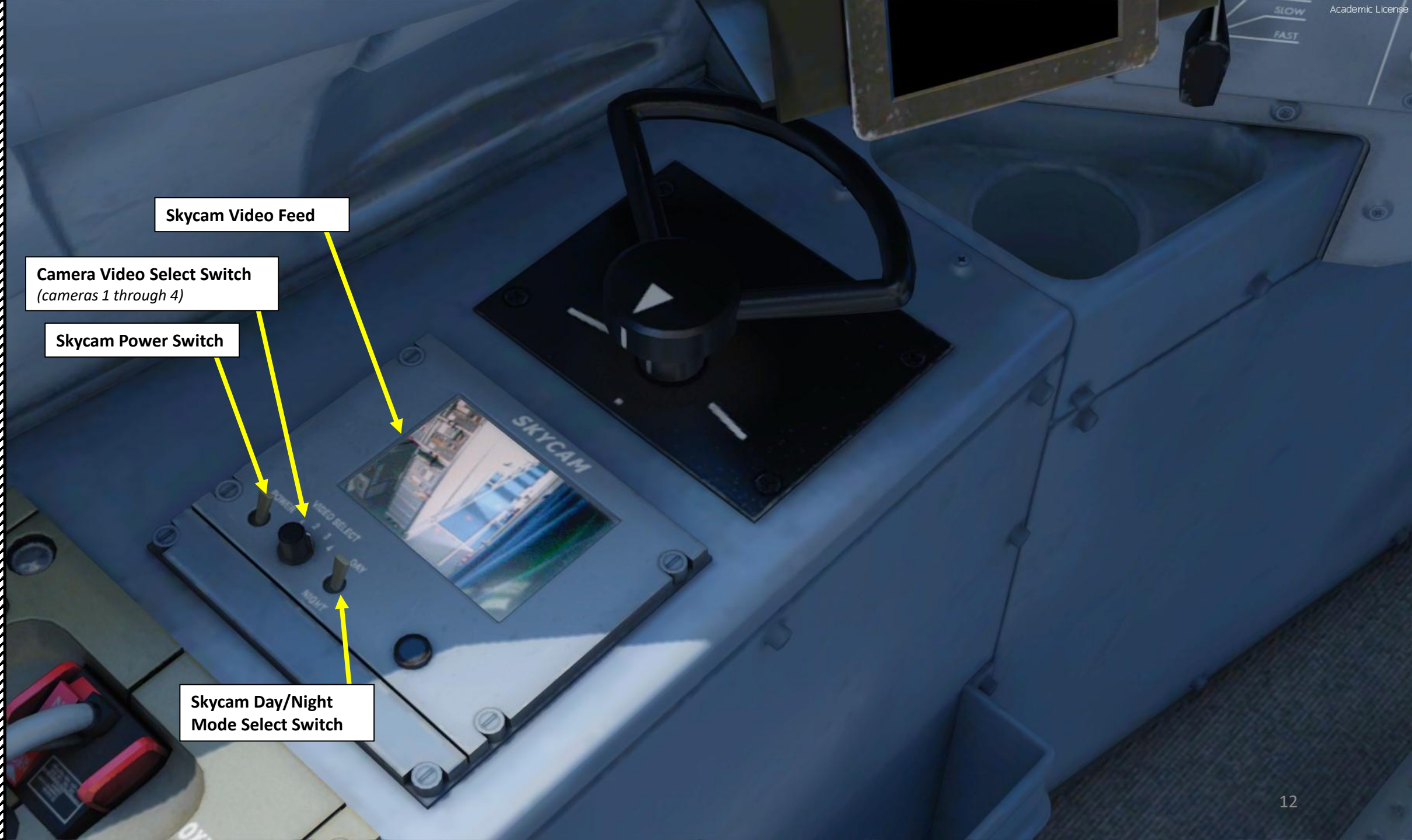
Aussie Star Flight Simulation CRJ700 Checklists
http://aussiestarfs.com/wp-content/uploads/2016/10/Bombardier-CRJ-700-Panels-Checklists-v2-1.pdf

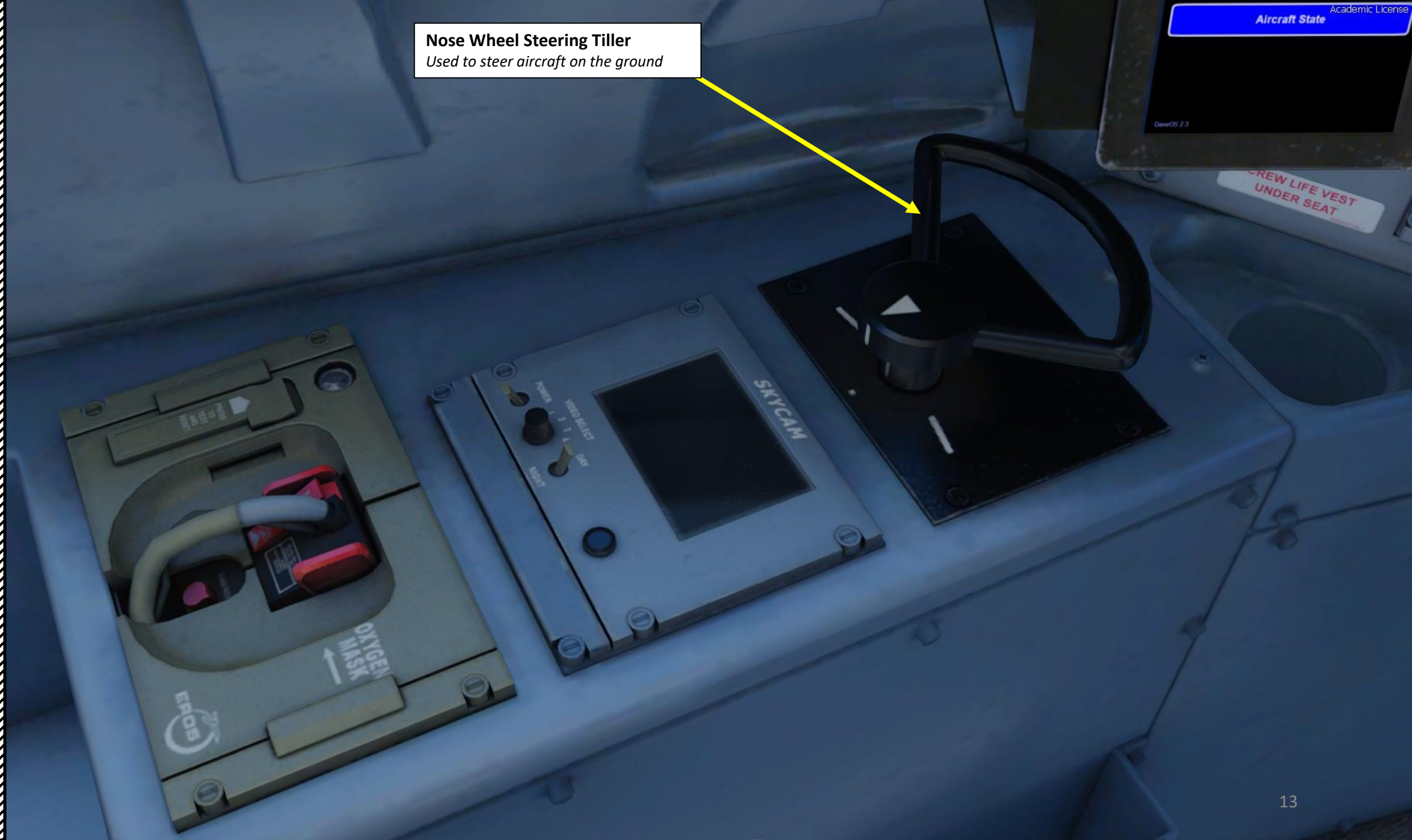
PART 2 – COCKPIT LAYOUT




Captain's Map Light Knob
Skycam Video Surveillance Control Panel
Oxygen Mask
Oxygen Regulator Press to Test & Reset Switch

PART 2 – COCKPIT LAYOUT




Nose Wheel Steering Tiller
Used to steer aircraft on the ground
Academic License
Aircraft State
CREW LIFE VEST
UNDER SEAT
SKYCAM
OXYGEN
MASK

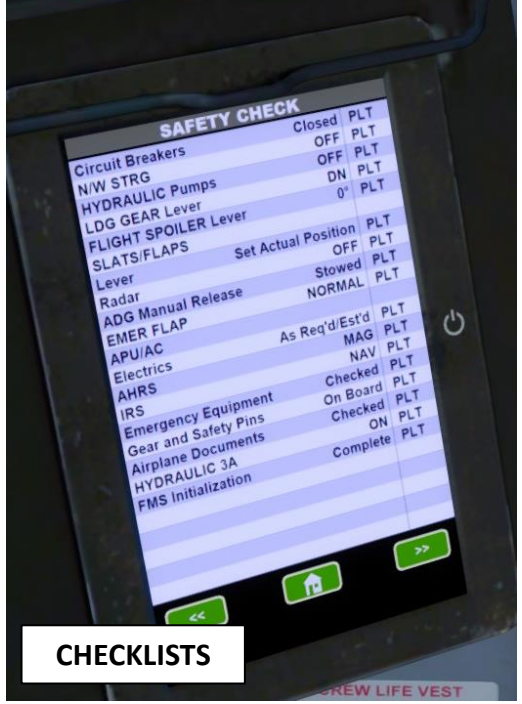
DAVE EFB (Electronic Flight Bag)

In real life, an electronic flight bag is an electronic information management device that helps flight crews perform flight management tasks more easily and efficiently with less paper. It is a general purpose computing platform intended to reduce, or replace, paper-based reference material often found in the pilot's carry-on flight bag, including the aircraft operating manual, flight-crew operating manual, and navigational charts (including moving map for air and ground operations). In addition, the EFB can host purpose-built software applications to automate other functions normally conducted by hand, such as performance take-off calculations.

In the simulation world, an electronic flight bag is used as a user interface to change fuel loadout, cargo setup, interact with ground crews (like using ground power units, refueling, pushback, etc.), consult checklists, and set different simulation options. The EFB simulated by Digital Aviation is called "Dave", named after one of the crew members in 2001: Space Odyssey.

DAVE EFB Power Button

EFB MAIN MENU



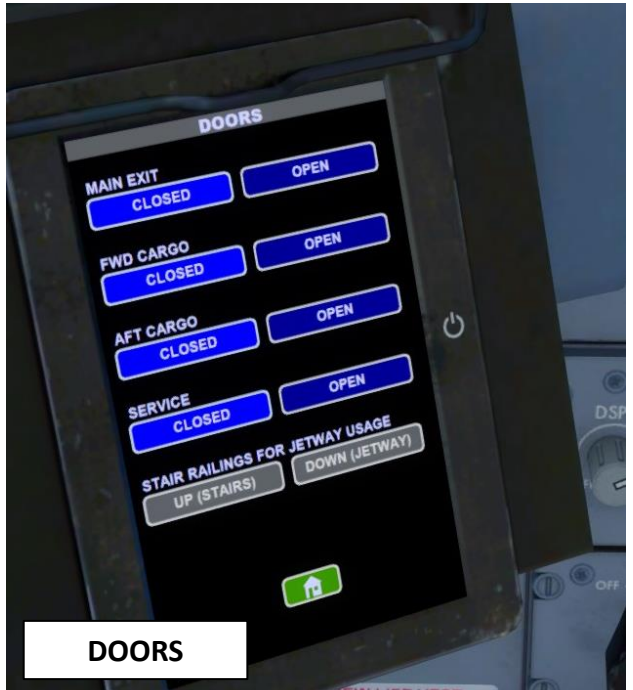
CHECKLISTS

V-SPEEDS

OPTIONS

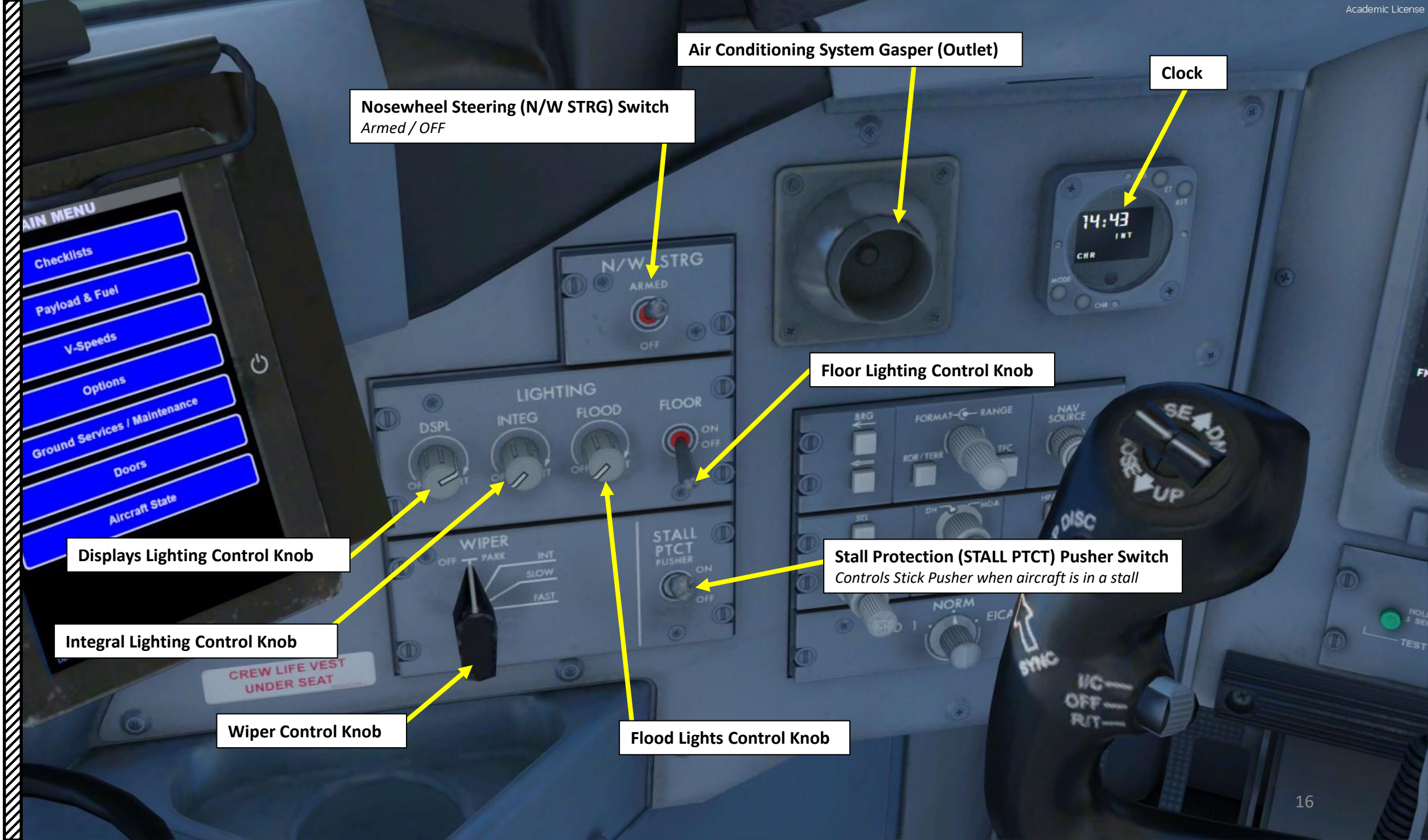
PAYLOAD & FUEL

AIRCRAFT STATE



DOORS

GROUND SERVICES



V Speeds (VT, V1, VR, V2) (kts)

Reference Height Selector Knobs
- *INNER KNOB: Selects either DH (Decision Height) or MDA (Minimum Descent Altitude). Pressing in the inner knob clears the values you input off the screen and a second press will redisplay them.*
- *OUTER KNOB: Turn to set DH/MDA value.*

ND (Navigation Display) Format & Range Selector Knobs
- *OUTER KNOB: Changes MFD (Multifunction Display) Format to either PLAN, MAP, HSI (Horizontal Situation Indicator), Weather Radar or TCAS (Traffic & Collision Avoidance System)*
- *INNER KNOB: Selects navigation display range to either 5, 10, 20, 40, 80, 160, 320 or 640 nm*

ND (Navigation Display) Radar/Terrain Overlay Switch

TFC (Traffic) Display Switch

Navigation Source Selector
- *When turned, switches navigation between FMS1 (Flight Management System 1), FMS2, NAV1 or NAV2.*
- *When pushed in, X-Side (Cross-side) swaps navigational sources from opposite side's MFD.*

Bearing Pointer Source 1 Selector
Switches between OFF, NAV1 and ADF1

Bearing Pointer Source 2 Selector
Switches between OFF, NAV2 and ADF2

Target (TGT) / V-Speed Selector
When SPEED REFS selector is set to V SPDS, toggles which reference speed (V1, VR or V2) is being selected when changing the reference speed value with the inner SPEED REFS knob.

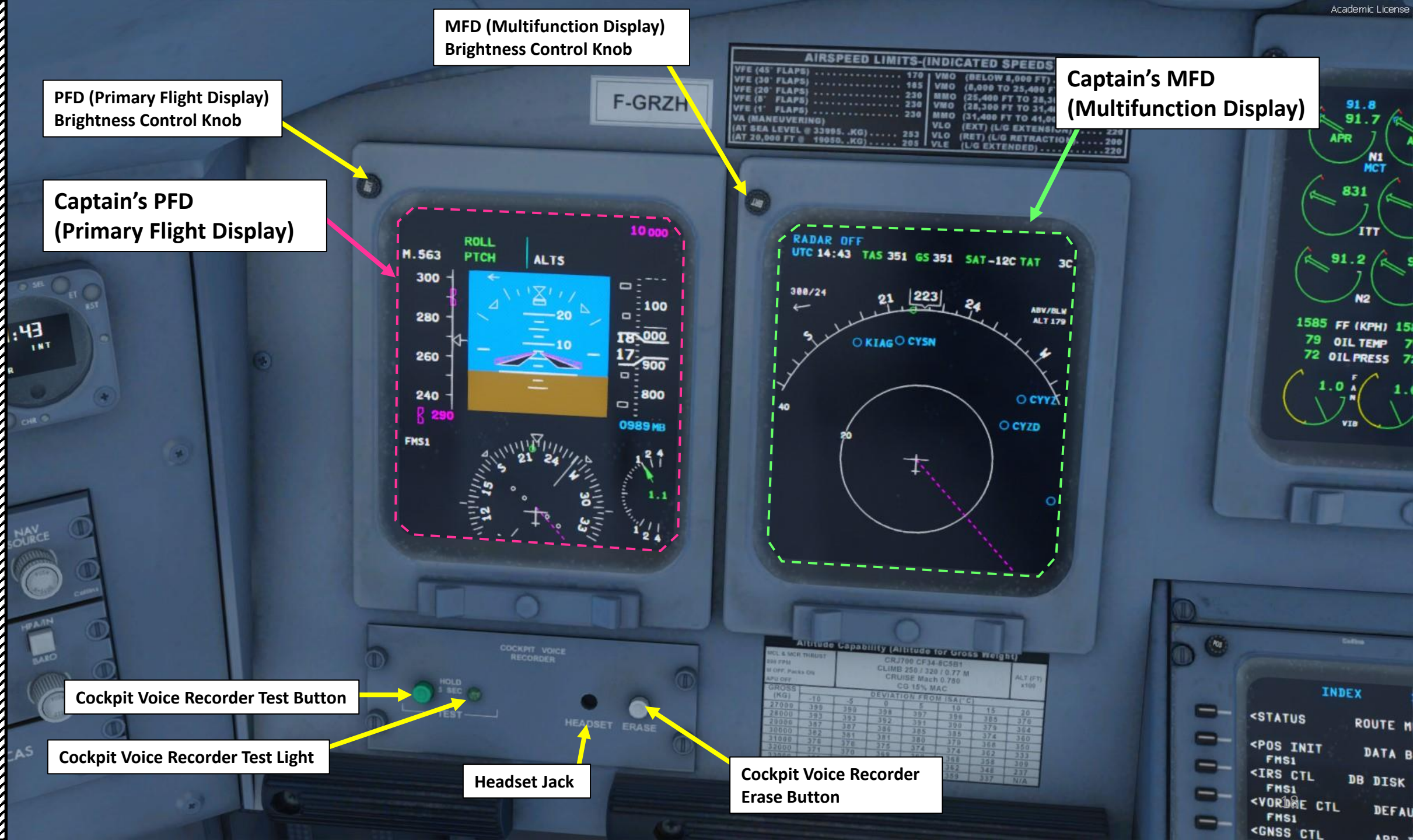
Barometric Pressure HPa/Inches of Hg Selector Switch

Barometric Pressure Setting Knob
- *Turn to set pressure*
- *Push in to set to standard pressure (29.92 in Hg or 1013.25 HPa)*

Target (TGT) / V-Speed Setting Knobs
- *OUTER KNOB: Selects either TGT (VT Target Reference Speed) or V SPDS (V1, VR, V2 reference speeds)*
- *INNER KNOB: Changes selected reference speed (V1, VR, V2 or VT) when turning the knob. Pressing in the inner knob resets the selected speed with a dashed line, but a second press will restore the old V-speed.*

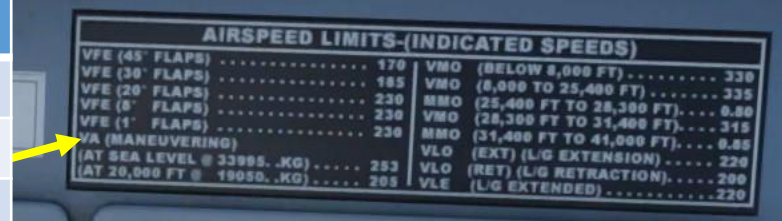
RA (Radar Altimeter) Test Switch

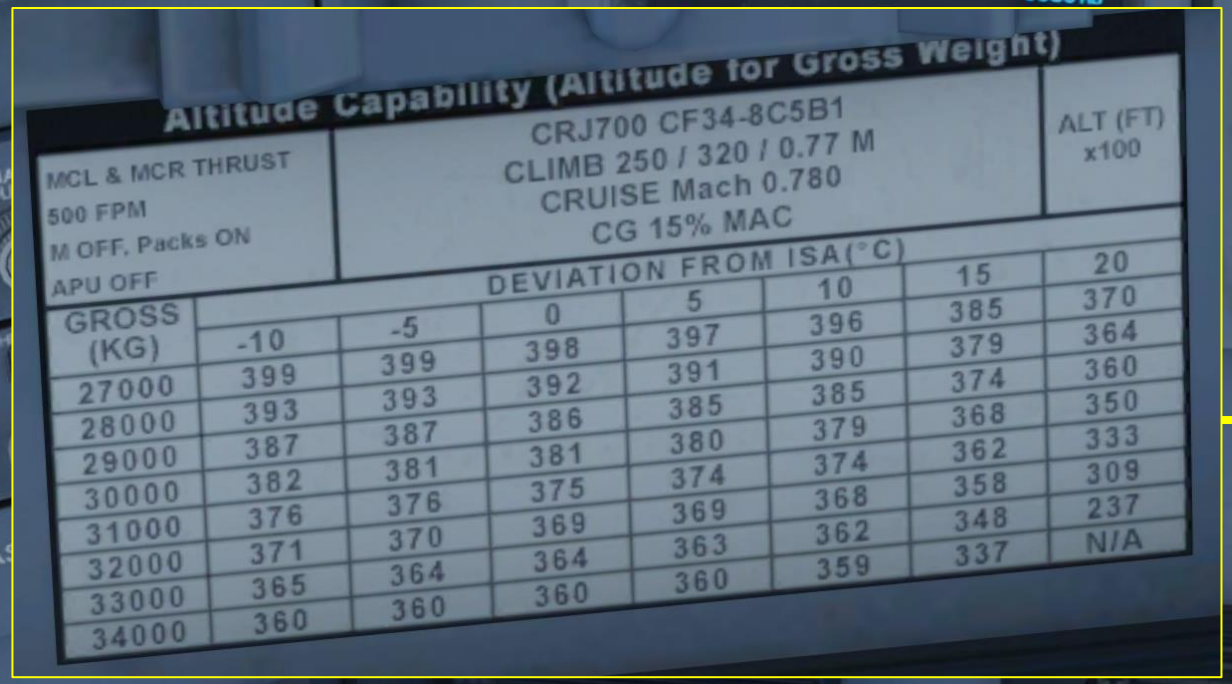
MFD (Multifunction Display) Mode Selector / Display Reversionary Panel
- *PFD1: Sets Primary Flight Display 1 on MFD*
- *NORM: Sets Navigation Information on MFD*
- *EICAS: Sets EICAS (Engine-Indicating and Crew-Alerting System) Status page on the MFD (then you can choose which EICAS page you want using its panel)*

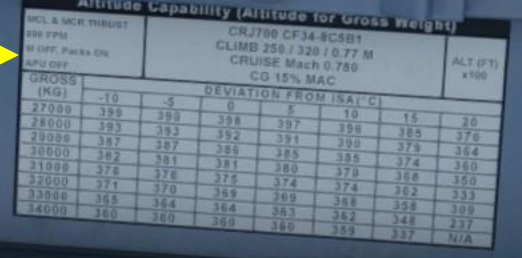

MFD (Multifunction Display)
Brightness Control Knob
PFD (Primary Flight Display)
Brightness Control Knob
Captain's MFD
(Multifunction Display)
Captain's PFD
(Primary Flight Display)
Cockpit Voice Recorder Test Button
Cockpit Voice Recorder Test Light
Headset Jack
Cockpit Voice Recorder
Erase Button
F-GRZH
AIRSPEED LIMITS-(INDICATED SPEEDS
RADAR OFF
UTC 14:43 TAS 351 GS 351 SAT -12C TAT 3C
KIAG CYSN
CYYZ
CYZD
COCKPIT VOICE RECORDER
HOLD 5 SEC TEST
HEADSET
ERASE
INDEX
<STATUS
<POS INIT
FMS1
<IRS CTL
FMS1
<VORDME CTL
FMS1
<GNSS CTL
ROUTE
DATA
DB DISK
DEFAU
Academic License

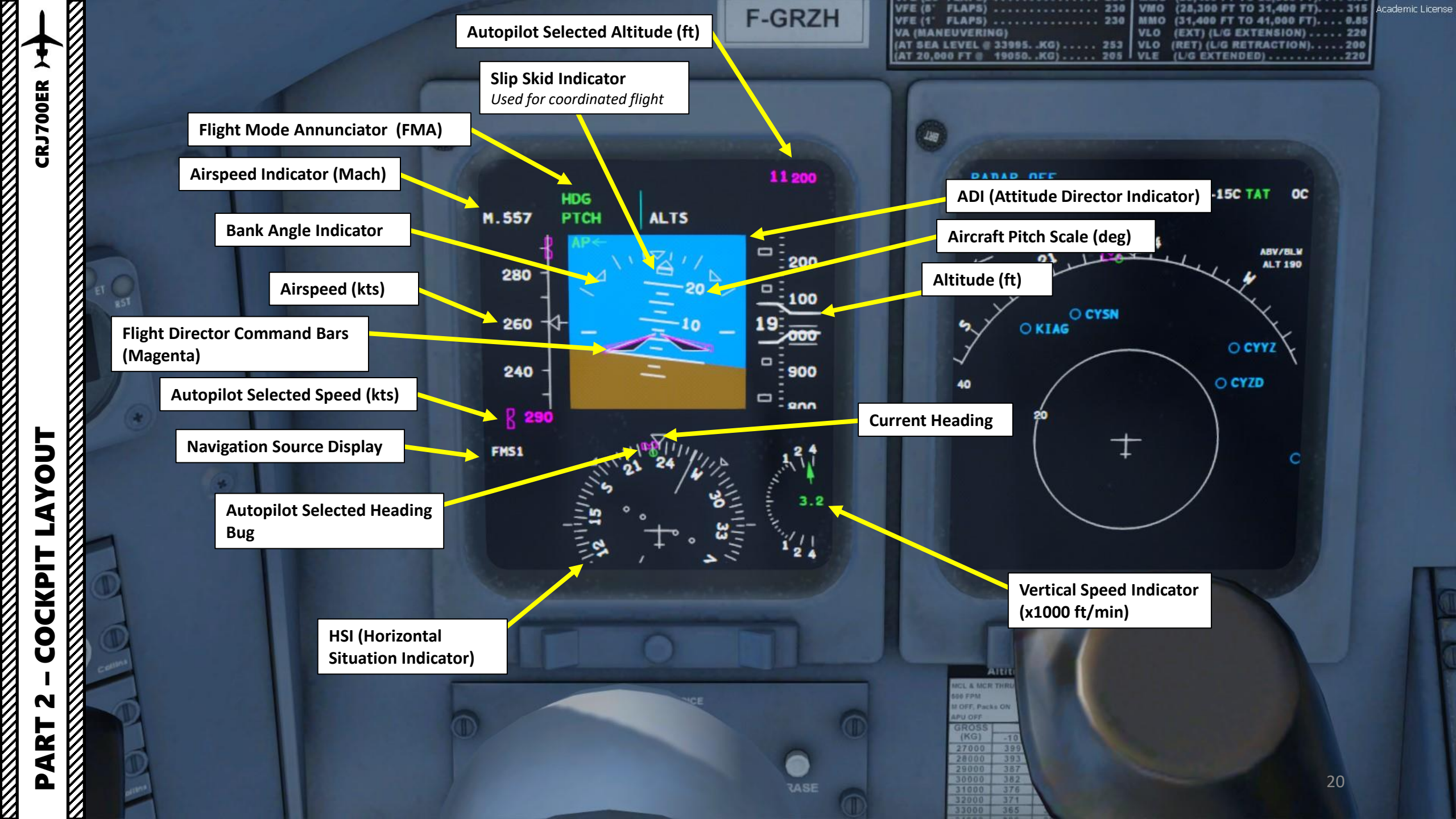
Airspeed Limits (Indicated Speeds)

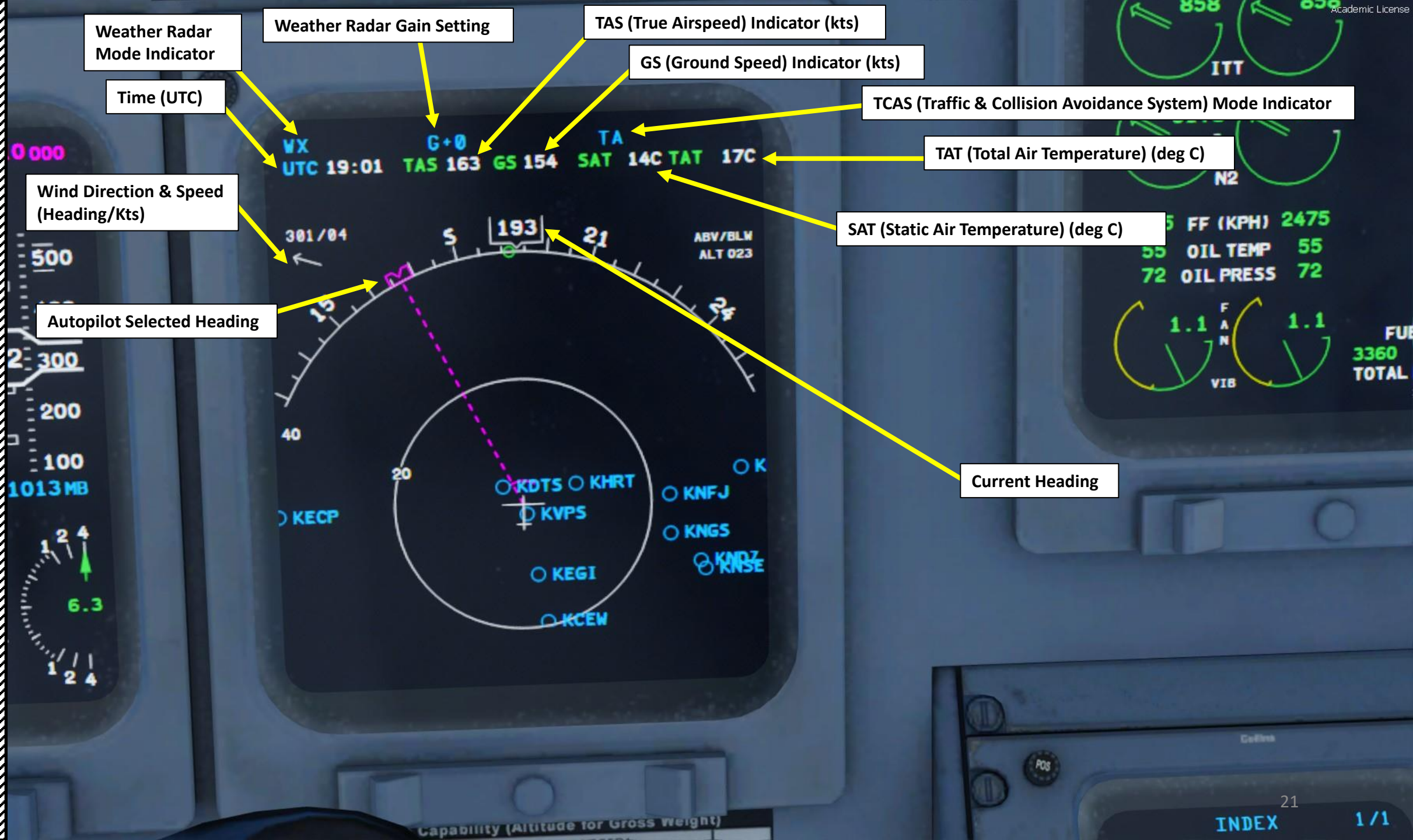
V_{FE} (45 deg FLAPS) – 170 kts	V_{MO} (below 8000 ft) – 330 kts
V_{FE} (30 deg FLAPS) – 185 kts	V_{MO} (8000 to 25400 ft) – 335 kts
V_{FE} (20 deg FLAPS) – 230 kts	M_{MO} (25400 to 28300 ft) – Mach 0.8
V_{FE} (5 deg FLAPS) – 230 kts	V_{MO} (28300 to 31400 ft) – 315 kts
V_{FE} (1 deg FLAPS) – 230 kts	M_{MO} (31400 to 41000 ft) – Mach 0.85
V_A (MANEUVERING) AT SEA LEVEL @ 33995 kg) – 253 kts	V_{LO} (EXT) (L/G EXTENSION) – 220 kts
V_A (MANEUVERING) AT 20000 ft @ 19050 kg) – 205 kts	V_{LO} (RET) (L/G RETRACTION) – 200 kts
	V_{LE} (EXT) (L/G EXTENDED) – 220 kts





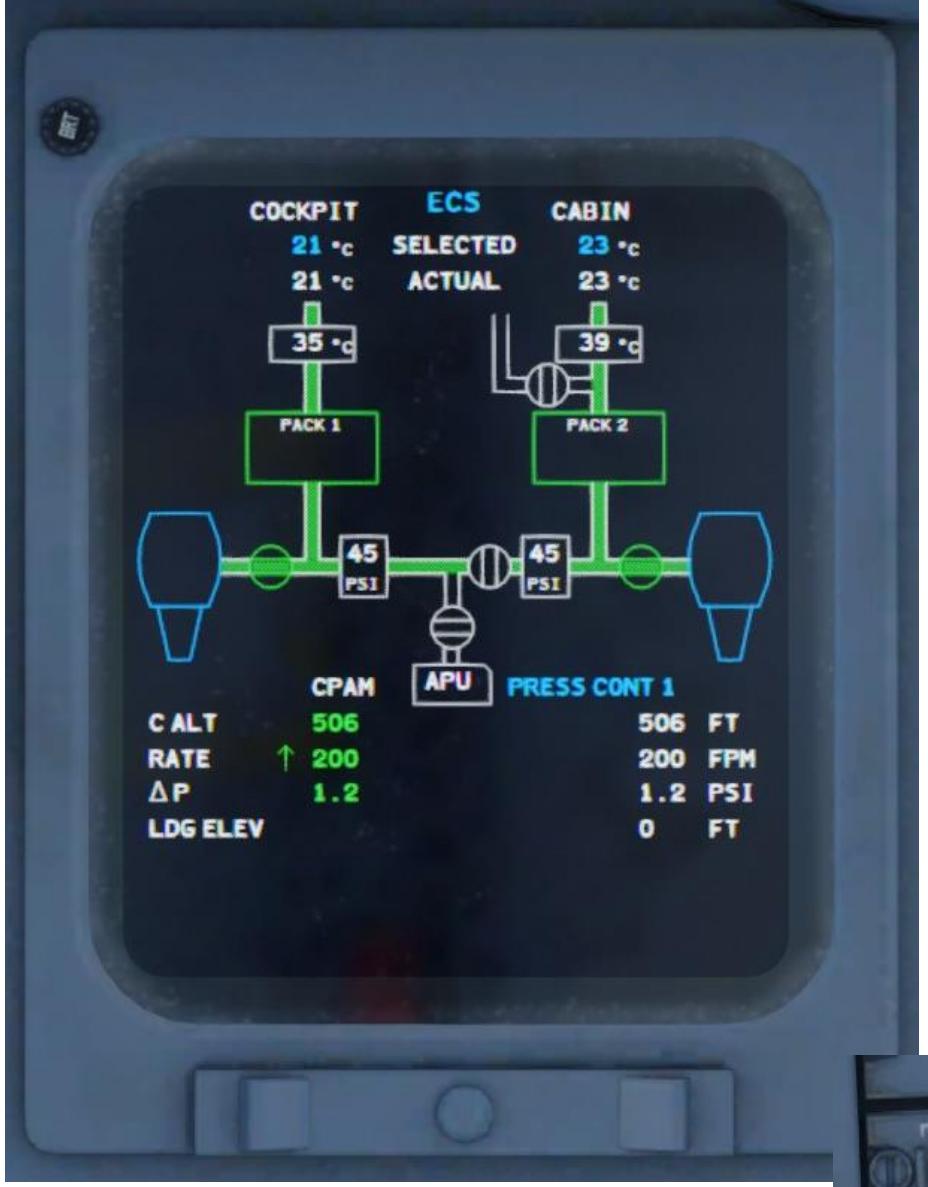



Autopilot Selected Altitude (ft)
Slip Skid Indicator
Used for coordinated flight
Flight Mode Annunciator (FMA)
Airspeed Indicator (Mach)
Bank Angle Indicator
Airspeed (kts)
Flight Director Command Bars (Magenta)
Autopilot Selected Speed (kts)
Navigation Source Display
Autopilot Selected Heading Bug
HSI (Horizontal Situation Indicator)
ADI (Attitude Director Indicator)
Aircraft Pitch Scale (deg)
Altitude (ft)
Current Heading
Vertical Speed Indicator (x1000 ft/min)
F-GRZH
HDG
PTCH
ALTS
M.557
280
260
240
290
FMS1
11200
19000
3.2
KIAG
CYSN
CYYZ
CYZD

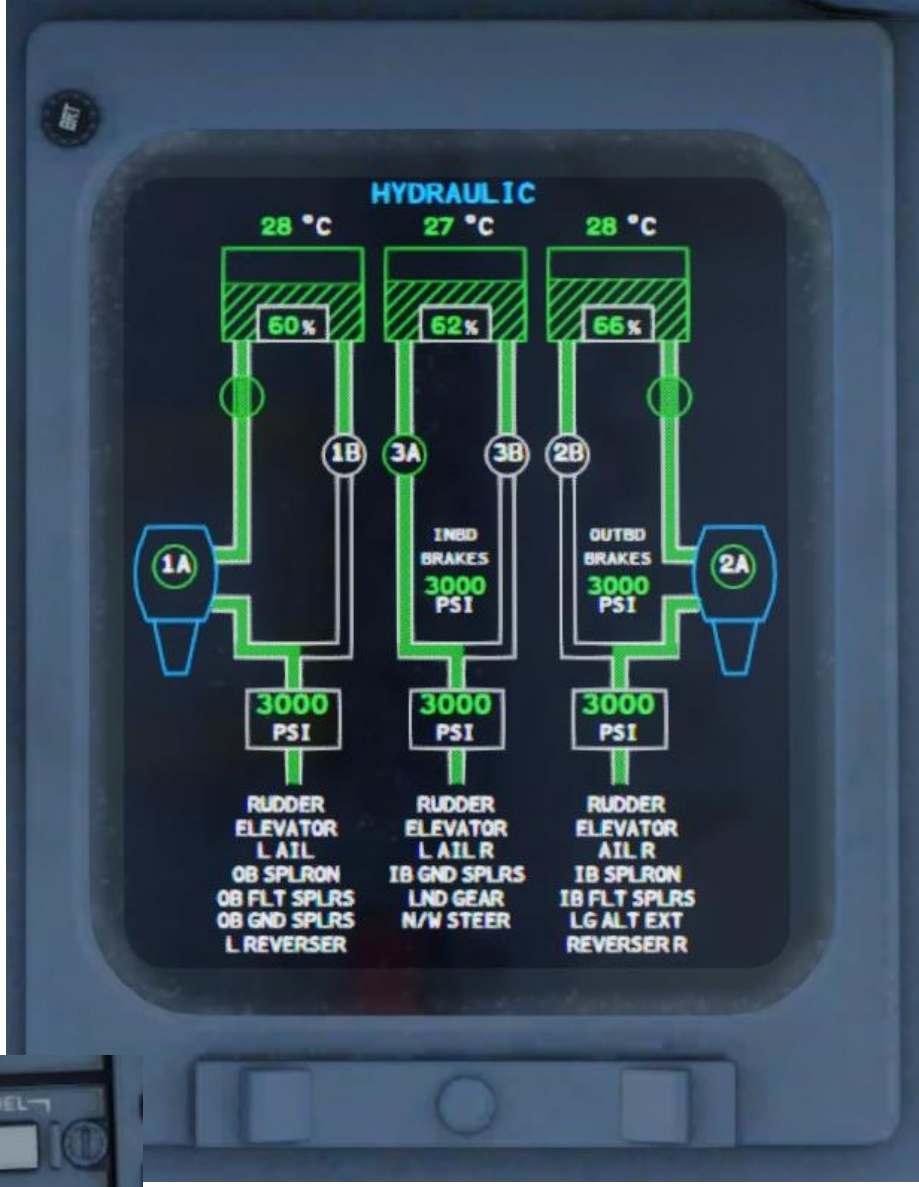

Weather Radar Mode Indicator
Weather Radar Gain Setting
TAS (True Airspeed) Indicator (kts)
GS (Ground Speed) Indicator (kts)
Time (UTC)
TCAS (Traffic & Collision Avoidance System) Mode Indicator
TAT (Total Air Temperature) (deg C)
Wind Direction & Speed (Heading/Kts)
SAT (Static Air Temperature) (deg C)
Autopilot Selected Heading
Current Heading
WX G+0 TA
UTC 19:01 TAS 163 GS 154 SAT 14C TAT 17C
301/04
193
ABV/BLW ALT 023
KDTS KHRT
KVPS
KECP
KNFJ
KNGS
KEGI
KCEW
1013 MB
ITT
N2
FF (KPH) 2475
OIL TEMP 55
OIL PRESS 72
INDEX 1/1

Primary EICAS (Engine-Indicating & Crew Alerting System) Page

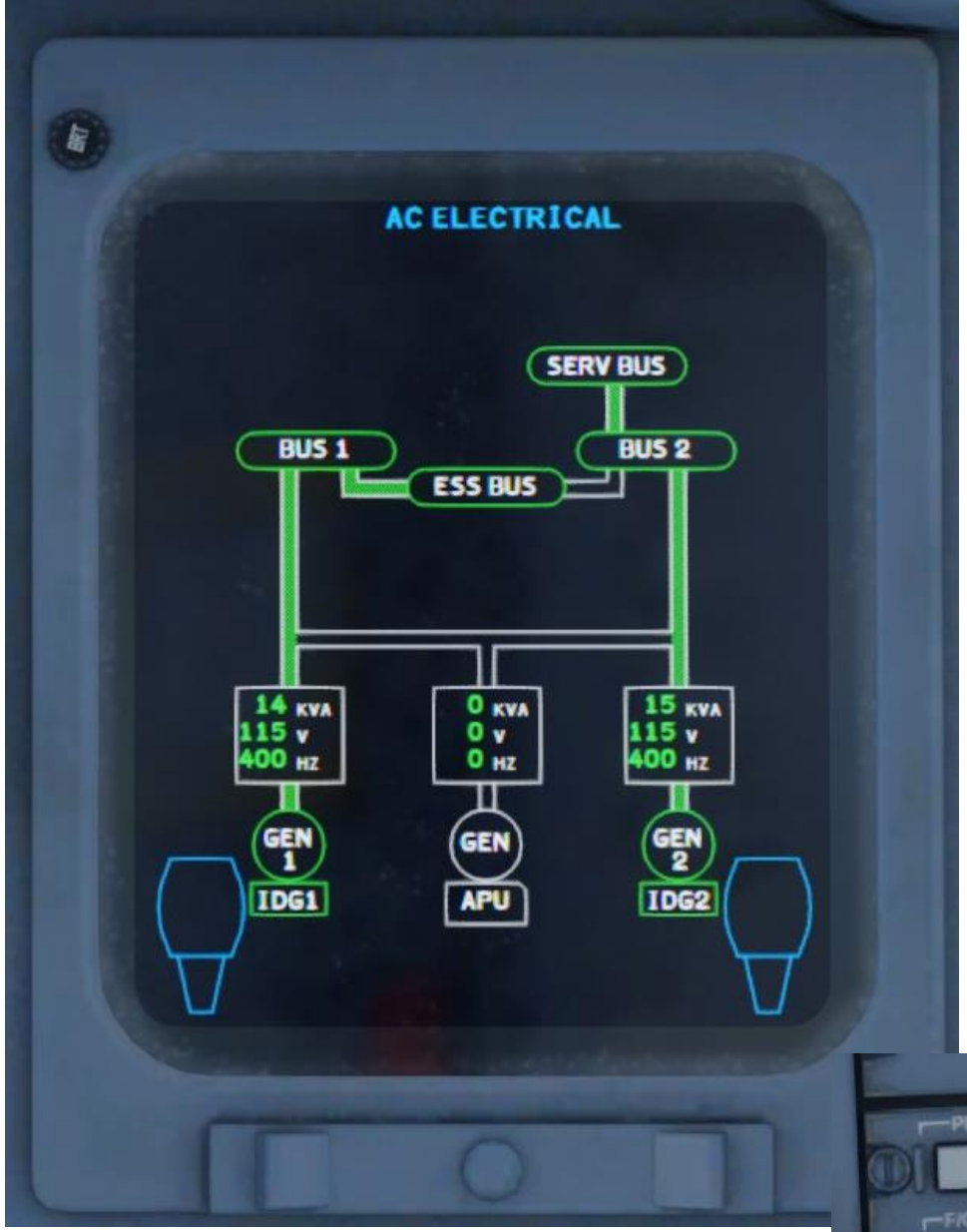
Status Page



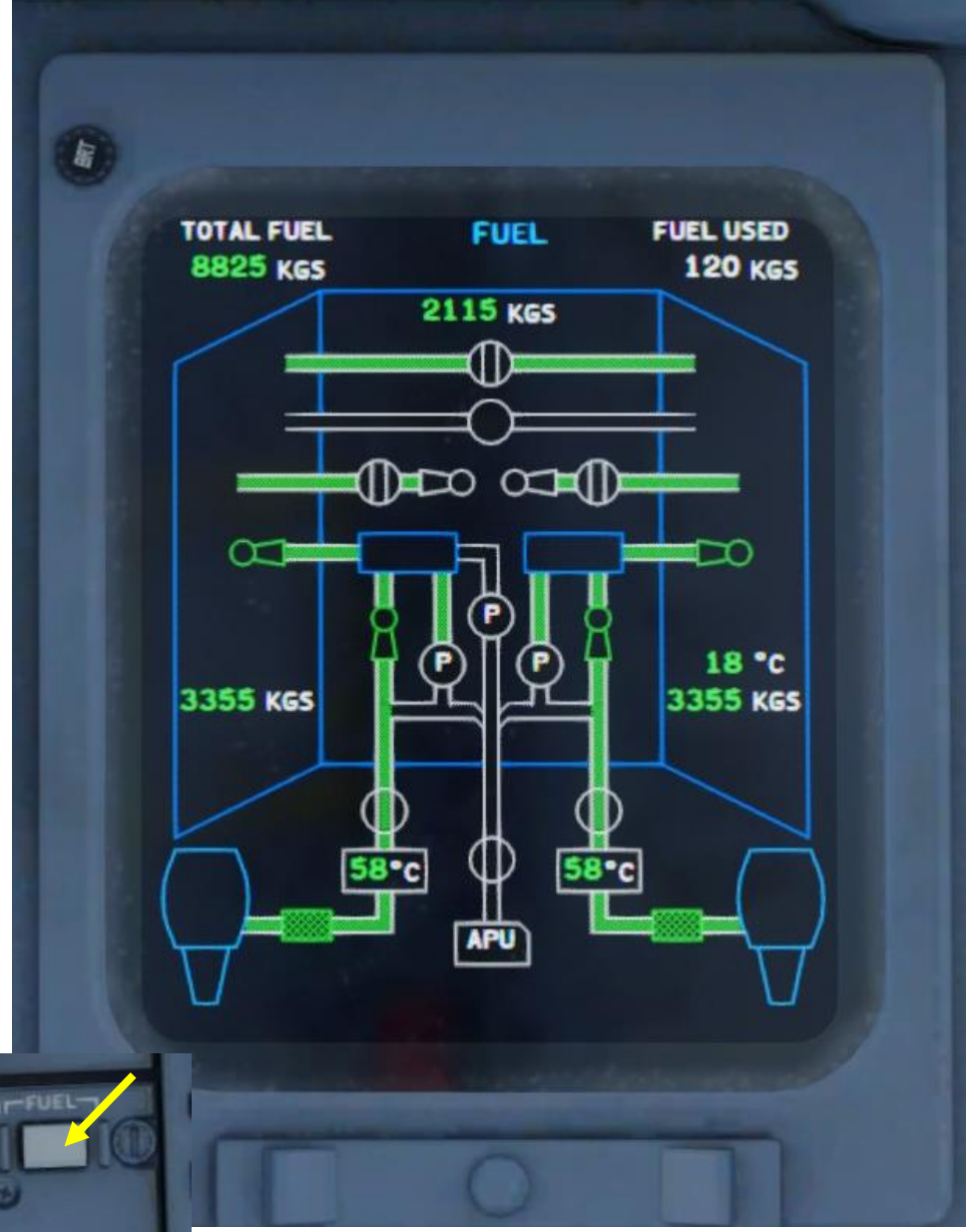
ECS (Environmental Control System) Page



Hydraulic Systems Page

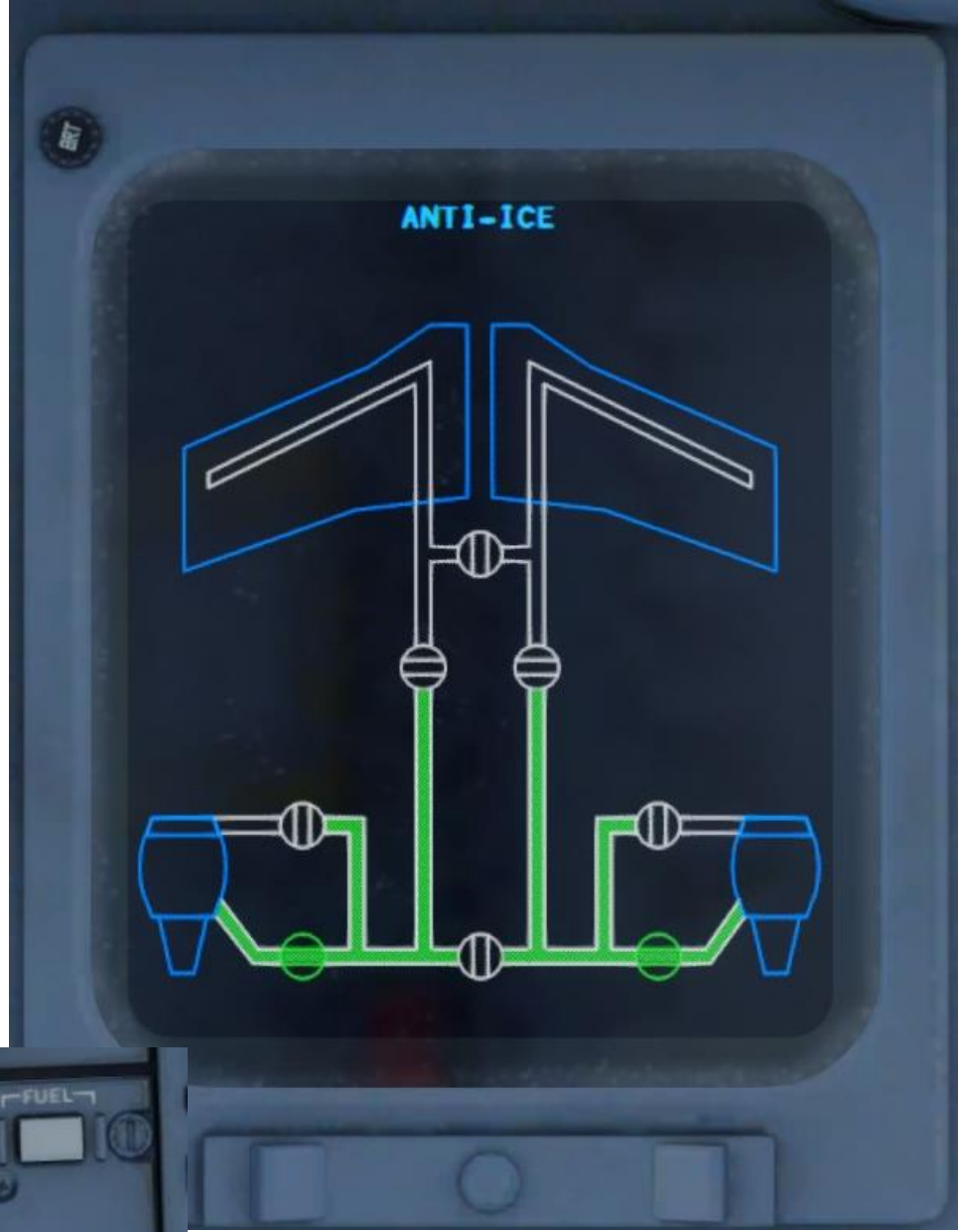


Electrical Systems Page

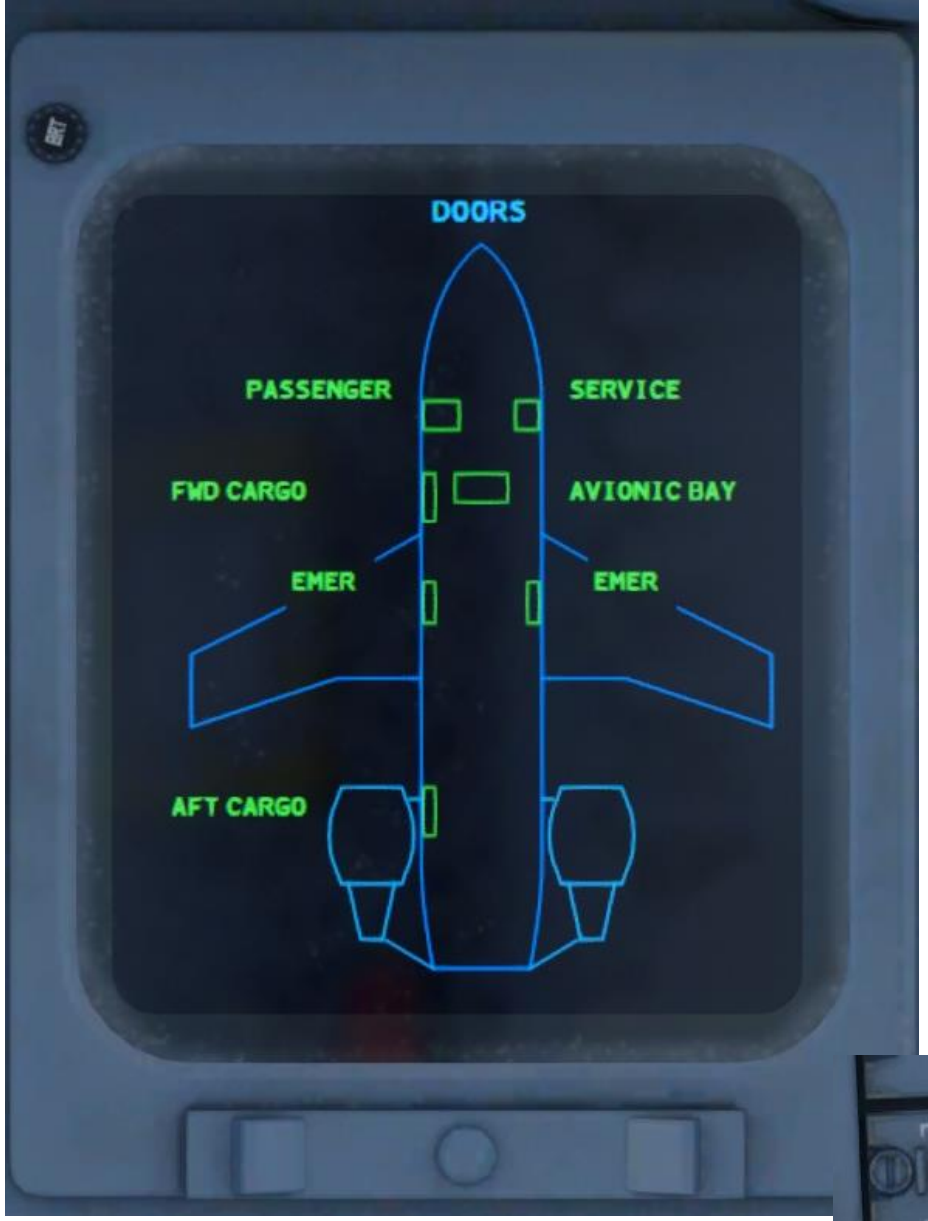


Fuel Systems Page

Flight Controls Systems Page

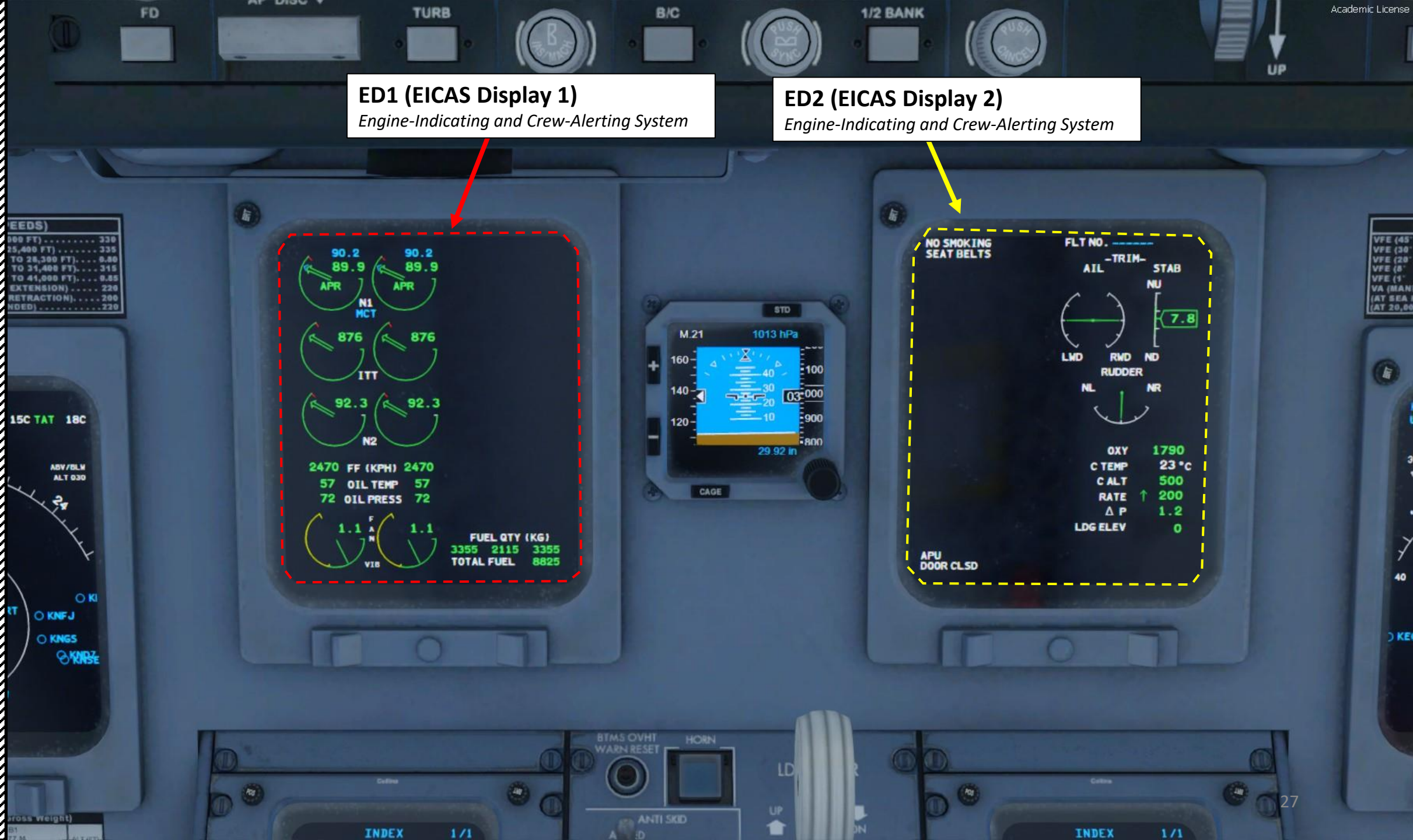


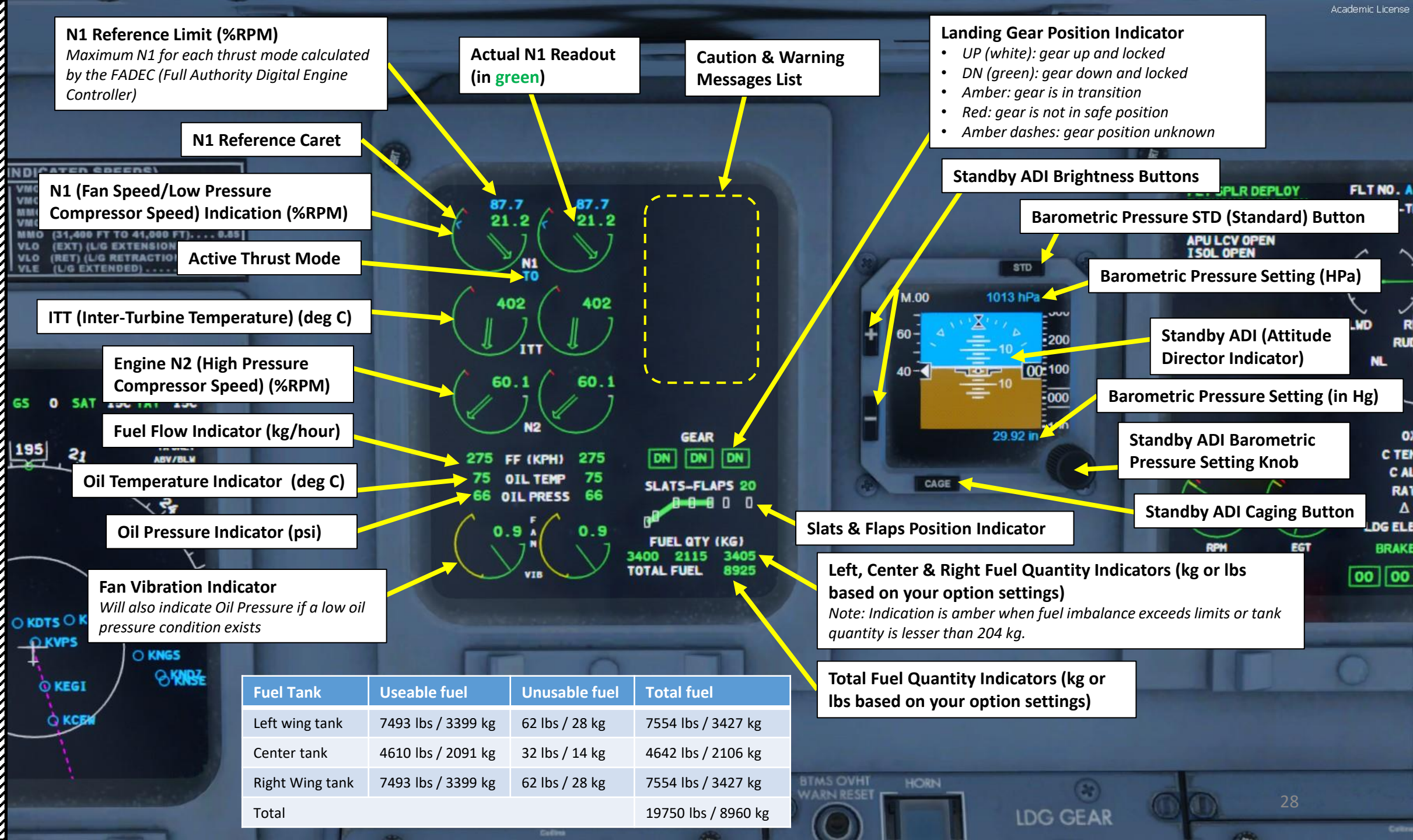
Anti-Ice Systems Page



Door Systems Page

Main Menu Page


ED1 (EICAS Display 1)
Engine-Indicating and Crew-Alerting System
ED2 (EICAS Display 2)
Engine-Indicating and Crew-Alerting System
90.2
89.9
APR
N1
MCT
876
ITT
92.3
N2
2470 FF (KPH) 2470
57 OIL TEMP 57
72 OIL PRESS 72
1.1
VIB
FUEL QTY (KG)
3355 2115 3355
TOTAL FUEL 8825
M.21
1013 hPa
29.92 in
CAGE
NO SMOKING
SEAT BELTS
FLT NO.
-TRIM-
AIL
STAB
NU
7.8
LWD
RWD
ND
RUDDER
NL
NR
OXY 1790
C TEMP 23 °C
C ALT 500
RATE 200
Δ P 1.2
LDG ELEV 0
APU
DOOR CLSD
FD
TURB
B/C
1/2 BANK
UP
BTMS OVHT
WARN RESET
HORN
ANTI SKID
INDEX 1/1
INDEX 1/1



N1 Reference Limit (%RPM)
Maximum N1 for each thrust mode calculated by the FADEC (Full Authority Digital Engine Controller)

Actual N1 Readout (in green)

Caution & Warning Messages List

Landing Gear Position Indicator
- *UP (white): gear up and locked*
- *DN (green): gear down and locked*
- *Amber: gear is in transition*
- *Red: gear is not in safe position*
- *Amber dashes: gear position unknown*

N1 Reference Caret

N1 (Fan Speed/Low Pressure Compressor Speed) Indication (%RPM)

Active Thrust Mode

Standby ADI Brightness Buttons

Barometric Pressure STD (Standard) Button

ITT (Inter-Turbine Temperature) (deg C)

Barometric Pressure Setting (HPa)

Engine N2 (High Pressure Compressor Speed) (%RPM)

Standby ADI (Attitude Director Indicator)

Barometric Pressure Setting (in Hg)

Fuel Flow Indicator (kg/hour)

Standby ADI Barometric Pressure Setting Knob

Oil Temperature Indicator (deg C)

Standby ADI Caging Button

Oil Pressure Indicator (psi)

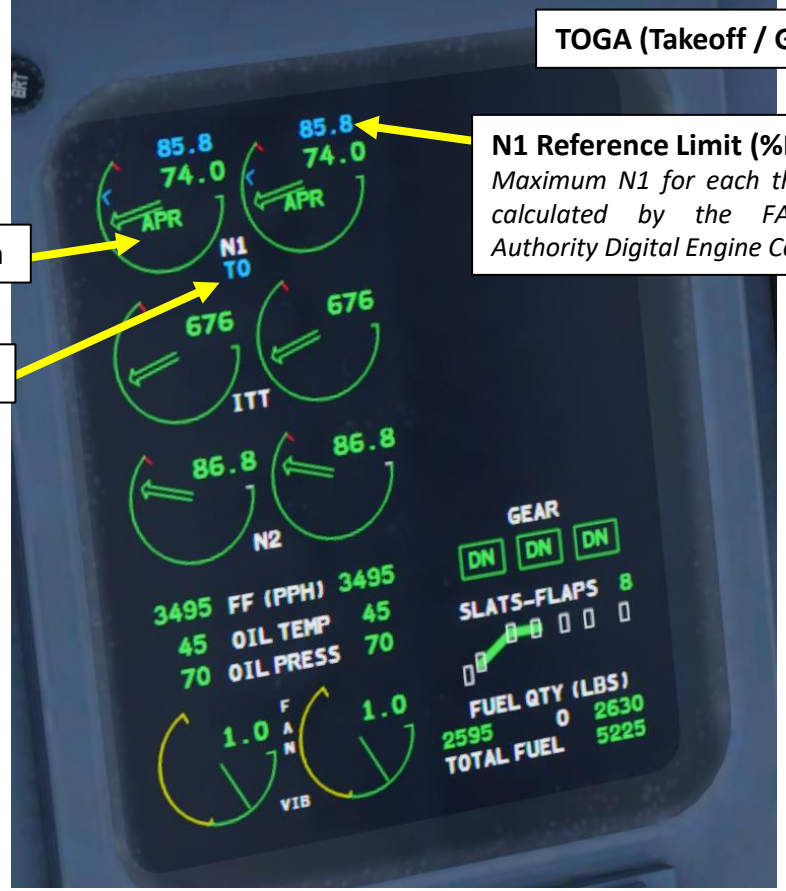
Slats & Flaps Position Indicator

Fan Vibration Indicator
Will also indicate Oil Pressure if a low oil pressure condition exists

Left, Center & Right Fuel Quantity Indicators (kg or lbs based on your option settings)
Note: Indication is amber when fuel imbalance exceeds limits or tank quantity is lesser than 204 kg.

Total Fuel Quantity Indicators (kg or lbs based on your option settings)

Fuel Tank	Useable fuel	Unusable fuel	Total fuel
Left wing tank	7493 lbs / 3399 kg	62 lbs / 28 kg	7554 lbs / 3427 kg
Center tank	4610 lbs / 2091 kg	32 lbs / 14 kg	4642 lbs / 2106 kg
Right Wing tank	7493 lbs / 3399 kg	62 lbs / 28 kg	7554 lbs / 3427 kg
Total			19750 lbs / 8960 kg

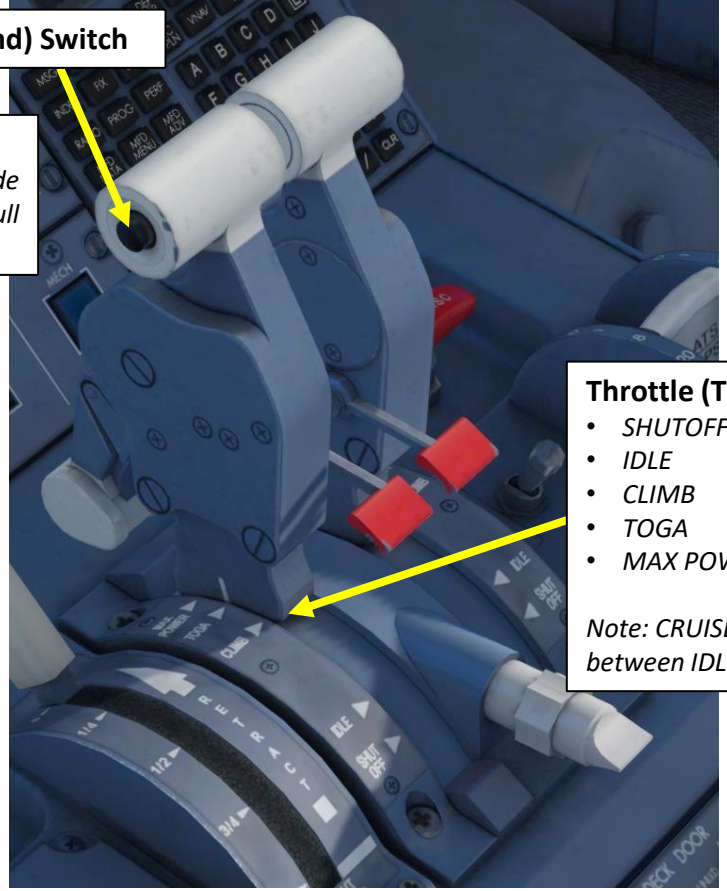


APR Indication

Active Thrust Mode

N1 Reference Limit (%RPM)
Maximum N1 for each thrust mode calculated by the FADEC (Full Authority Digital Engine Controller)

TOGA (Takeoff / Go Around) Switch

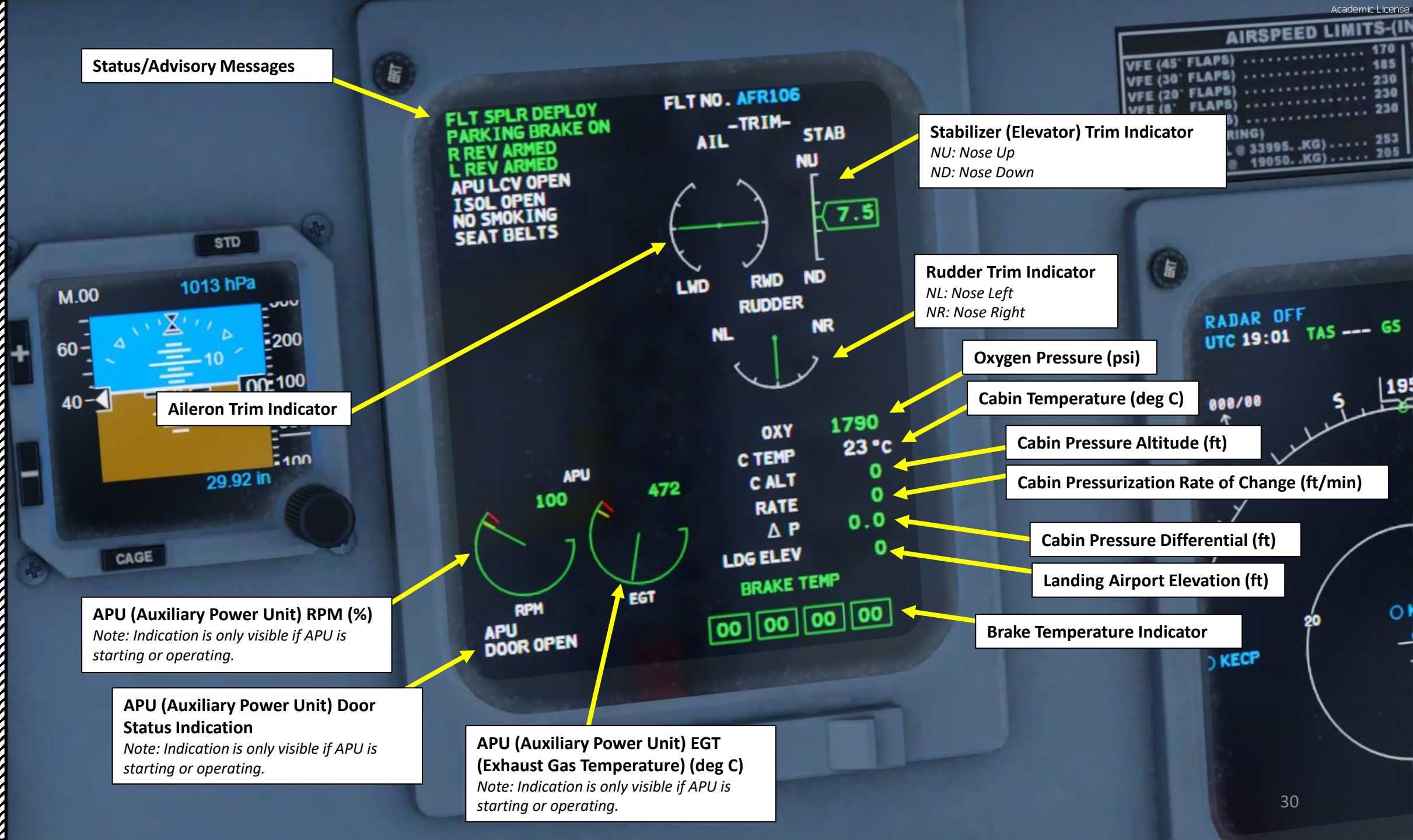


Throttle (Thrust Lever) Detents
- *SHUTOFF*
- *IDLE*
- *CLIMB*
- *TOGA*
- *MAX POWER*

Note: CRUISE RANGE is the throttle angle between IDLE and CLIMB detents.

Thrust Mode Annunciation
- ***CRZ**: Cruise. Thrust levers are in the CRUISE range (between the IDLE and CLIMB detents since there is no CRZ detent on throttle).*
- ***CLB**: Climb. Thrust levers are in the CLIMB detent.*
- ***TO**: Takeoff. Ground operations when TOGA switch has been selected or thrust levers are in the TOGA detent for takeoff.*
- ***GA**: Go-Around. Thrust levers are in the TOGA detent for in flight go around.*
- ***MCT**: Max Continuous Thrust. Thrust levers are in the CLIMB detent and OEI (One Engine Inoperative) condition is active or high power has been selected.*
- ***FLX**: Flex Takeoff power programmed.*
- ***APR**: Automatic Power Reserve. Displayed when APR system is activated by an engine failure, or when a thrust lever is set to the MAX POWER detent.*

The automatic power reserve (APR) system (which is a feature of the FADEC) monitors for engine failures and/or power loss during takeoff and climb. The APR feature is armed during takeoff when the N1 rpm of both engines are within 8% of the take off N1 reference value. On the approach, the APR system is armed for the go--around with either engine available and flaps greater than 20 - or landing gear down. A failure is detected when an engine N1 speed decreases below 15% of the set power. If the detected failure was due to an N1 mismatch, the failure signal is cleared when the N1 mismatch becomes less than 13%. When an engine fails, the APR will automatically increase the thrust on the good engine to maximum continuous thrust (MCT). The amount of the increased thrust depends on the position of the thrust levers at the time of the engine failure.



Status/Advisory Messages

Stabilizer (Elevator) Trim Indicator
NU: Nose Up
ND: Nose Down

Rudder Trim Indicator
NL: Nose Left
NR: Nose Right

Aileron Trim Indicator

Oxygen Pressure (psi)

Cabin Temperature (deg C)

Cabin Pressure Altitude (ft)

Cabin Pressurization Rate of Change (ft/min)

Cabin Pressure Differential (ft)

Landing Airport Elevation (ft)

Brake Temperature Indicator

APU (Auxiliary Power Unit) RPM (%)
Note: Indication is only visible if APU is starting or operating.

APU (Auxiliary Power Unit) Door Status Indication
Note: Indication is only visible if APU is starting or operating.

APU (Auxiliary Power Unit) EGT (Exhaust Gas Temperature) (deg C)
Note: Indication is only visible if APU is starting or operating.


First Officer's MFD
(Multifunction Display)
First Officer's PFD
(Primary Flight Display)
AIRSPEED LIMITS-(INDICATED SPEEDS)
F-GRZH
R REV ARMED
L REV ARMED
NO SMOKING
SEAT BELTS
FLT NO. ------
-TRIM-
AIL
STAB
NU
3.7
LWD
RWD
ND
RUDDER
NL
NR
OXY 1790
C TEMP 23 °C
C ALT 800
RATE 100
Δ P 6.9
LDG ELEV 0
APU
DOOR CLSD
RADAR OFF
UTC 14:43 TAS 351 GS 351 SAT -12C TAT 3C
KIAG
CYSN
CYYZ
CYZD
ROLL
PTCH
ALTS
M.563
FD1
FMS2
14:43
INT
CHR
NORM
PFD 2
INDEX 1/1
ROUTE MENU>


Academic License
MASTER CAUTION
MASTER WARNING
MAIN MENU
Checklists
Payload & Fuel
V-Speeds
Options
Ground Services / Maintenar
Doors
Aircraft State
14:43
INT
CHR
LIGHTING
DSPL
INTEG
FLOOR
FLOOD
ON
OFF
WIPER
PARK
INT
SLOW
FAST
STALL PTCT
PUSHER
CREW LIFE VEST UNDER SEAT
BRG
FORMAT
RANGE
NAV SOURCE
TFC
NORM
EICAS
FD 2
SKYCAM


Circuit Breaker Panel
DC BUS 2
DC UTILITY
DC SERVICE
BATTERY BUS
AC BUS 2
AC SERVICE
FUEL QTY

Radio Transmitter Switch
I/C: Intercom
OFF
P/T: Push to Talk

Stabilizer Trim (Nose Up / Nose Down)

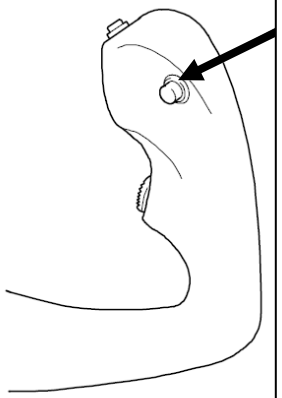
Autopilot Disconnect Button

Control Wheel / Yoke

Checklist

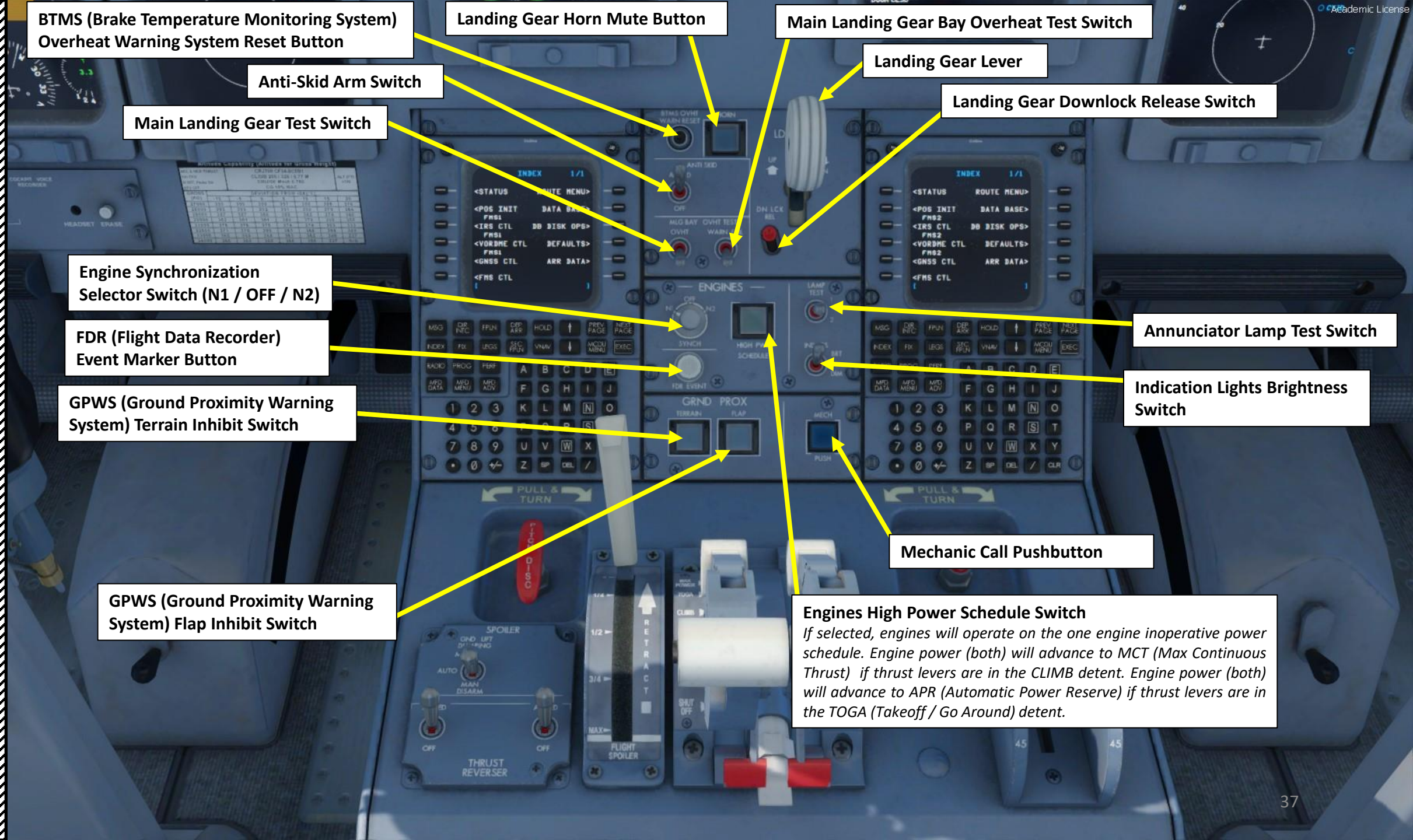
Control Column

Microphone



Control Wheel
Rear View

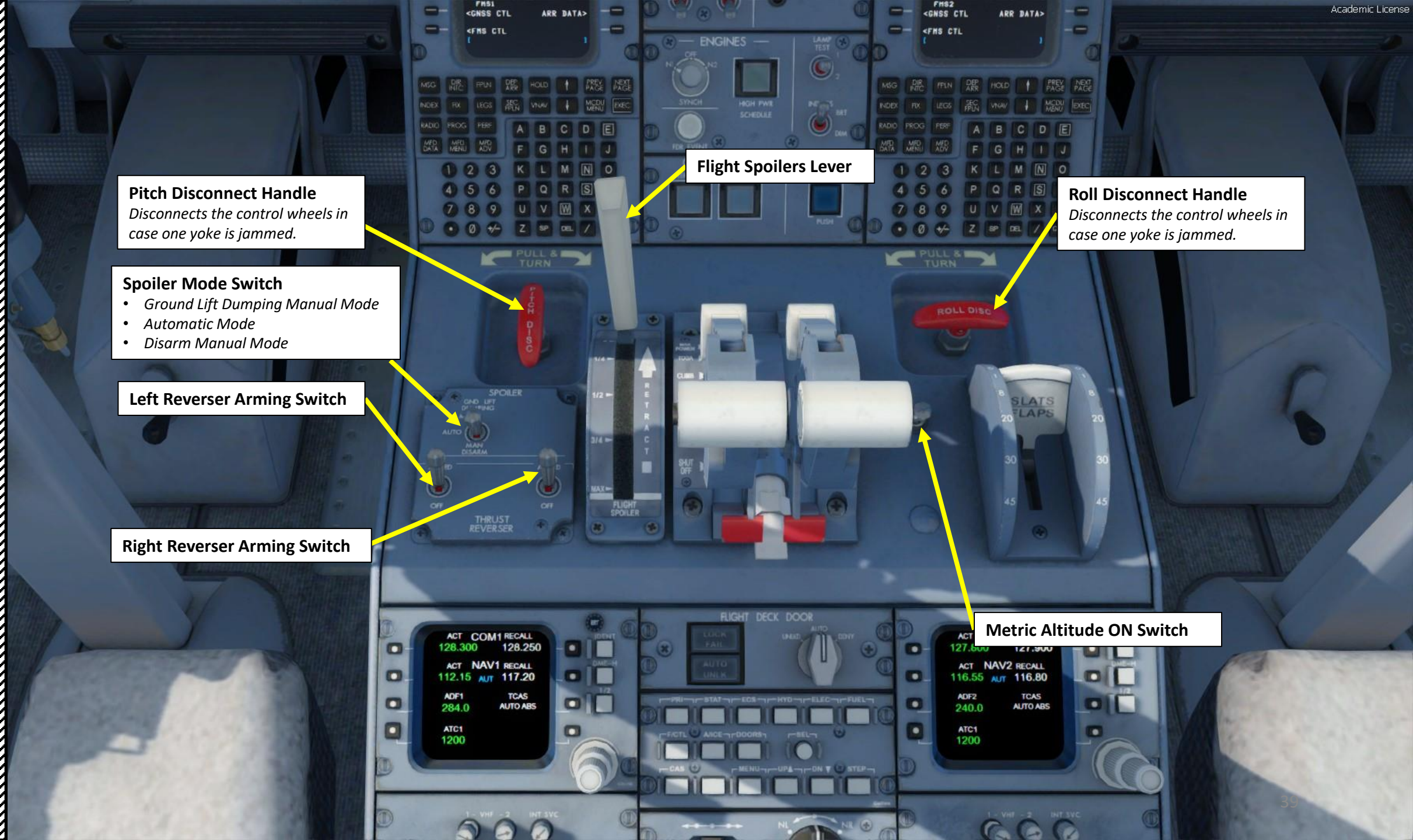
Flight Director (FD) Synchronization Switch
The FD SYNC switch is used when autopilot is not coupled, to synchronize vertical and lateral references to those currently flown. Example: If you are hand flying at 2000 FPM but the FD is set to 1000 FPM, you're going to be flying above the FD, by pressing the Sync button it will replace the 1000 FPM with 2000 FPM. This will also show a yellow SYNC on your PFD.

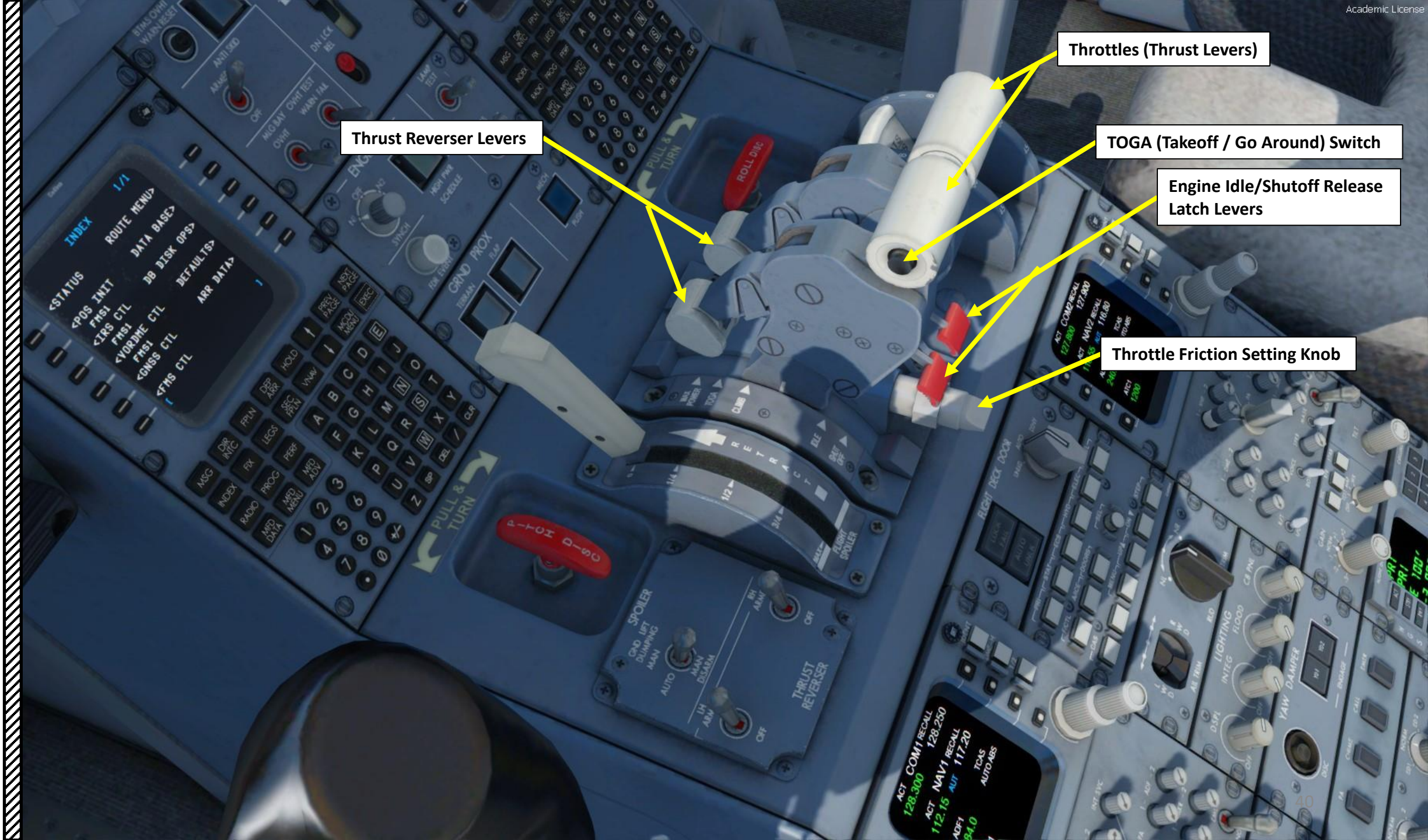


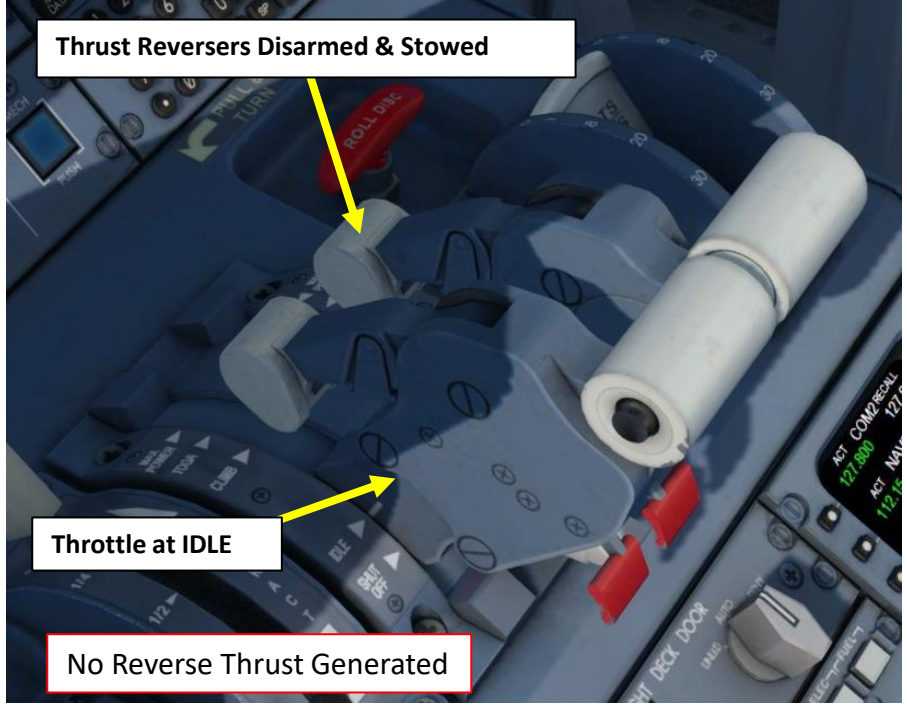
FMS (Flight Management System) CDU 1 (Control Display Unit)

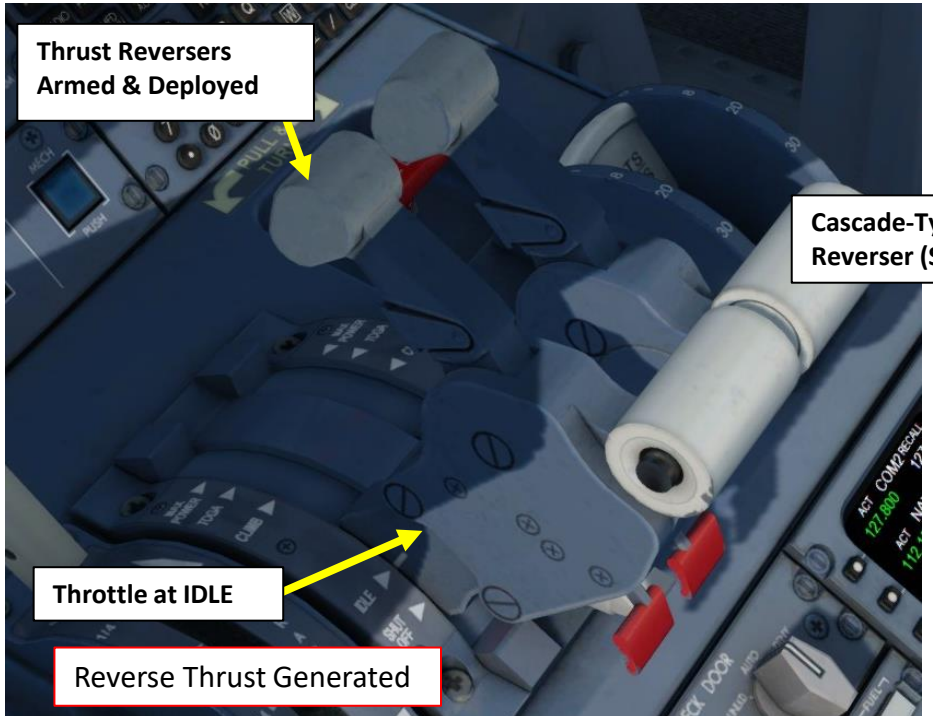
- A **FMS** is a specialized computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew to the point that modern civilian aircraft no longer carry flight engineers or navigators. A primary function is in-flight management of the flight plan.
- The FMS is controlled through the **CDU** physical interface.
- The FMS sends the flight plan for display to the Electronic Flight Instrument System (**EFIS**), Navigation Display (**ND**), or Multifunction Display (**MFD**).

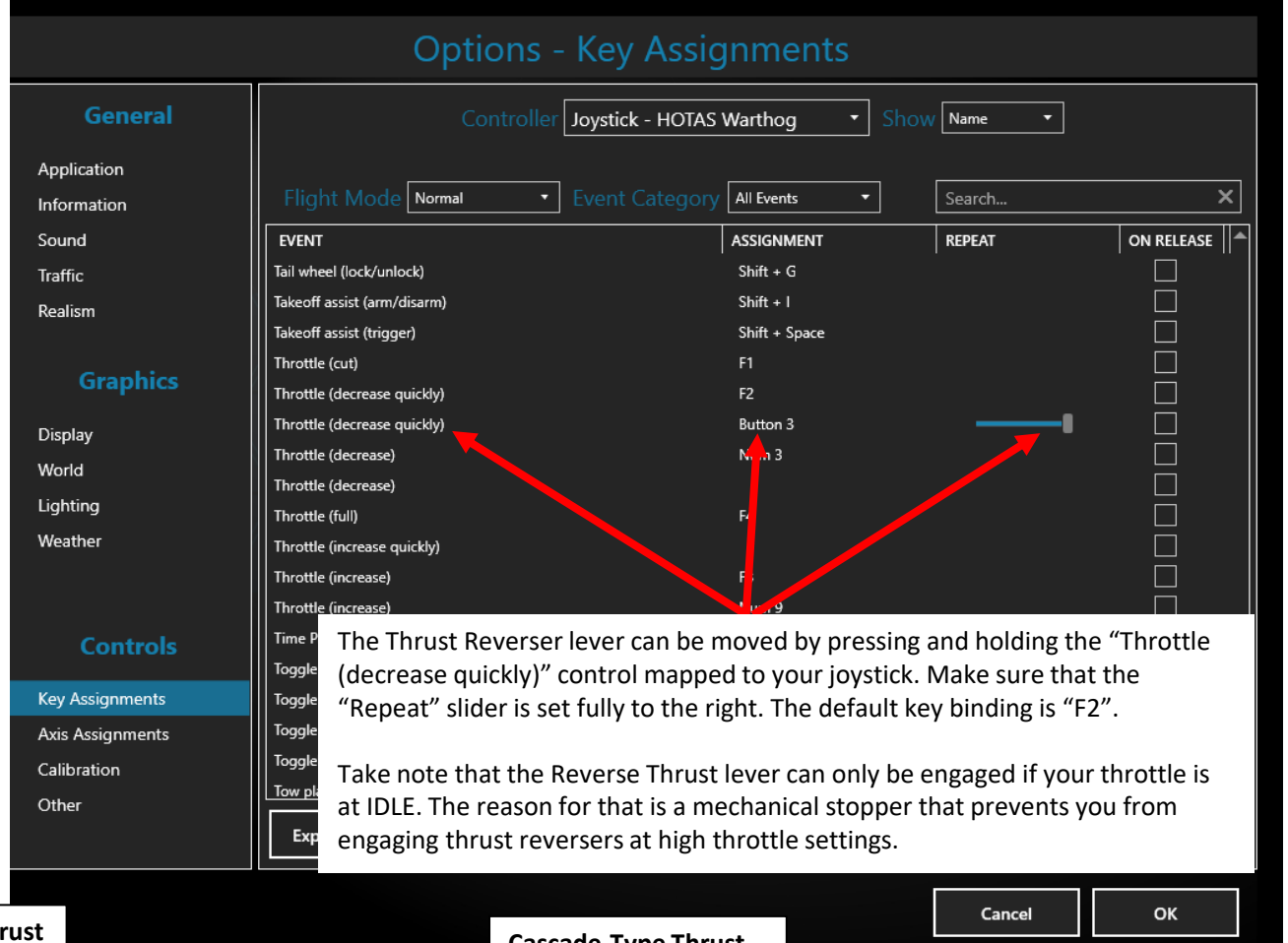
FMS (Flight Management System) CDU 2 (Control Display Unit)





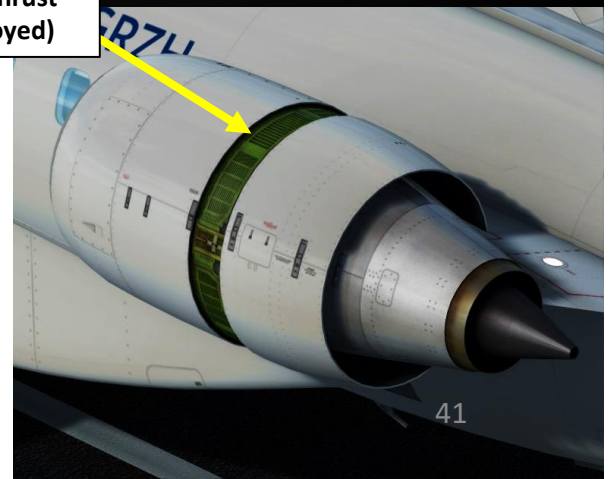


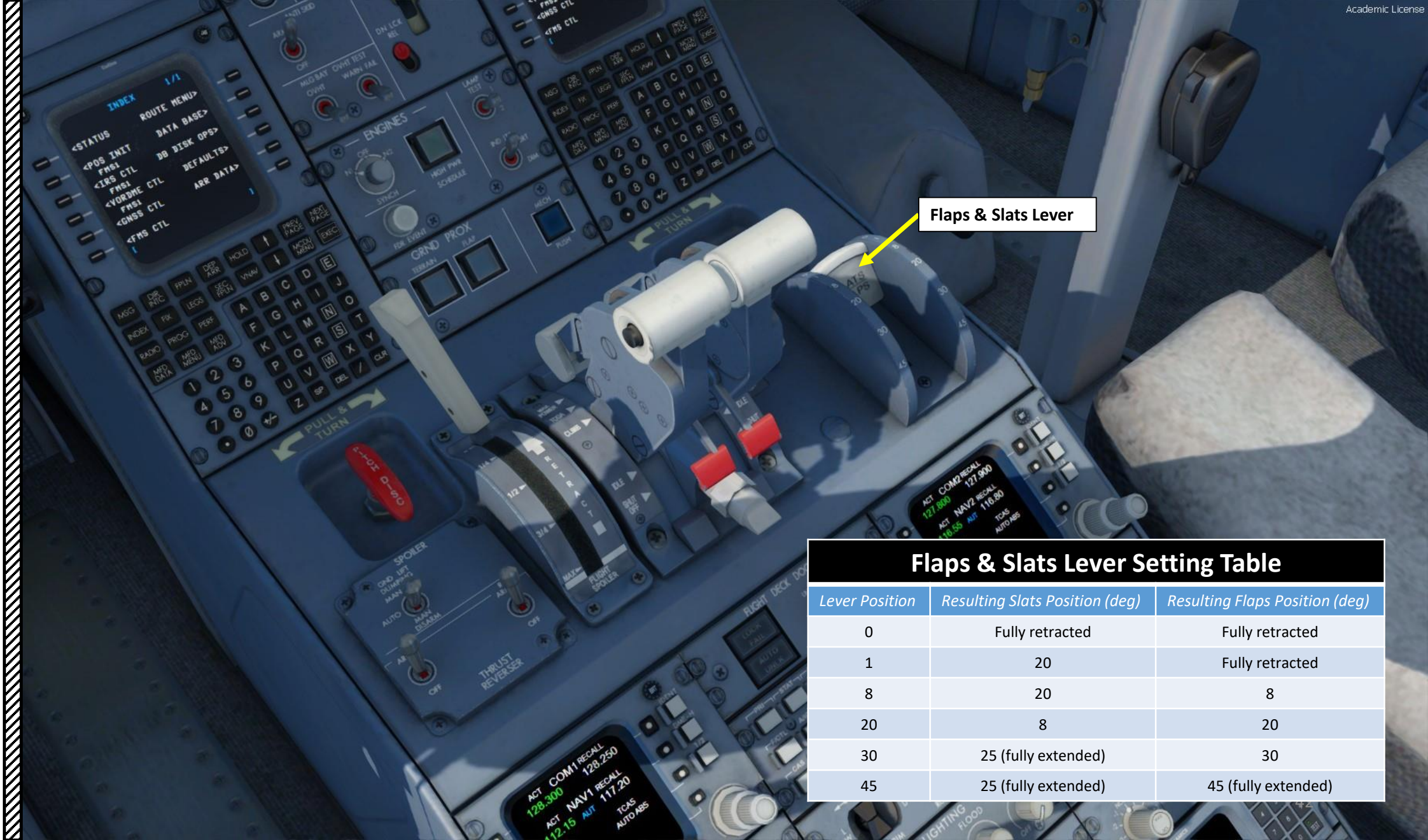




The Thrust Reverser lever can be moved by pressing and holding the “Throttle (decrease quickly)” control mapped to your joystick. Make sure that the “Repeat” slider is set fully to the right. The default key binding is “F2”.

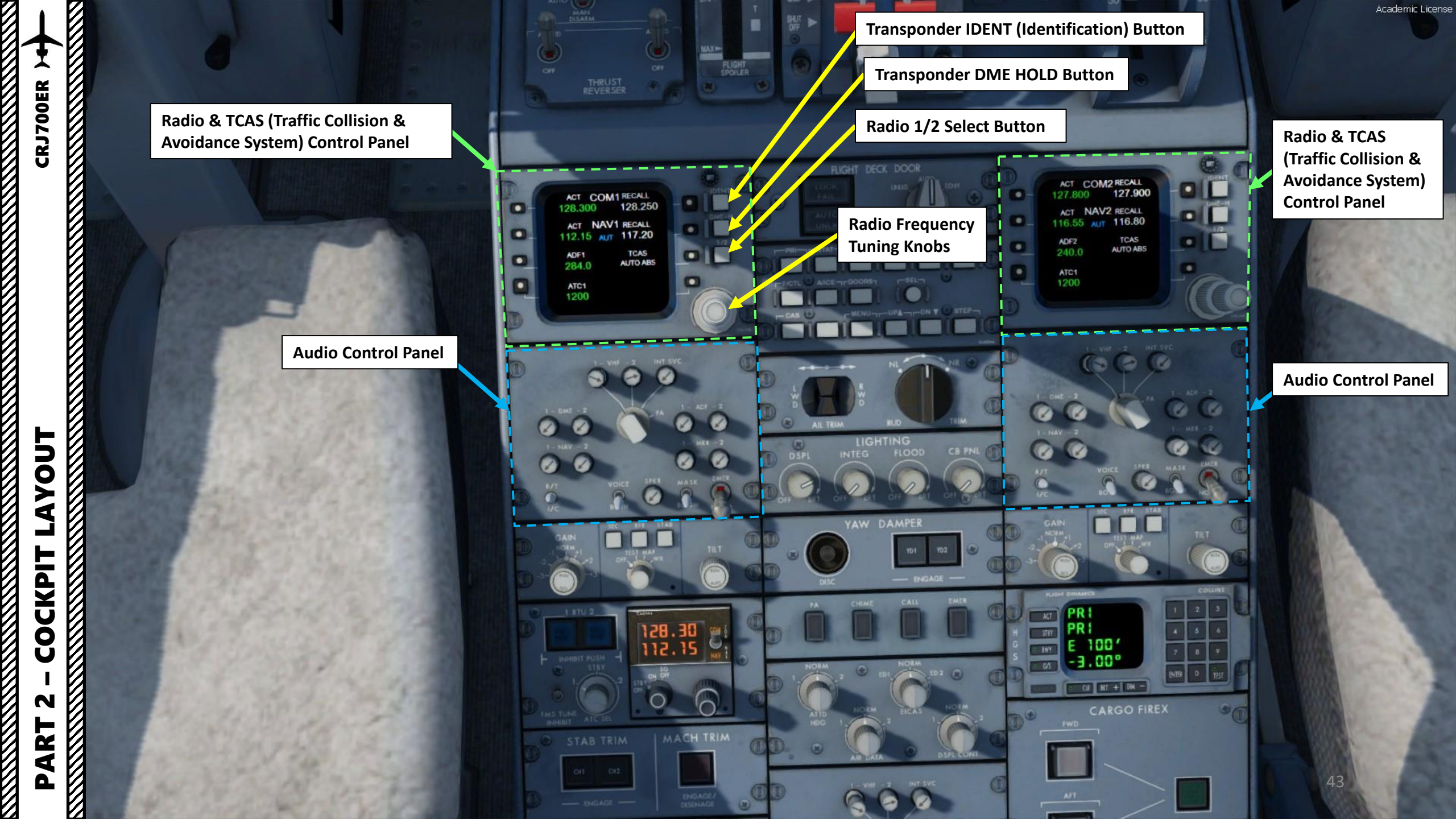
Take note that the Reverse Thrust lever can only be engaged if your throttle is at IDLE. The reason for that is a mechanical stopper that prevents you from engaging thrust reversers at high throttle settings.

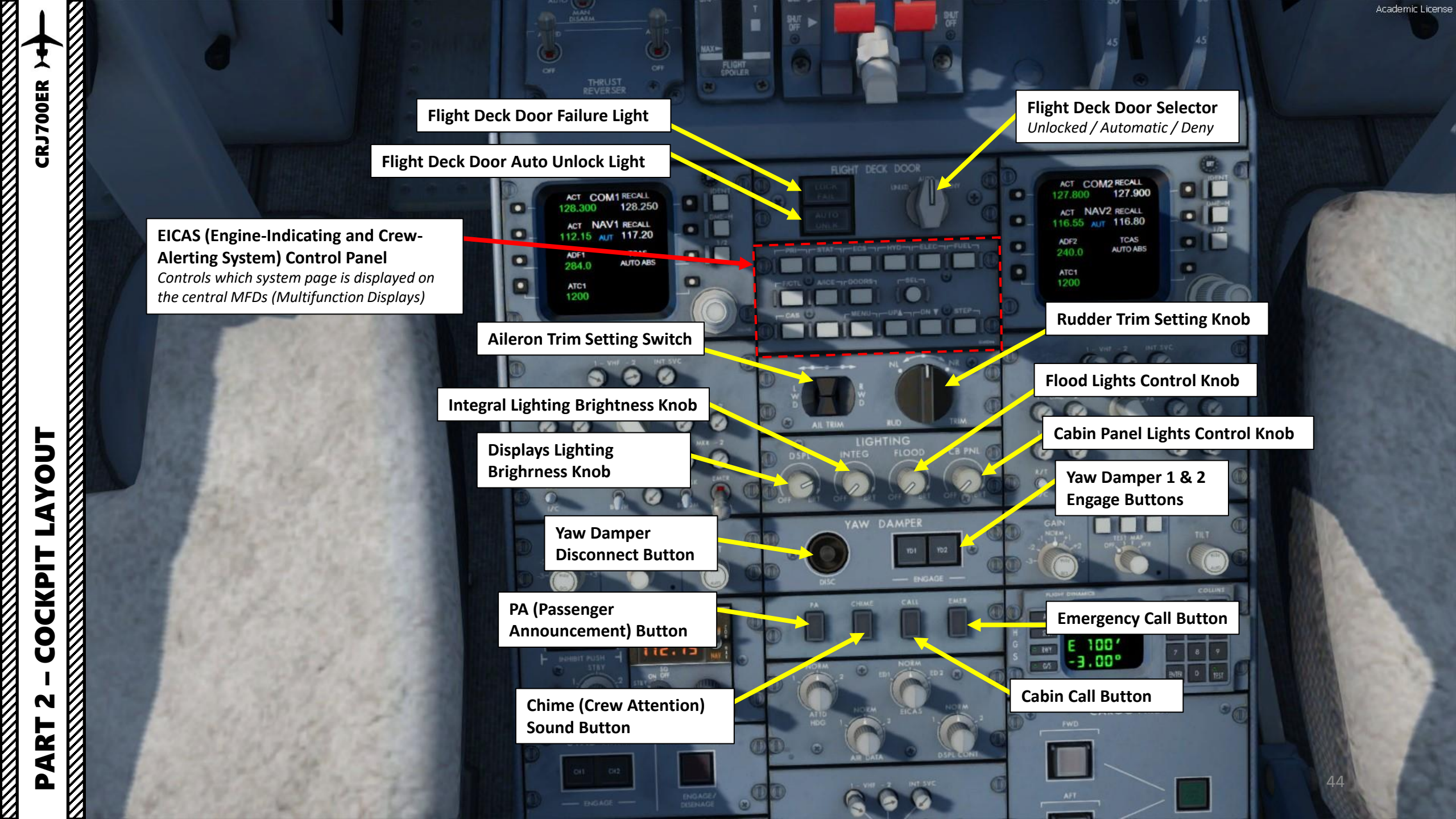


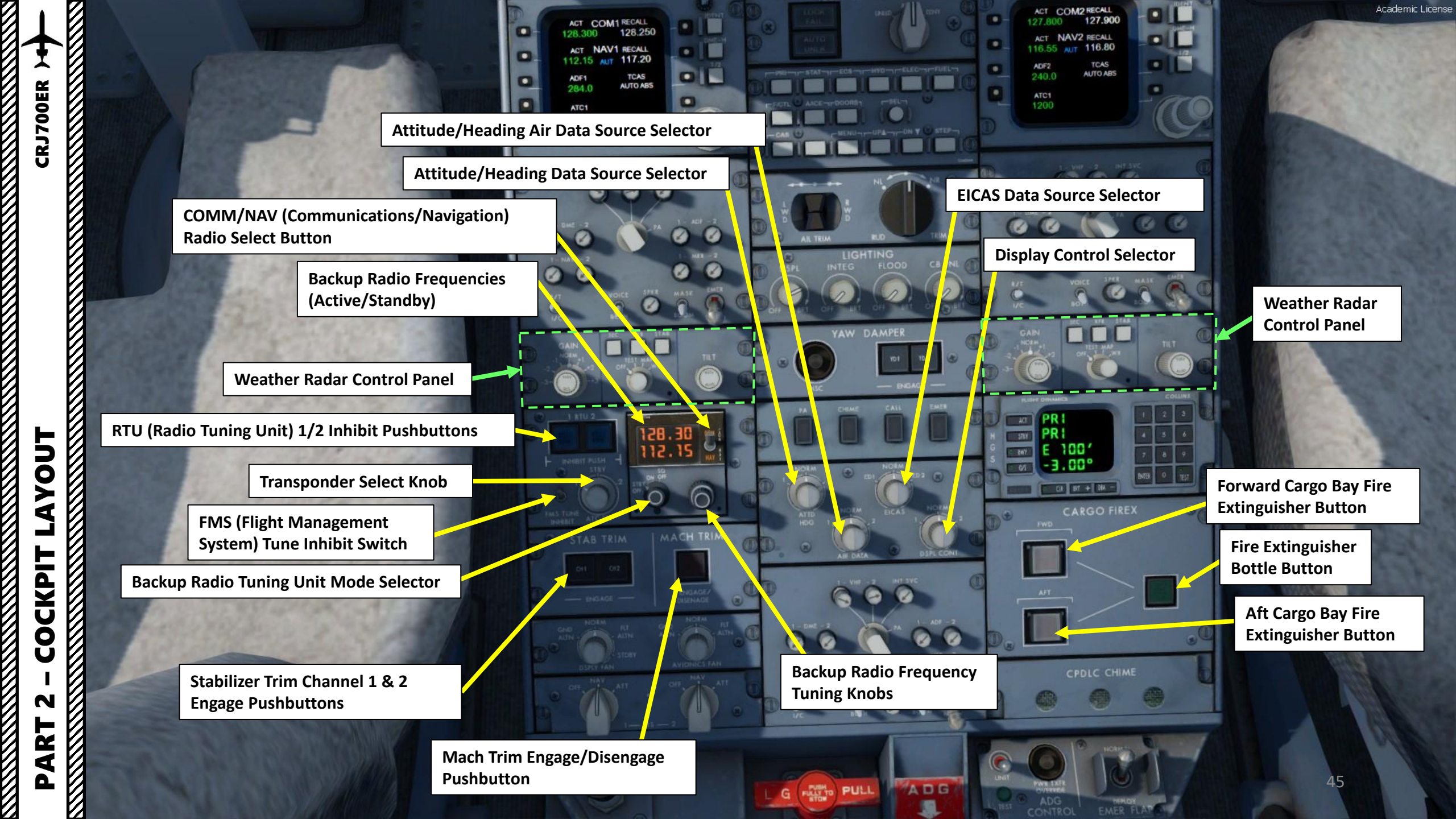


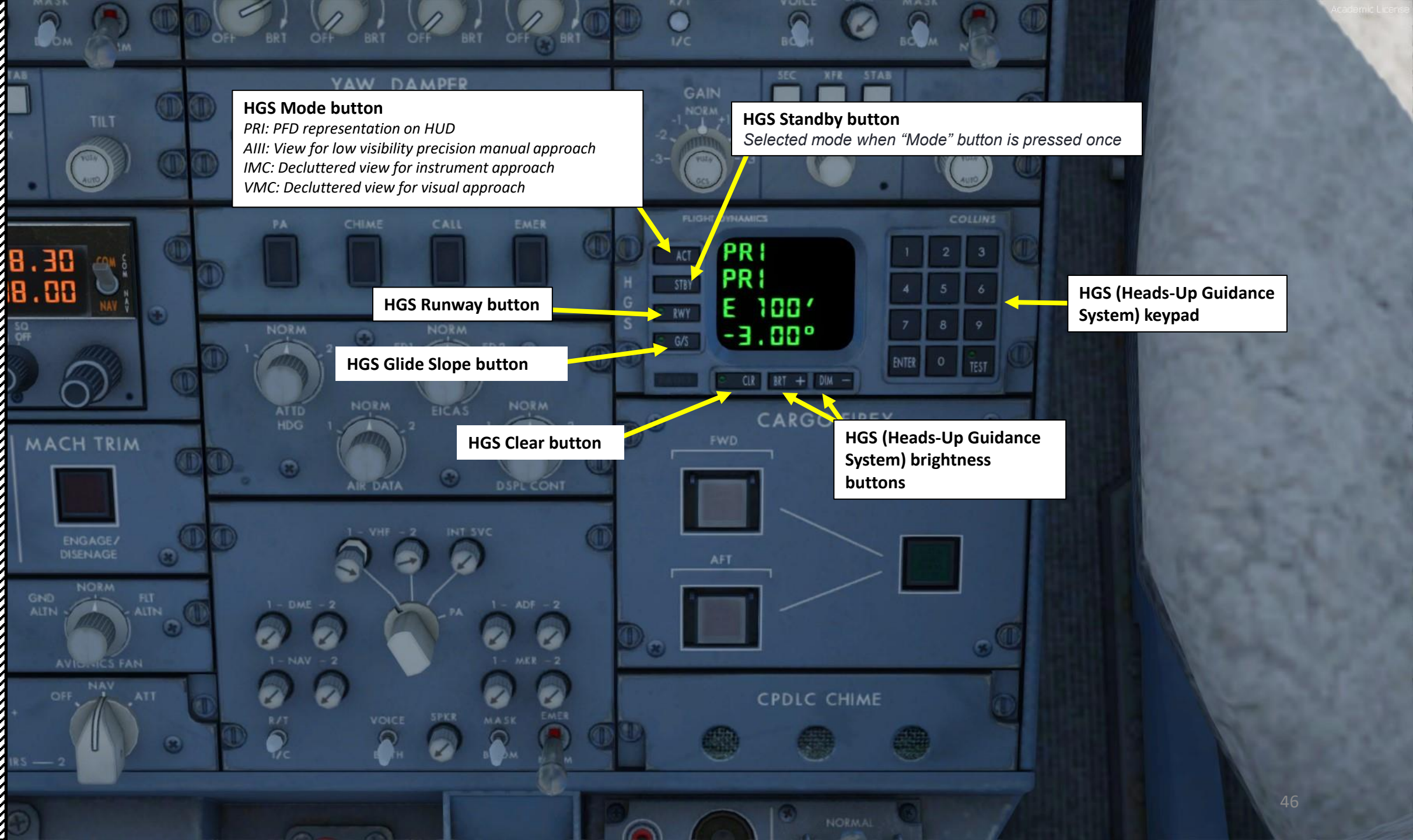
Flaps & Slats Lever Setting Table

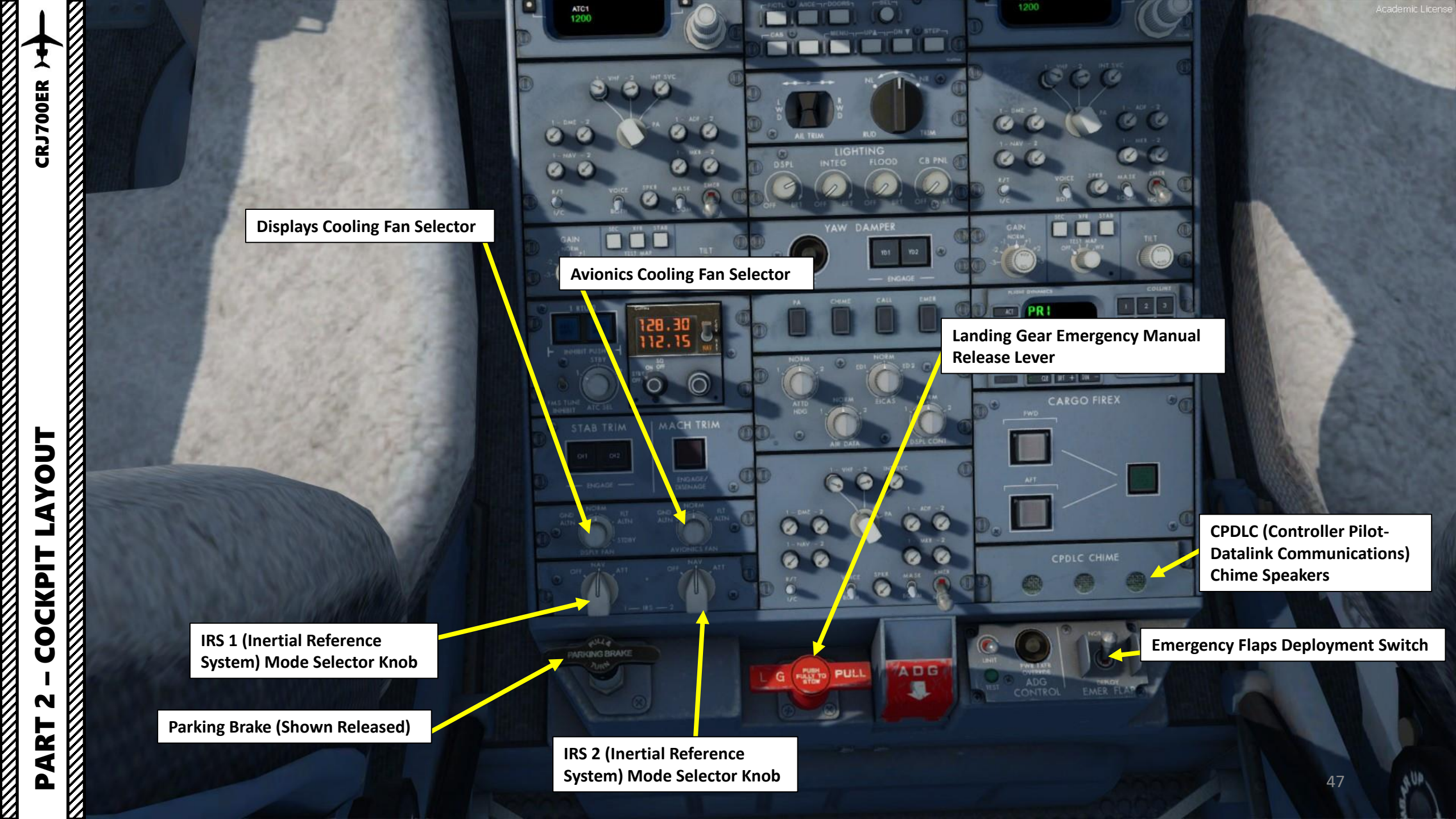
Lever Position	*Resulting Slats Position (deg)*	*Resulting Flaps Position (deg)*
0	Fully retracted	Fully retracted
1	20	Fully retracted
8	20	8
20	8	20
30	25 (fully extended)	30
45	25 (fully extended)	45 (fully extended)

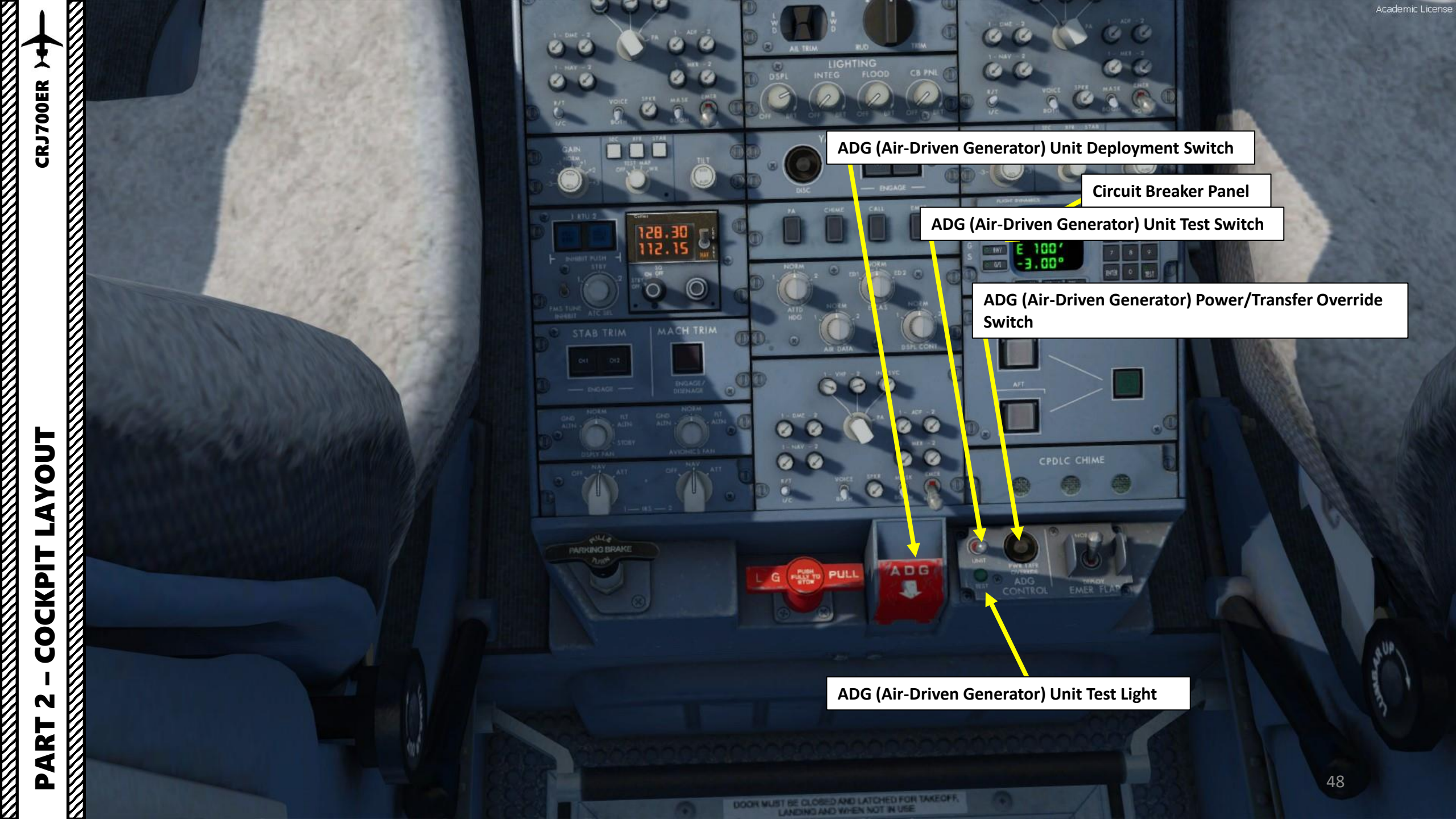




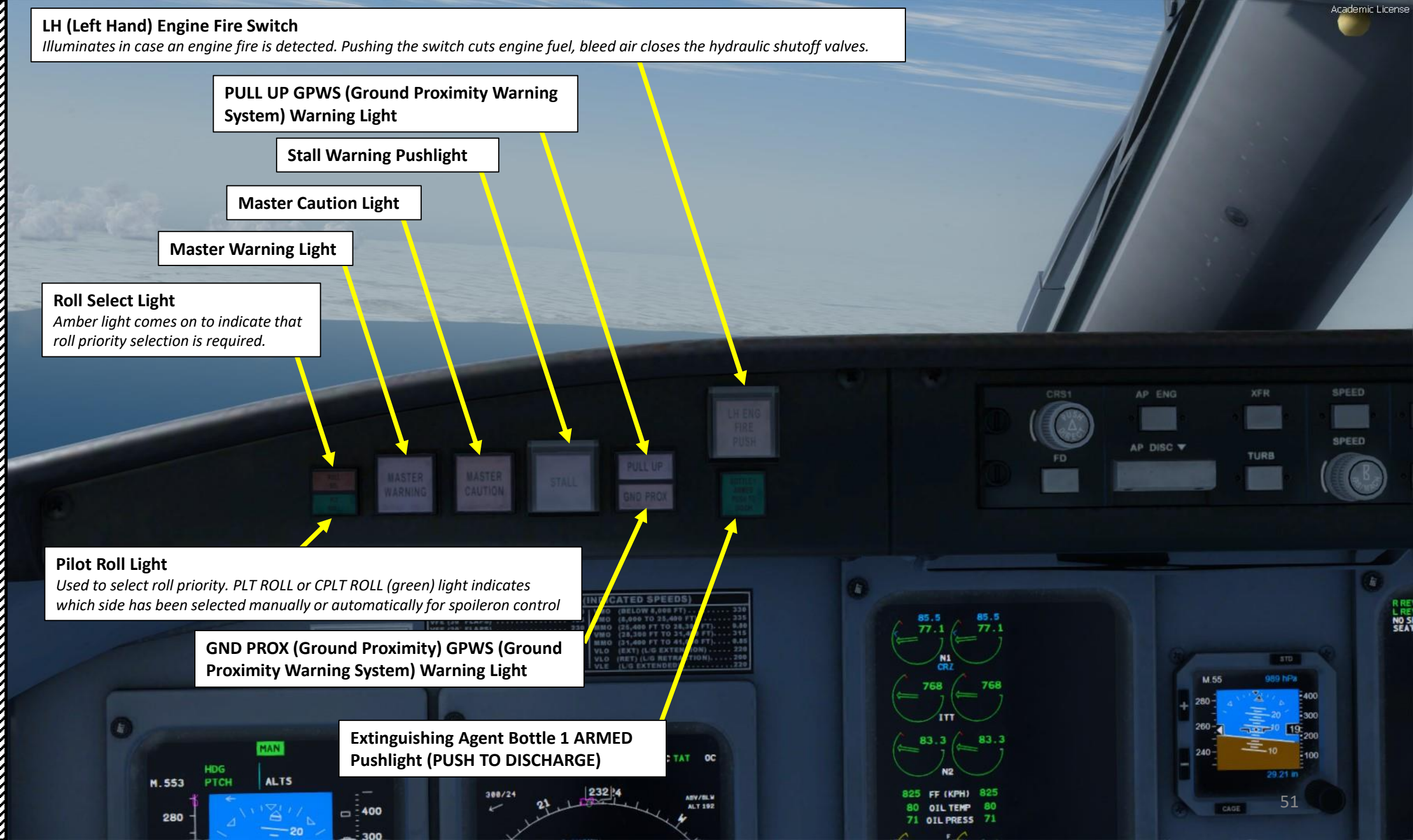


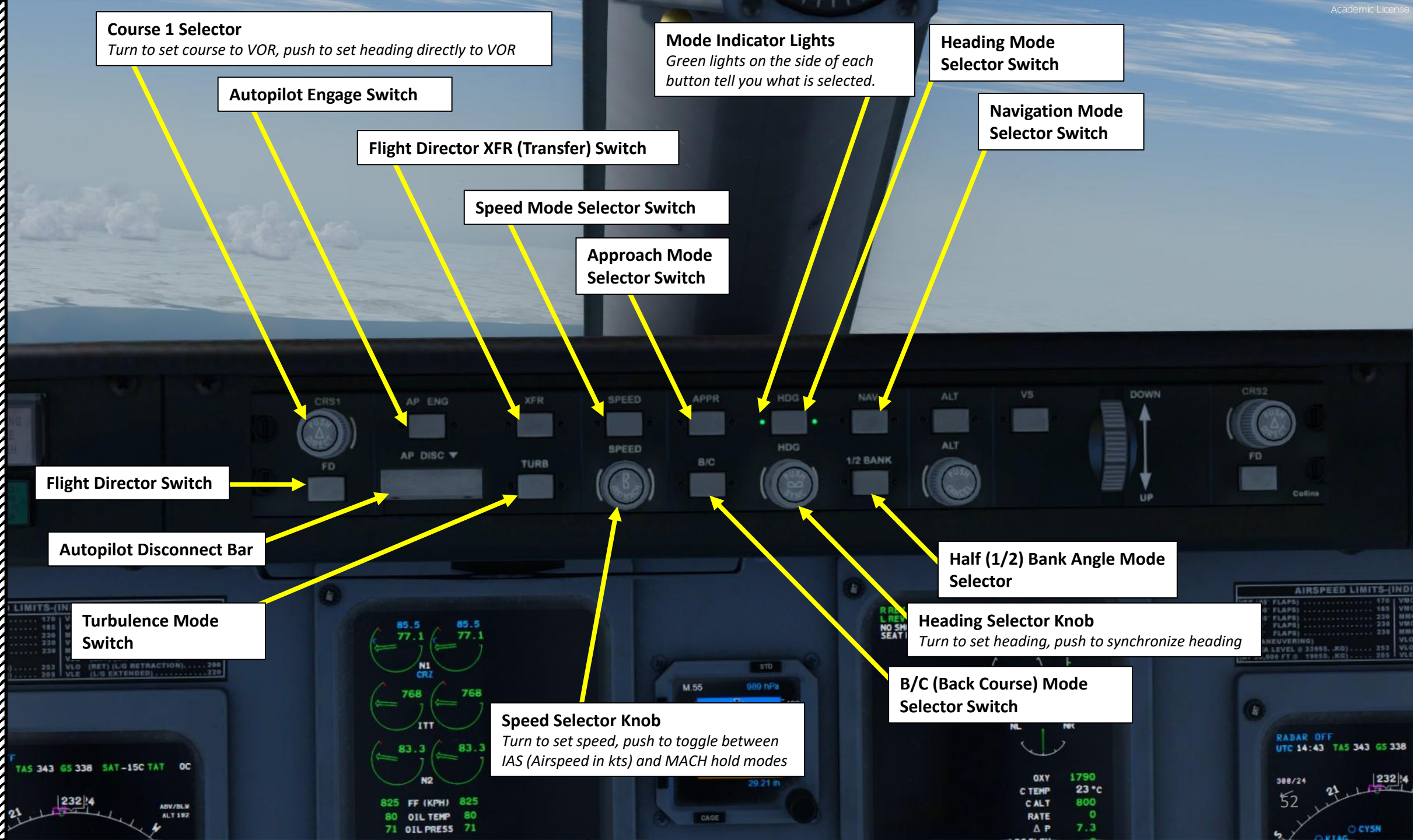

HGS Mode button
PRI: PFD representation on HUD
AIII: View for low visibility precision manual approach
IMC: Decluttered view for instrument approach
VMC: Decluttered view for visual approach
HGS Standby button
Selected mode when "Mode" button is pressed once
HGS Runway button
HGS Glide Slope button
HGS Clear button
HGS (Heads-Up Guidance System) keypad
HGS (Heads-Up Guidance System) brightness buttons
ACT
STBY
RWY
G/S
CLR
BRT +
DIM –
PRI
PRI
E 100'
-3.00°
ENTER
TEST
YAW DAMPER
GAIN
TILT
MACH TRIM
ENGAGE/ DISENGAGE
CPDLC CHIME
FWD
AFT

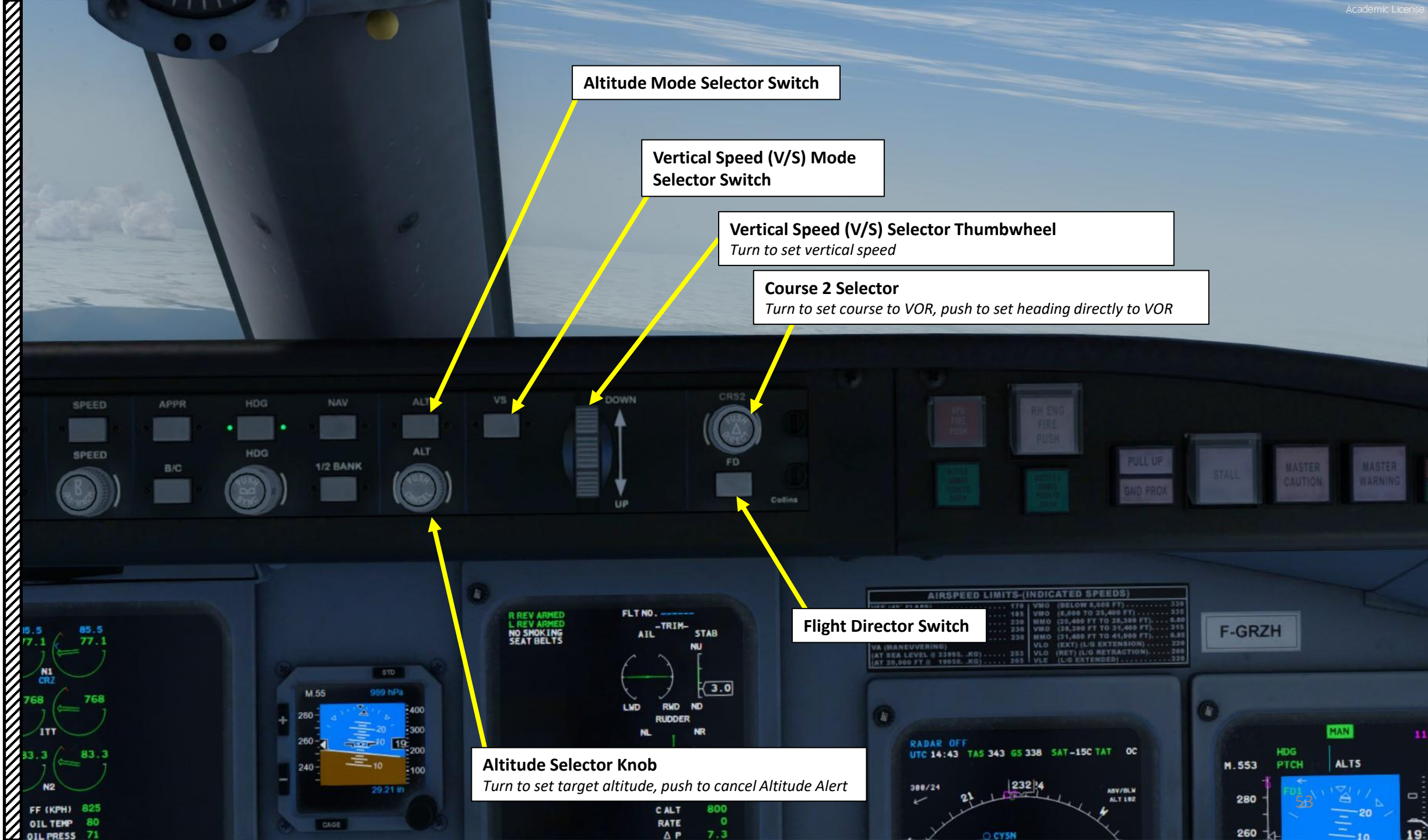




PART 2 – COCKPIT LAYOUT


LH (Left Hand) Engine Fire Switch
Illuminates in case an engine fire is detected. Pushing the switch cuts engine fuel, bleed air closes the hydraulic shutoff valves.
PULL UP GPWS (Ground Proximity Warning System) Warning Light
Stall Warning Pushlight
Master Caution Light
Master Warning Light
Roll Select Light
Amber light comes on to indicate that roll priority selection is required.
Pilot Roll Light
Used to select roll priority. PLT ROLL or CPLT ROLL (green) light indicates which side has been selected manually or automatically for spoileron control
GND PROX (Ground Proximity) GPWS (Ground Proximity Warning System) Warning Light
Extinguishing Agent Bottle 1 ARMED Pushlight (PUSH TO DISCHARGE)
MASTER WARNING
MASTER CAUTION
STALL
PULL UP
GND PROX
LH ENG FIRE PUSH
CRS1
AP ENG
XFR
SPEED
AP DISC
FD
TURB
MAN
HDG
PTCH
ALTS
M.553
N1
N2
ITT
FF (KPH)
OIL TEMP
OIL PRESS
Academic License


Course 1 Selector
Turn to set course to VOR, push to set heading directly to VOR
Autopilot Engage Switch
Flight Director XFR (Transfer) Switch
Speed Mode Selector Switch
Approach Mode Selector Switch
Mode Indicator Lights
Green lights on the side of each button tell you what is selected.
Heading Mode Selector Switch
Navigation Mode Selector Switch
Flight Director Switch
Autopilot Disconnect Bar
Turbulence Mode Switch
Speed Selector Knob
Turn to set speed, push to toggle between IAS (Airspeed in kts) and MACH hold modes
Half (1/2) Bank Angle Mode Selector
Heading Selector Knob
Turn to set heading, push to synchronize heading
B/C (Back Course) Mode Selector Switch
CRS1
AP ENG
XFR
SPEED
APPR
HDG
NAV
ALT
VS
DOWN
UP
CRS2
FD
AP DISC
TURB
SPEED
B/C
HDG
1/2 BANK
ALT
FD
Collins


Altitude Mode Selector Switch
Vertical Speed (V/S) Mode Selector Switch
Vertical Speed (V/S) Selector Thumbwheel
Turn to set vertical speed
Course 2 Selector
Turn to set course to VOR, push to set heading directly to VOR
Flight Director Switch
Altitude Selector Knob
Turn to set target altitude, push to cancel Altitude Alert
SPEED
APPR
HDG
NAV
ALT
VS
DOWN
UP
CRS2
FD
B/C
1/2 BANK
PULL UP
GND PROX
STALL
MASTER CAUTION
MASTER WARNING
F-GRZH
AIRSPEED LIMITS-(INDICATED SPEEDS)

RH (Right Hand) Engine Fire Switch
Illuminates in case an engine fire is detected. Pushing the switch cuts engine fuel, bleed air closes the hydraulic shutoff valves.

APU (Auxiliary Power Unit) Fire Switch
Illuminates in case an APU fire is detected. Pushing the switch cuts engine fuel, bleed air closes the hydraulic shutoff valves.

PULL UP GPWS (Ground Proximity Warning System) Warning Light

Stall Warning Pushlight

Master Caution Light

Master Warning Light

Roll Select Light
Amber light comes on to indicate that roll priority selection is required.

APU Extinguishing Agent Bottle ARMED Pushlight (PUSH TO DISCHARGE)

Extinguishing Agent Bottle 2 ARMED Pushlight (PUSH TO DISCHARGE)

GND PROX (Ground Proximity) GPWS (Ground Proximity Warning System) Warning Light

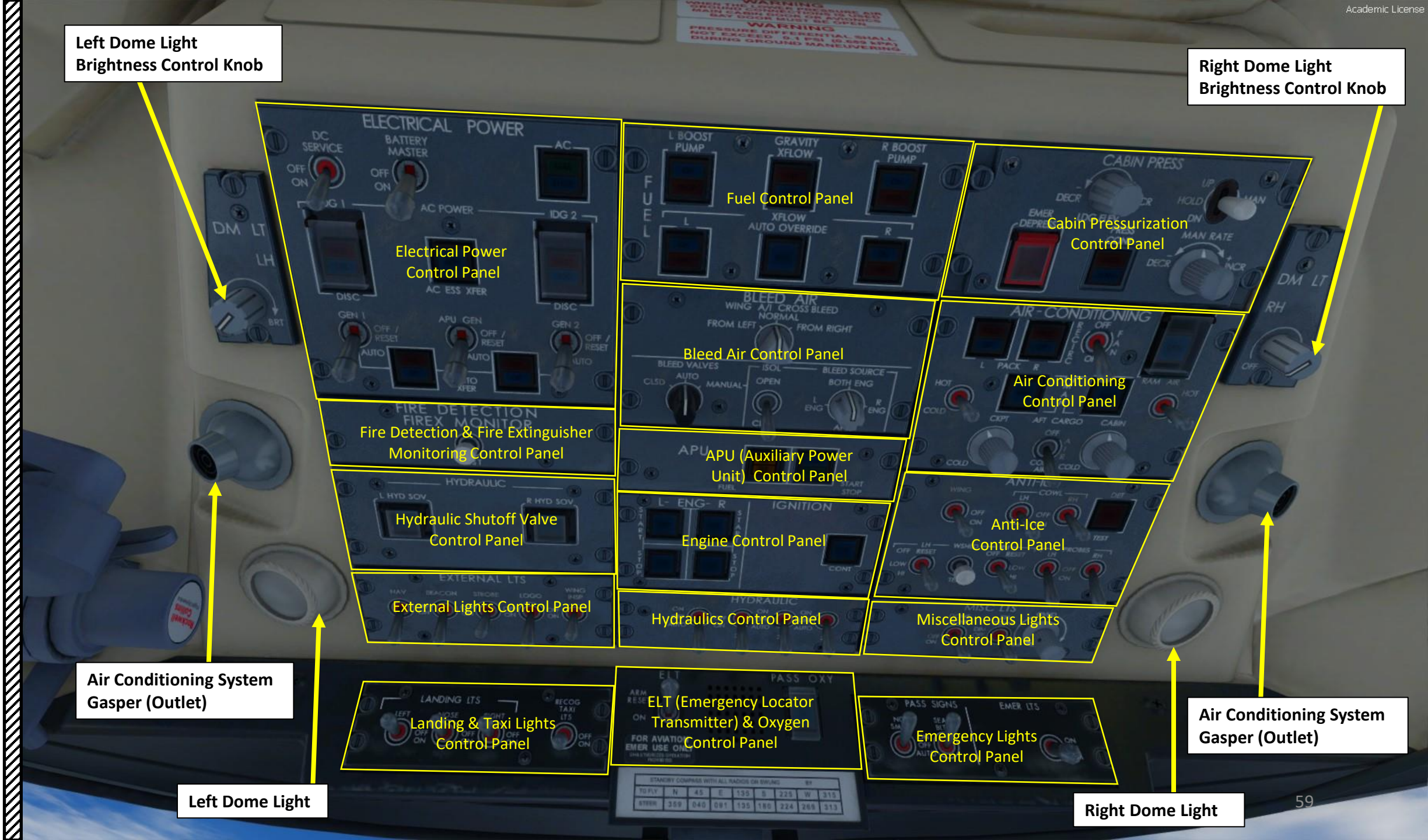
Copilot Roll Light
Used to select roll priority. PLT ROLL or CPLT ROLL (green) light indicates which side has been selected manually or automatically for spoileron control

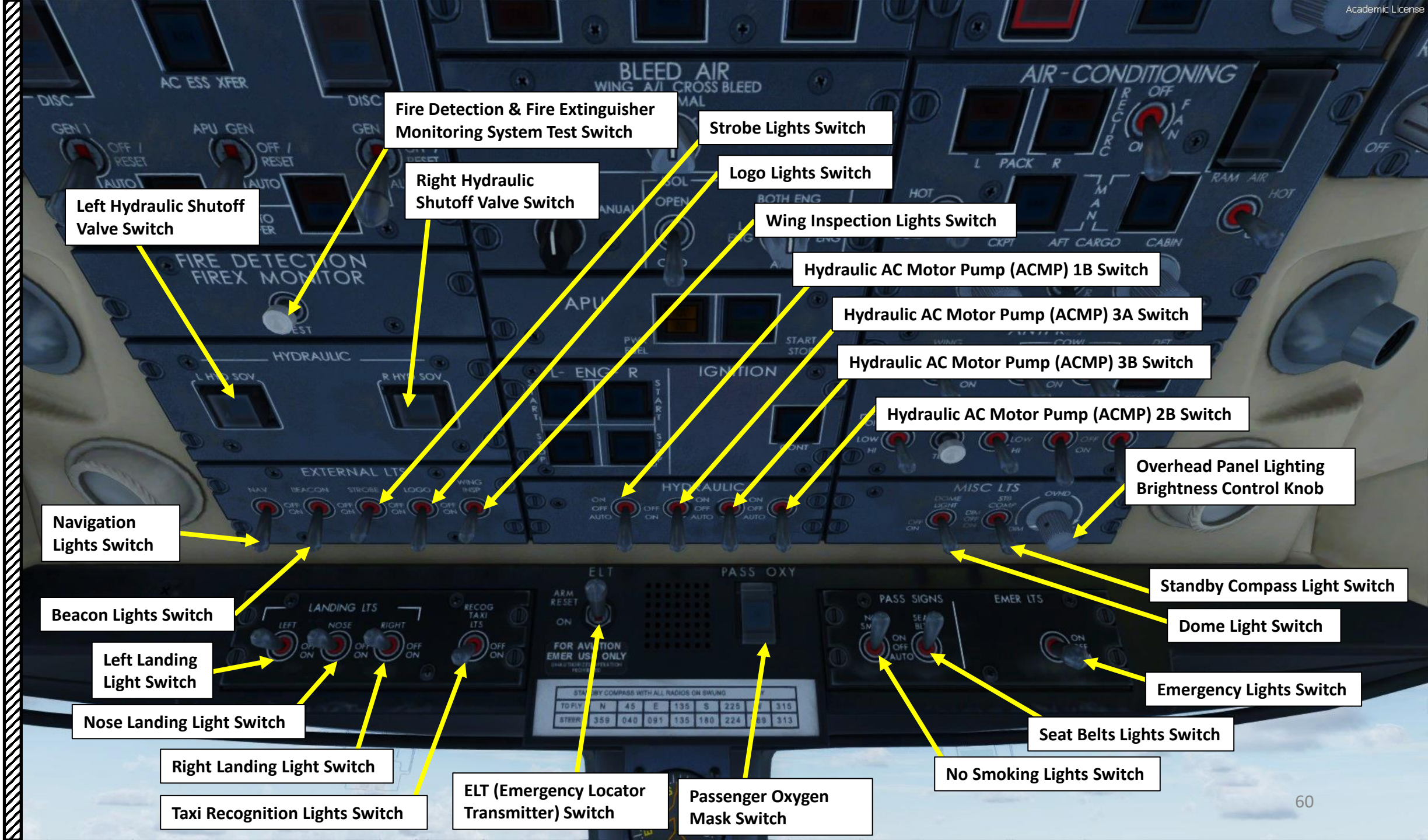

HUD (Heads-Up Display) screen
(click to stow or deploy)
Academic License
DISC
GEN 1
OFF / RESET
APU
AUTO XFER
HYDRAULIC
L HYD SOV
EXTERNAL LTS
NAV
BEACON
STROBE
LOGO
LANDING LTS
LEFT
NOSE
RIGHT
AUTO

Magnetic Compass Deviation Card								
TO FLY	North	045	East	135	South	225	West	315
STEER	359	040	091	135	180	224	269	313

Standby Magnetic Compass

Seat Position Sight Gauge
Used to position the seats so your eyes are always in the same location. The gray ball should hide the hold balls.


Left Dome Light Brightness Control Knob
Right Dome Light Brightness Control Knob
Electrical Power Control Panel
Fuel Control Panel
Cabin Pressurization Control Panel
Bleed Air Control Panel
Air Conditioning Control Panel
Fire Detection & Fire Extinguisher Monitoring Control Panel
APU (Auxiliary Power Unit) Control Panel
Hydraulic Shutoff Valve Control Panel
Engine Control Panel
Anti-Ice Control Panel
External Lights Control Panel
Hydraulics Control Panel
Miscellaneous Lights Control Panel
Air Conditioning System Gasper (Outlet)
Landing & Taxi Lights Control Panel
ELT (Emergency Locator Transmitter) & Oxygen Control Panel
Emergency Lights Control Panel
Air Conditioning System Gasper (Outlet)
Left Dome Light
Right Dome Light

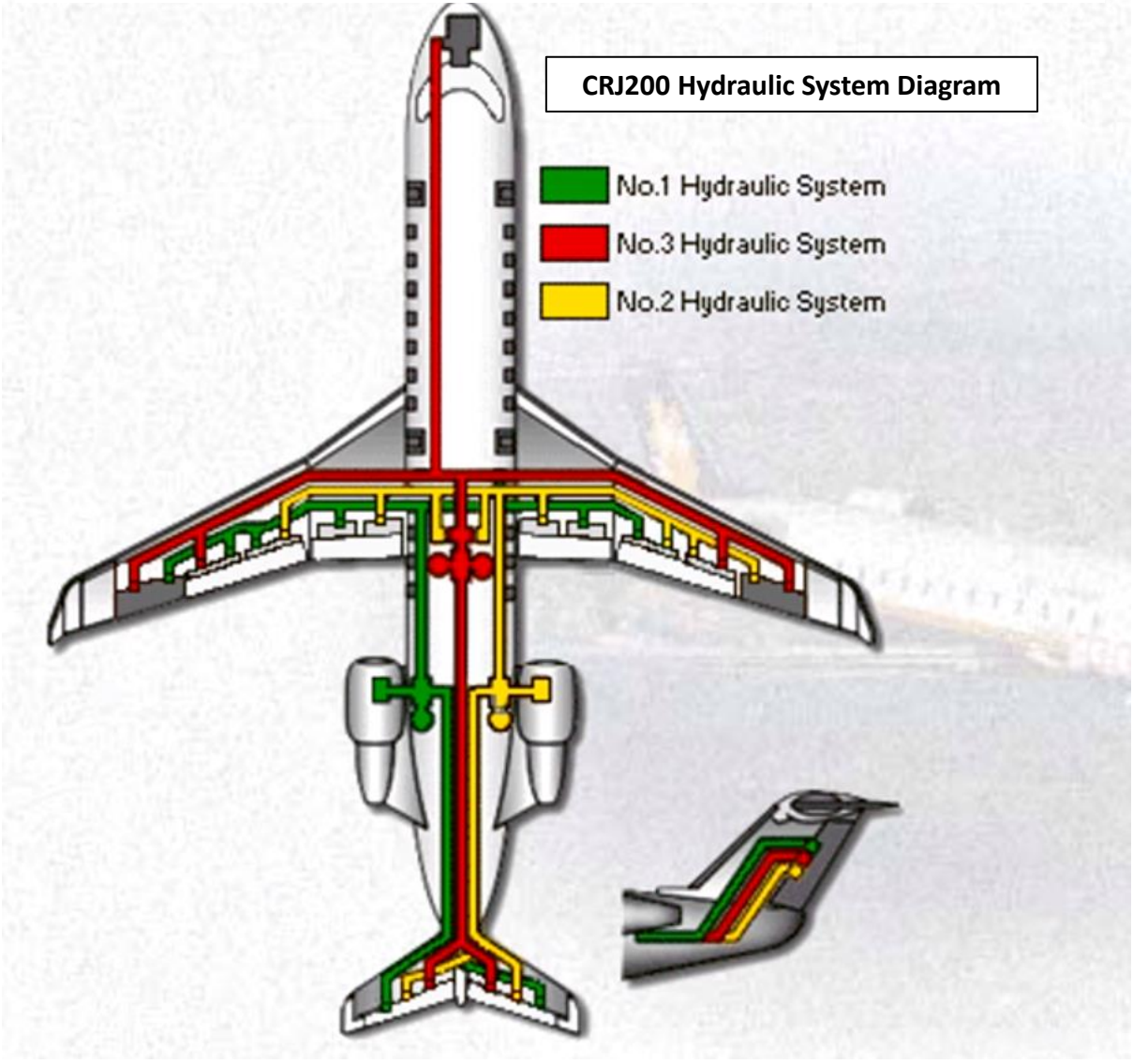


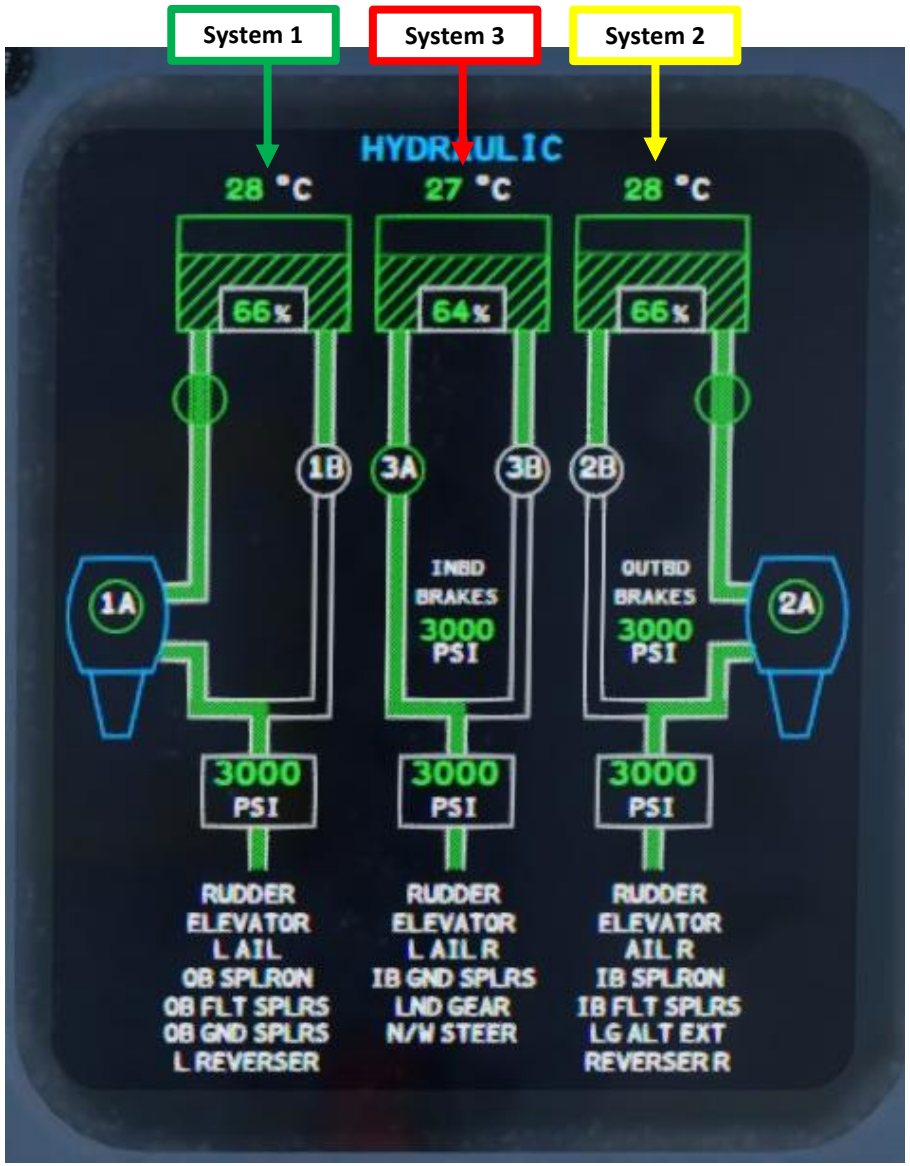
Hydraulic Systems

Three separate hydraulic systems service the hydraulic demands of the aircraft.

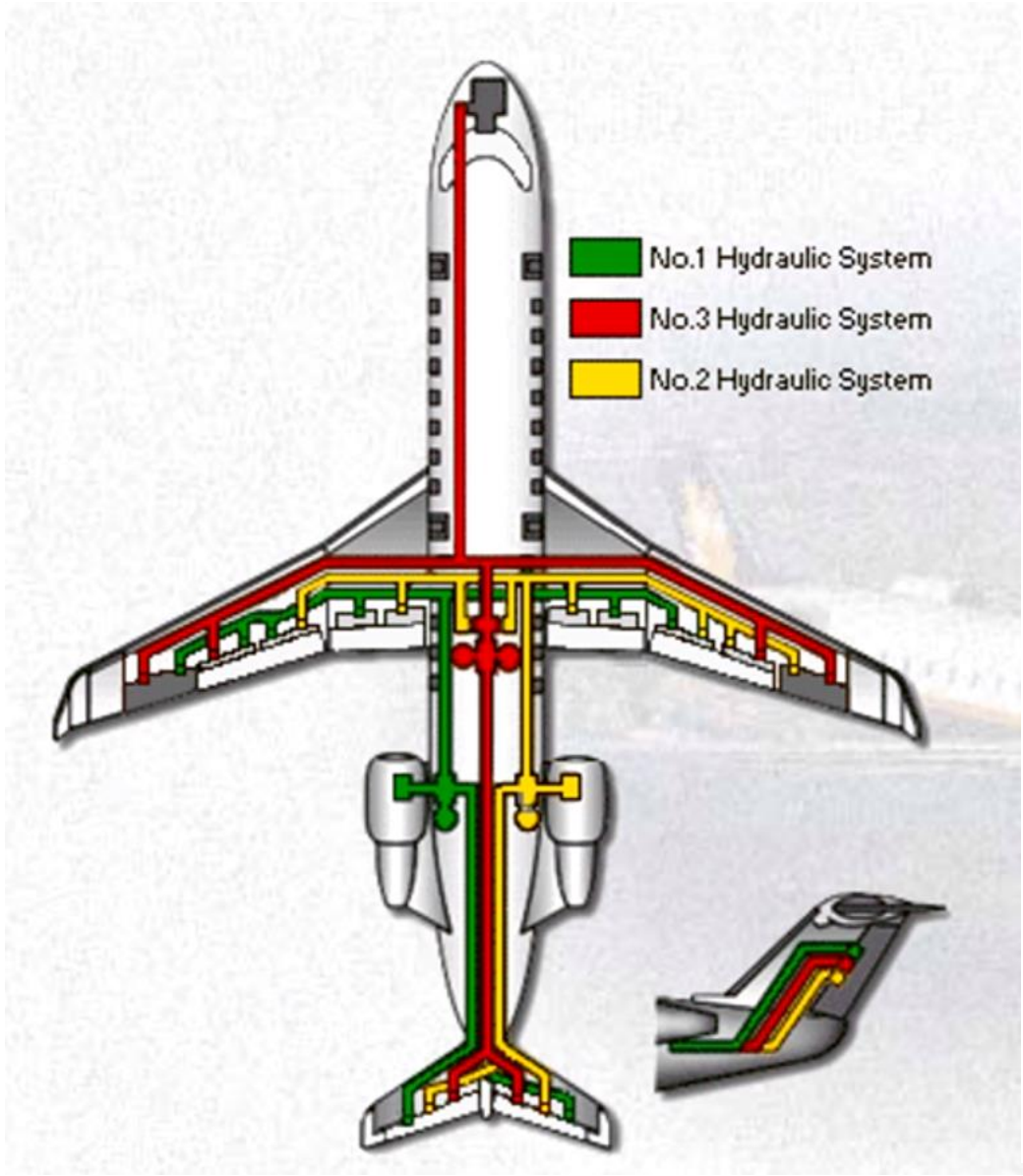
- **System 1** is powered by an engine-driven pump (EDP) and an alternating current motor pump (ACMP).
- **System 3** is powered by two ACMPs.
- **System 2** is powered by an EDP and an ACMP.

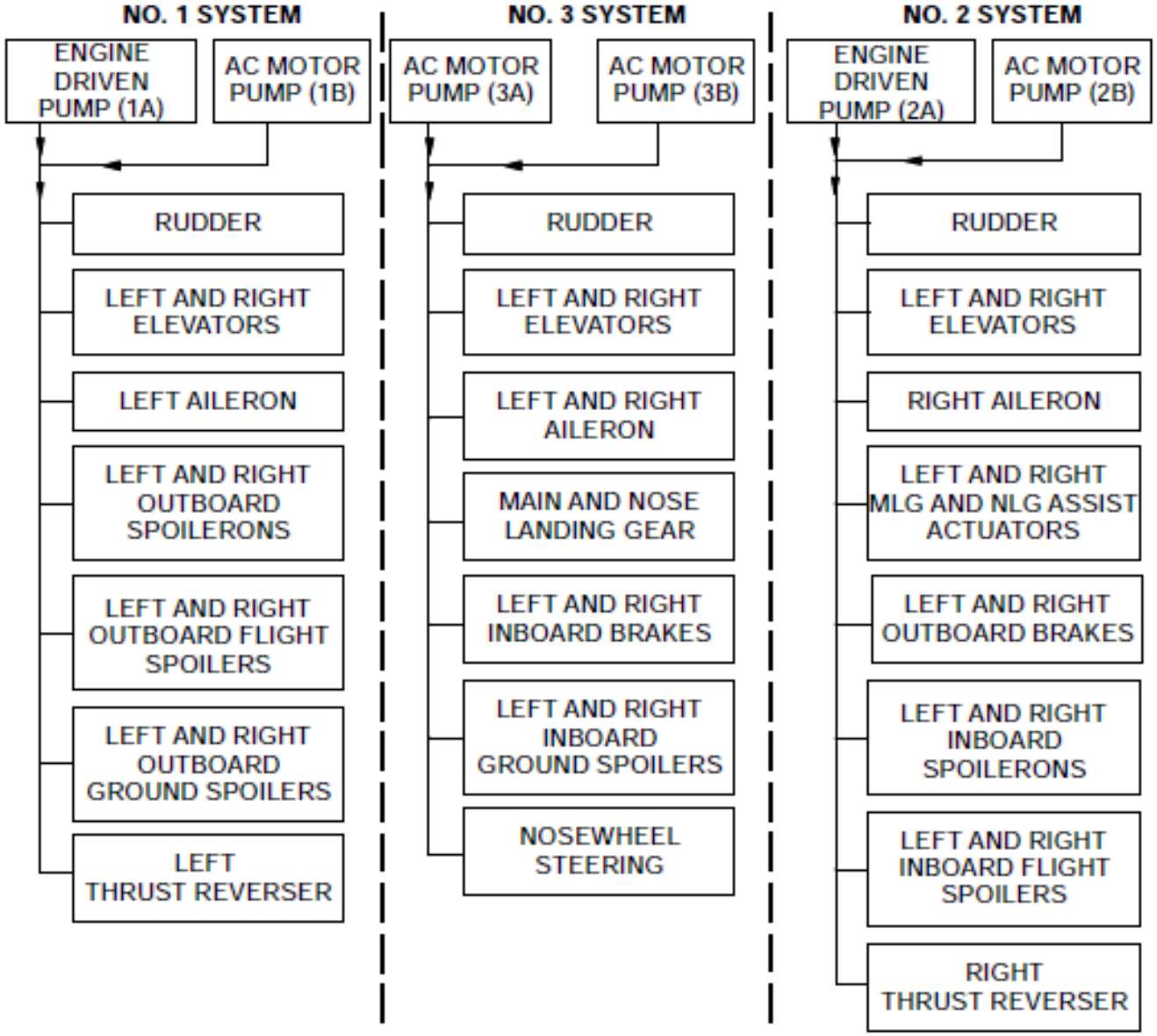
CRJ200 Hydraulic System Diagram

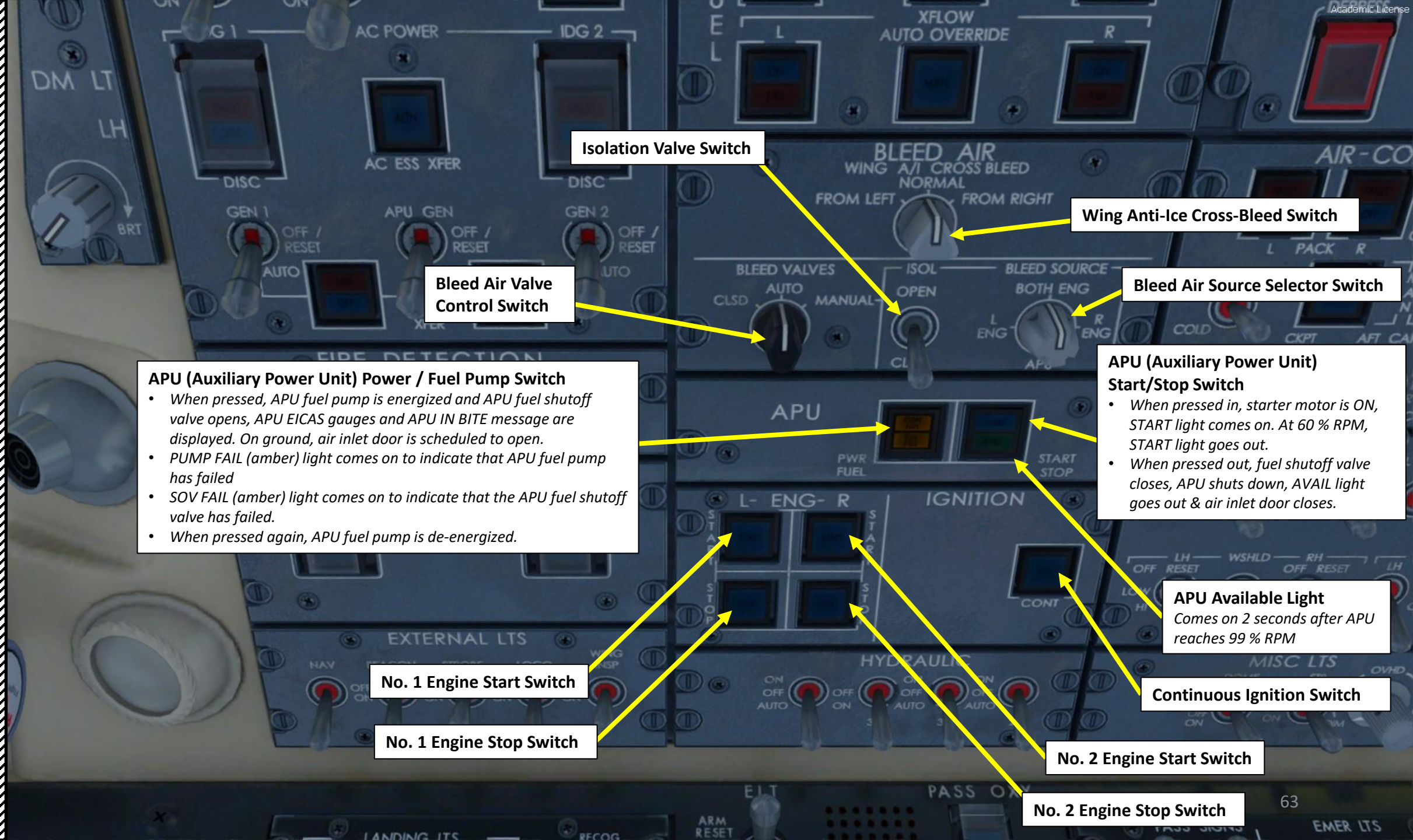


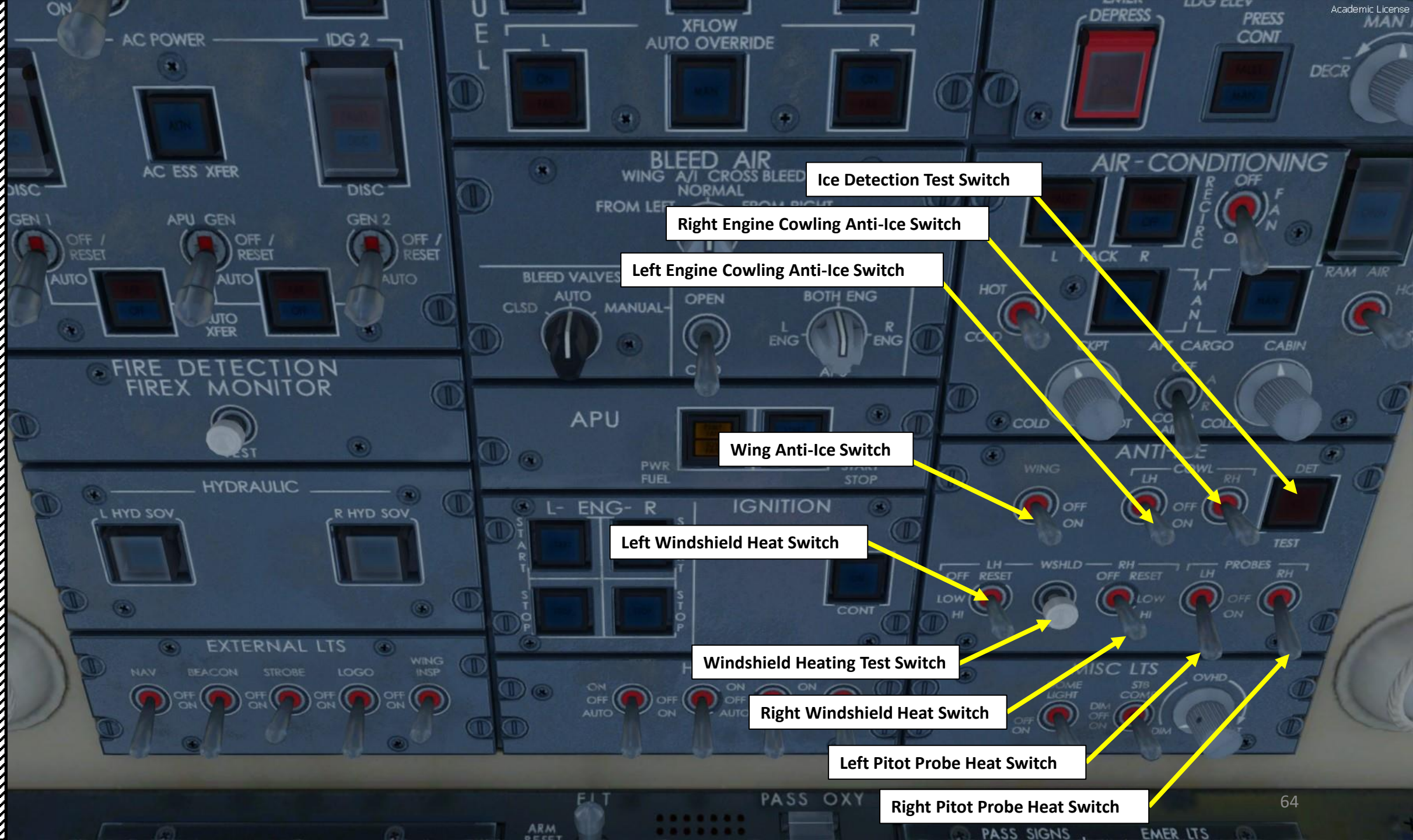


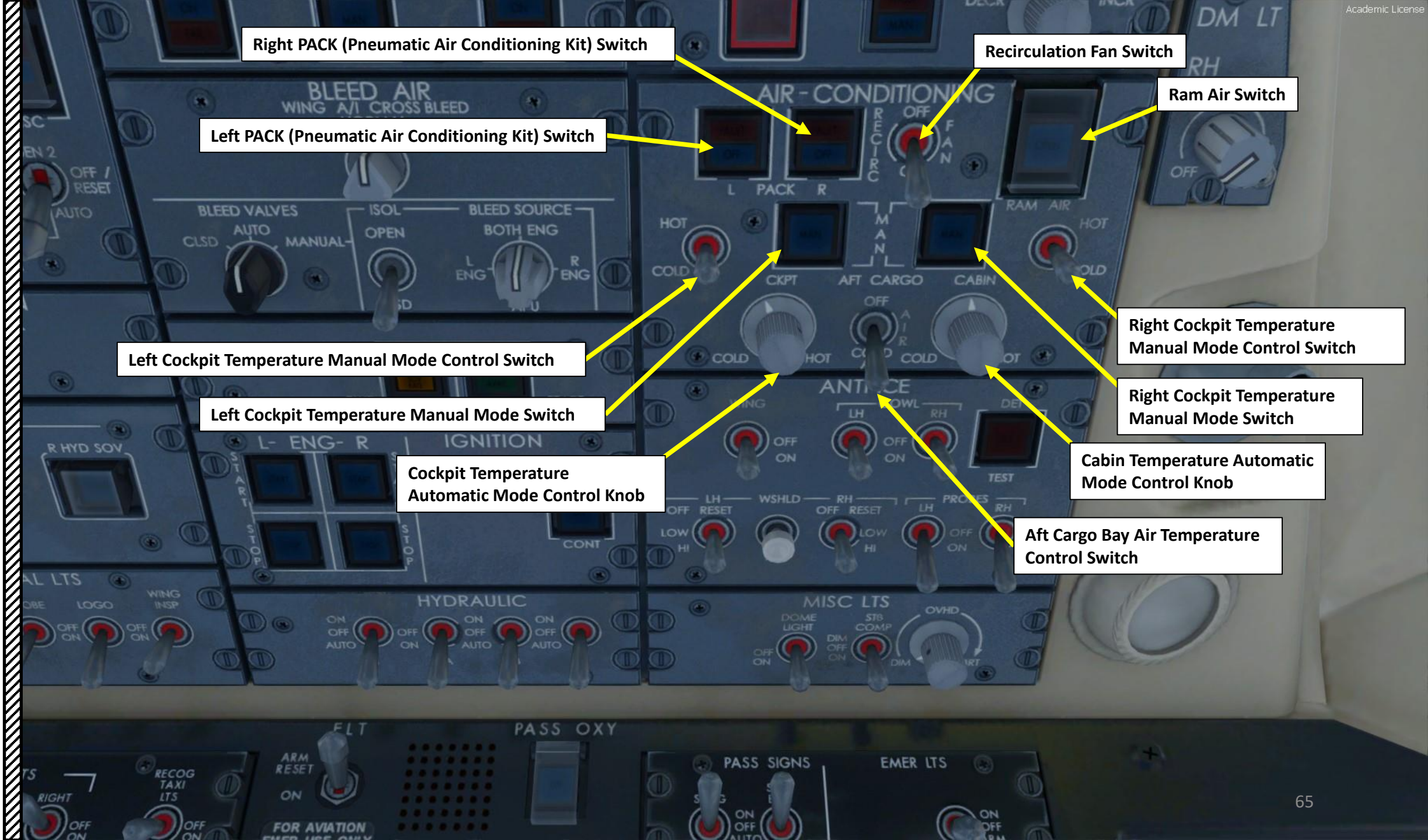
Hydraulic Systems

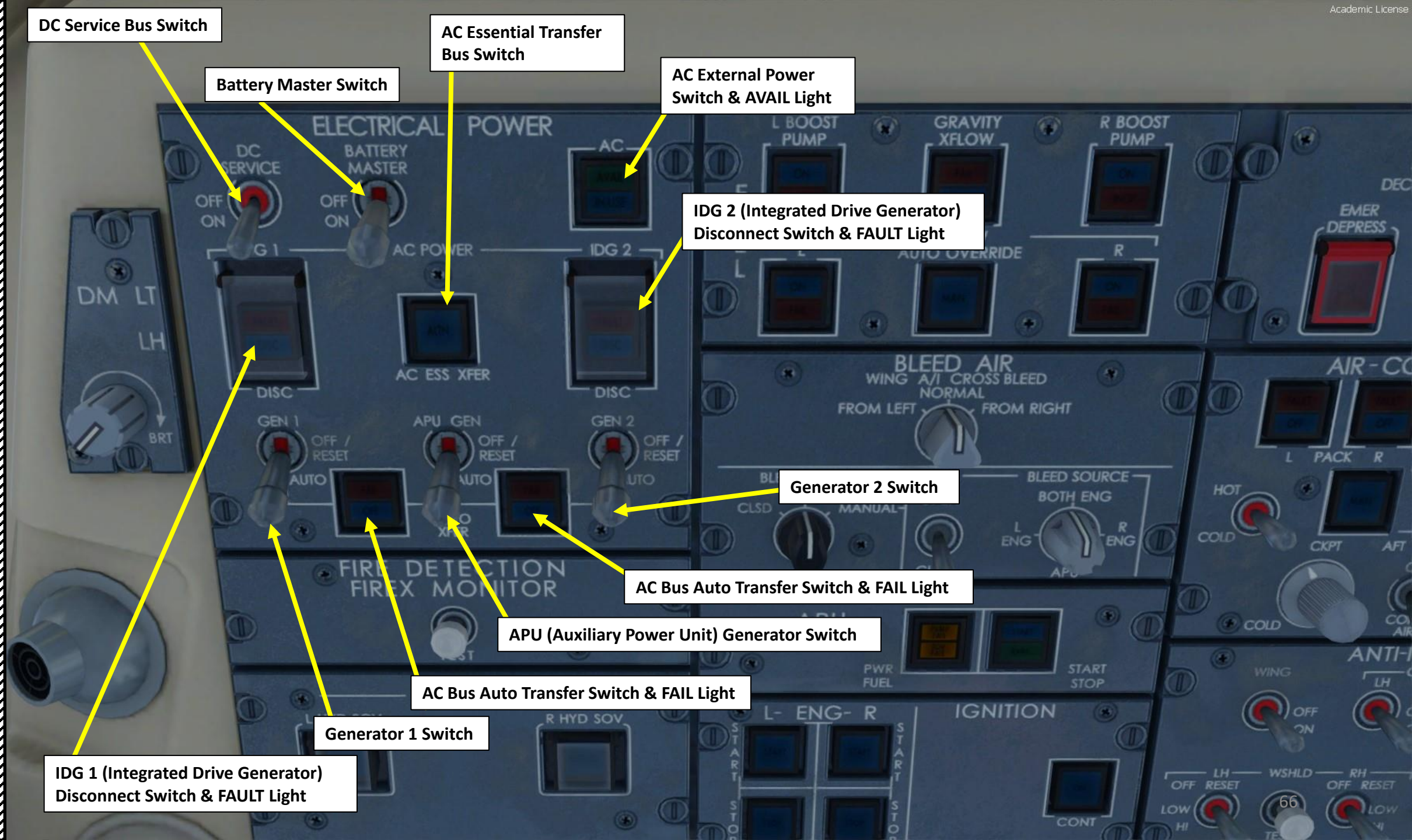


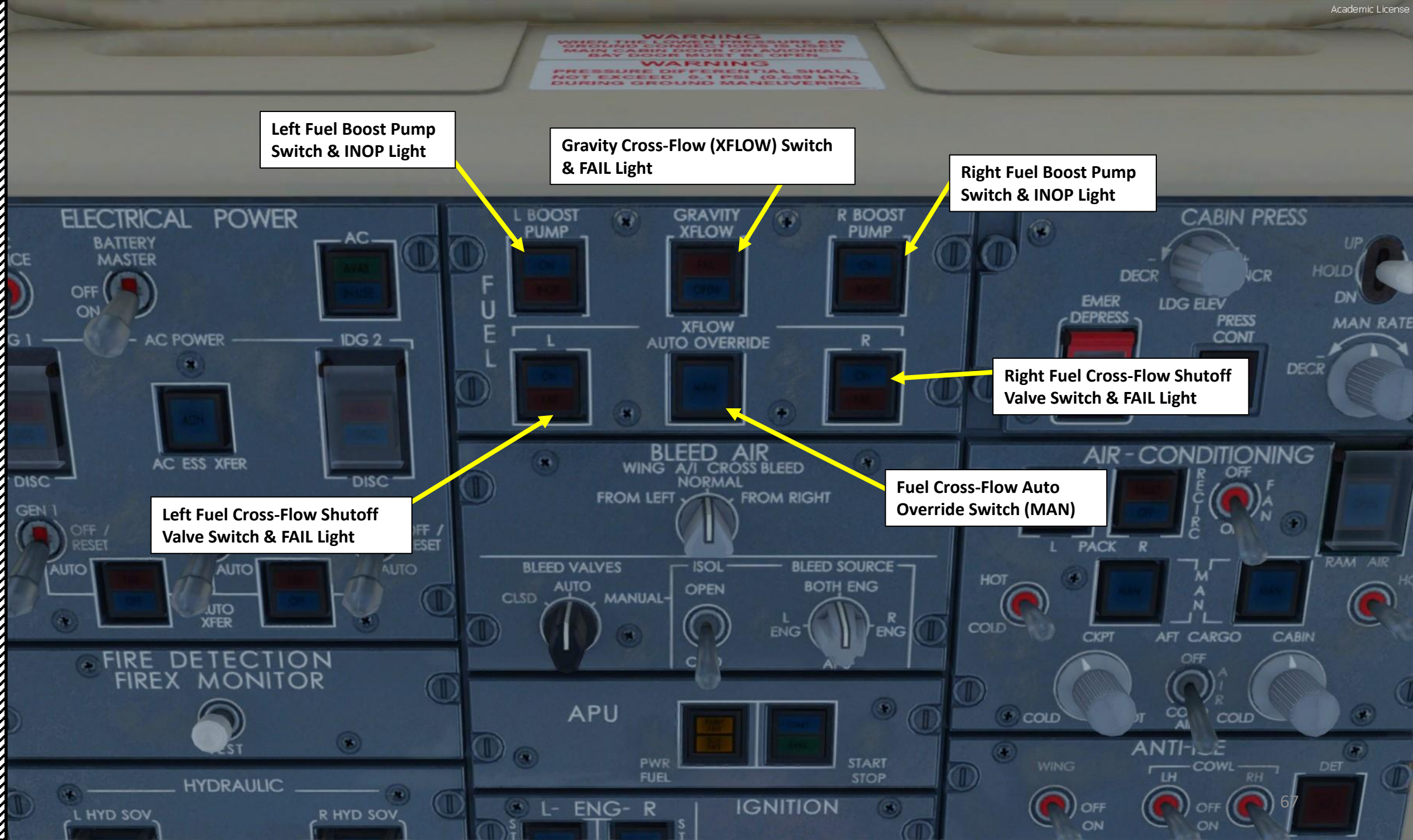


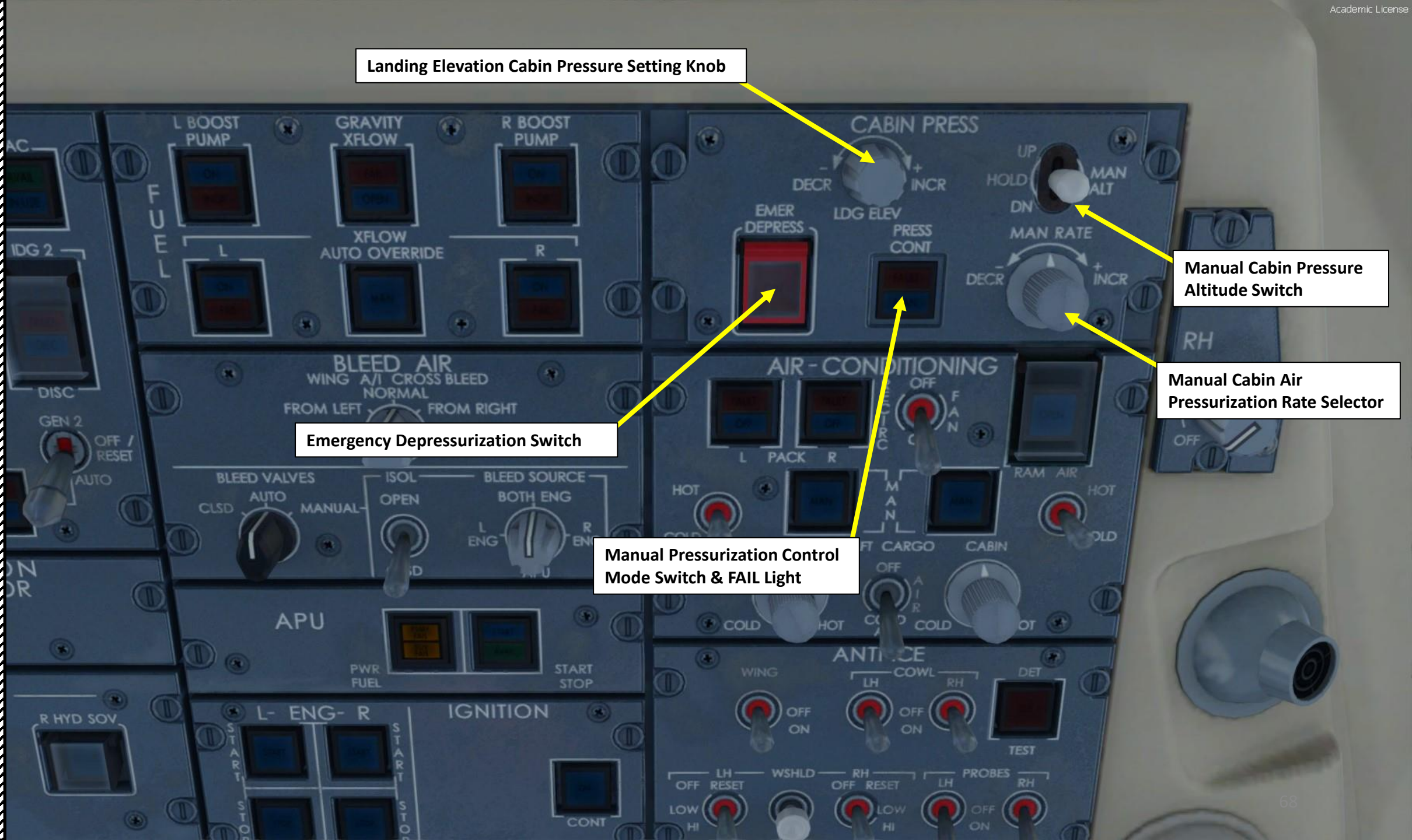

Isolation Valve Switch
Wing Anti-Ice Cross-Bleed Switch
Bleed Air Valve Control Switch
Bleed Air Source Selector Switch
APU (Auxiliary Power Unit) Power / Fuel Pump Switch
• When pressed, APU fuel pump is energized and APU fuel shutoff valve opens, APU EICAS gauges and APU IN BITE message are displayed. On ground, air inlet door is scheduled to open.
• PUMP FAIL (amber) light comes on to indicate that APU fuel pump has failed
• SOV FAIL (amber) light comes on to indicate that the APU fuel shutoff valve has failed.
• When pressed again, APU fuel pump is de-energized.
APU (Auxiliary Power Unit) Start/Stop Switch
• When pressed in, starter motor is ON, START light comes on. At 60 % RPM, START light goes out.
• When pressed out, fuel shutoff valve closes, APU shuts down, AVAIL light goes out & air inlet door closes.
APU Available Light
Comes on 2 seconds after APU reaches 99 % RPM
Continuous Ignition Switch
No. 1 Engine Start Switch
No. 1 Engine Stop Switch
No. 2 Engine Start Switch
No. 2 Engine Stop Switch

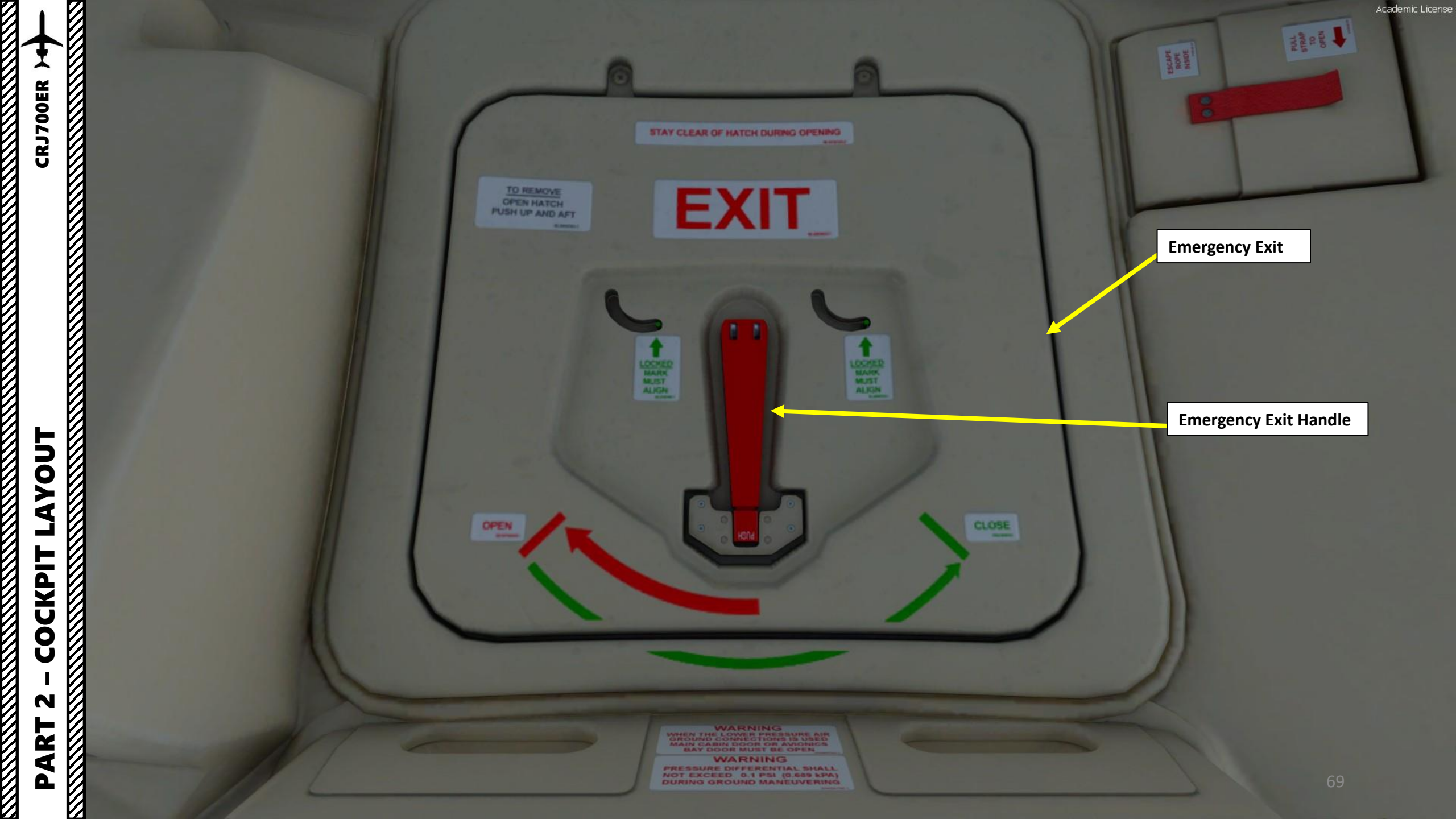



Right PACK (Pneumatic Air Conditioning Kit) Switch
Left PACK (Pneumatic Air Conditioning Kit) Switch
Recirculation Fan Switch
Ram Air Switch
Left Cockpit Temperature Manual Mode Control Switch
Left Cockpit Temperature Manual Mode Switch
Cockpit Temperature Automatic Mode Control Knob
Right Cockpit Temperature Manual Mode Control Switch
Right Cockpit Temperature Manual Mode Switch
Cabin Temperature Automatic Mode Control Knob
Aft Cargo Bay Air Temperature Control Switch
BLEED AIR
AIR - CONDITIONING
IGNITION
HYDRAULIC
MISC LTS
PASS SIGNS
EMER LTS
PASS OXY
FLT

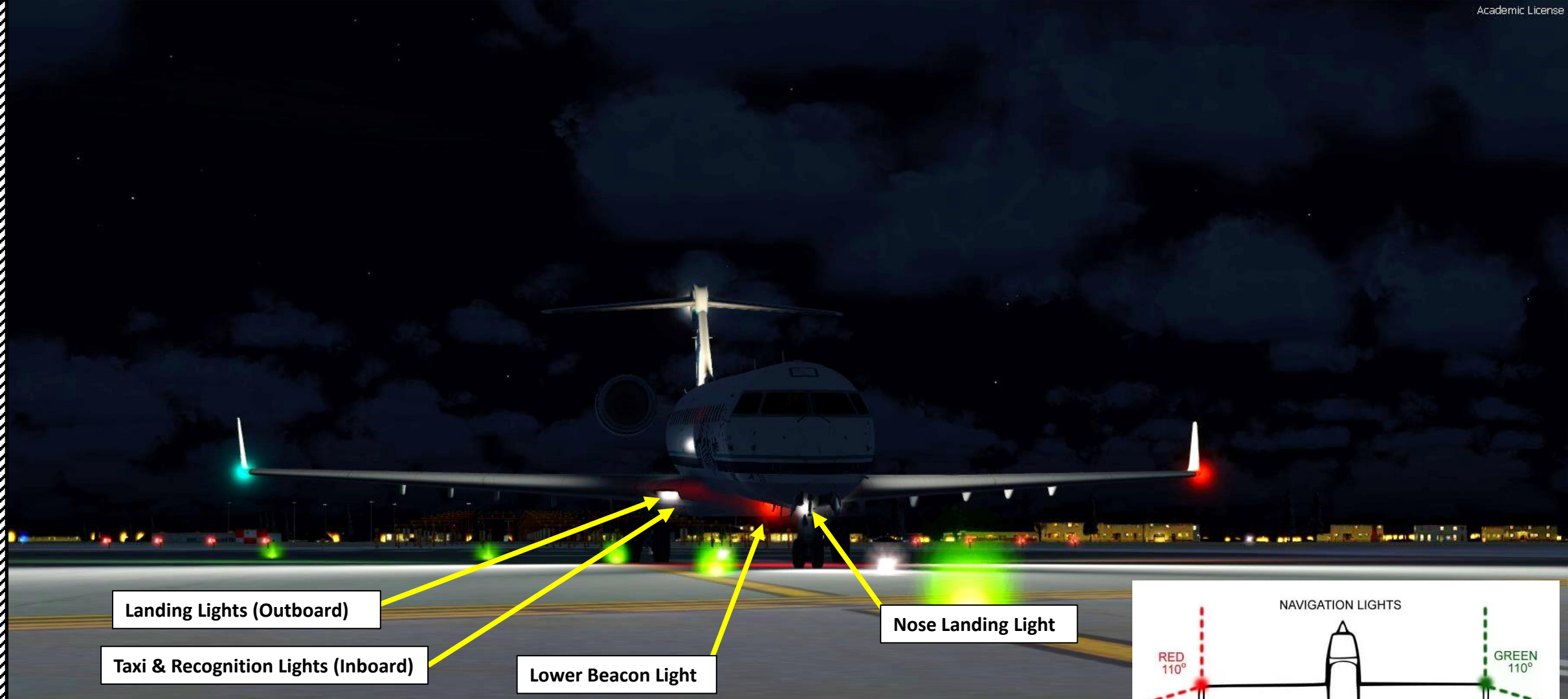

DC Service Bus Switch
Battery Master Switch
AC Essential Transfer Bus Switch
AC External Power Switch & AVAIL Light
IDG 2 (Integrated Drive Generator) Disconnect Switch & FAULT Light
Generator 2 Switch
AC Bus Auto Transfer Switch & FAIL Light
APU (Auxiliary Power Unit) Generator Switch
AC Bus Auto Transfer Switch & FAIL Light
Generator 1 Switch
IDG 1 (Integrated Drive Generator) Disconnect Switch & FAULT Light
ELECTRICAL POWER
DC SERVICE
BATTERY MASTER
AC
AC POWER
IDG 1
IDG 2
AC ESS XFER
DISC
DM LT
LH
BRT
GEN 1
APU GEN
GEN 2
OFF / RESET
AUTO
L BOOST PUMP
GRAVITY XFLOW
R BOOST PUMP
EMER DEPRESS
BLEED AIR
WING A/I CROSS BLEED
NORMAL
FROM LEFT
FROM RIGHT
BLEED SOURCE
BOTH ENG
MANUAL
CLSD
FIRE DETECTION
FIREX MONITOR
R HYD SOV
L- ENG- R
IGNITION
START
STOP
PWR
FUEL
CONT
L PACK R
HOT
COLD
CKPT
WING
LH
RH
WSHLD
LOW
HI
Academic License

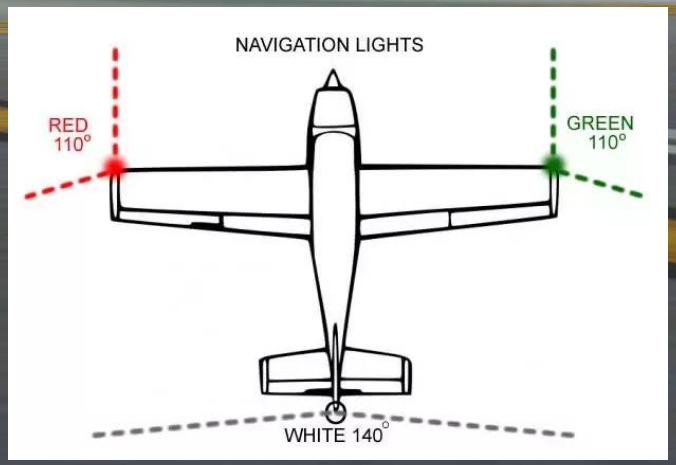

Left Fuel Boost Pump Switch & INOP Light
Gravity Cross-Flow (XFLOW) Switch & FAIL Light
Right Fuel Boost Pump Switch & INOP Light
Right Fuel Cross-Flow Shutoff Valve Switch & FAIL Light
Fuel Cross-Flow Auto Override Switch (MAN)
Left Fuel Cross-Flow Shutoff Valve Switch & FAIL Light
ELECTRICAL POWER
BATTERY MASTER
AC POWER
AC ESS XFER
L BOOST PUMP
GRAVITY XFLOW
R BOOST PUMP
FUEL
XFLOW AUTO OVERRIDE
CABIN PRESS
EMER DEPRESS
LDG ELEV
PRESS CONT
BLEED AIR
WING A/I CROSS BLEED
NORMAL
FROM LEFT
FROM RIGHT
BLEED VALVES
ISOL
BLEED SOURCE
BOTH ENG
AIR - CONDITIONING
PACK
RECIRC
RAM AIR
CKPT
AFT CARGO
CABIN
FIRE DETECTION
FIREX MONITOR
APU
PWR
START
STOP
HYDRAULIC
L HYD SOV
R HYD SOV
L- ENG- R
IGNITION
ANTI-ICE
WING
COWL
LH
RH
DET



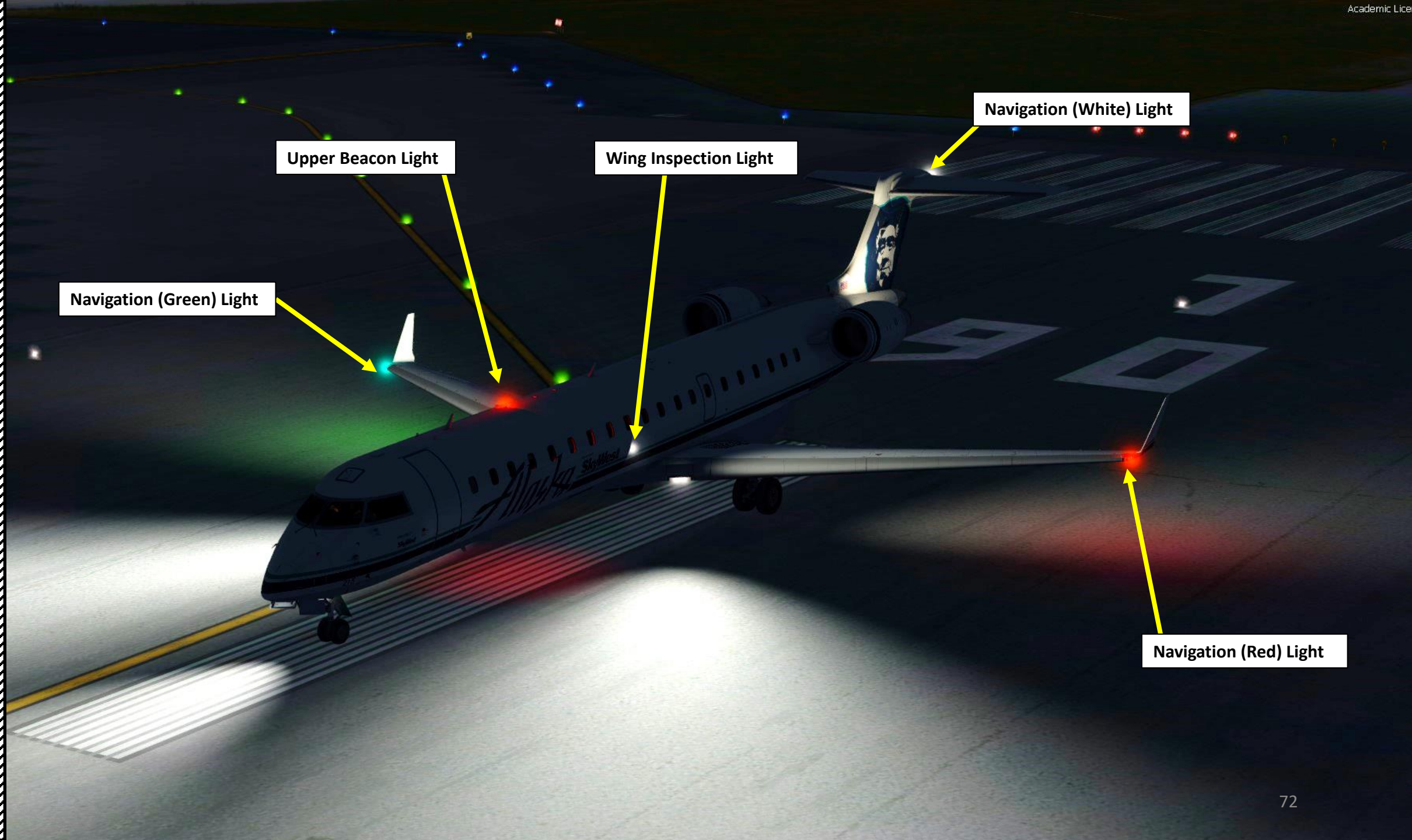


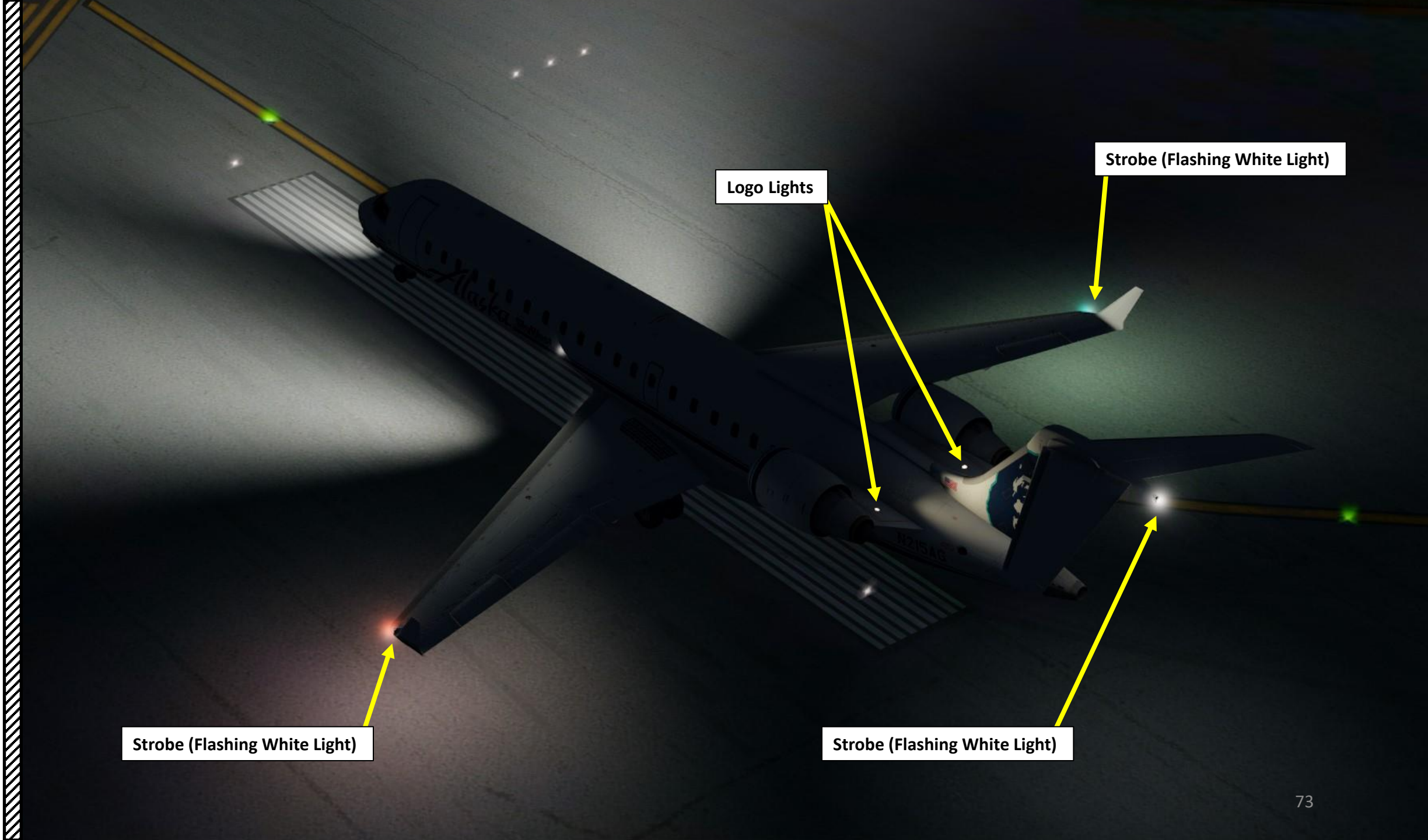

Academic License
DOOR MUST BE CLOSED AND LOCKED AT ALL TIMES





- **Landing** Lights: used to illuminate runway during landing
- **Nose Landing** Light: used to aid the crew in seeing the turn in the taxiway/runway
- **Taxi & Recognition** Lights: used to illuminate area in front of nosewheel during taxi
- **Beacon (Anti-Collision)** Lights: flashing red light used to prevent collisions and warn others that aircraft is active and engines are running
- **Navigation (Position)** Lights: red, green and white lights help you know the direction of an aircraft (red is on the left, green on the right, white on the tail).
- **Strobe (Anti-Collision)** Lights: pulsating white lights used when aircraft enters a runway in use to increase visibility
- **Wing Inspection** Lights: used to check wing at night (i.e. verify if there is ice accumulation on the wing)
- **Logo** Light: used to illuminate the airline's logo painted on the tail


Navigation (White) Light
Upper Beacon Light
Wing Inspection Light
Navigation (Green) Light
Navigation (Red) Light


Logo Lights
Strobe (Flashing White Light)
Strobe (Flashing White Light)
Strobe (Flashing White Light)

PLANNING THE FLIGHT

In real life, you cannot just fly an CRJ wherever and whenever you please. Just like on land, the sky is littered with an intricate network of waypoints and aerial highways. Therefore, it is necessary to plan your flight route and to determine how much fuel you will need to carry in order to reach your destination.

In order to do this, we will use a tool called “Online Flight Planner” available here: http://onlineflightplanner.org/

There are a number of fuel planners available online. These estimates may or may not be very accurate. There are specific charts created by Bombardier to come up with accurate fuel estimates which are unfortunately not available to the public. Therefore, for the sake of simplicity we will just use a rule of thumb that’s good enough for the purpose of this tutorial.

Airways:
CYYZ SID **MIGLO** STAR **CYUL**

Provided by RouteFinder

METAR:

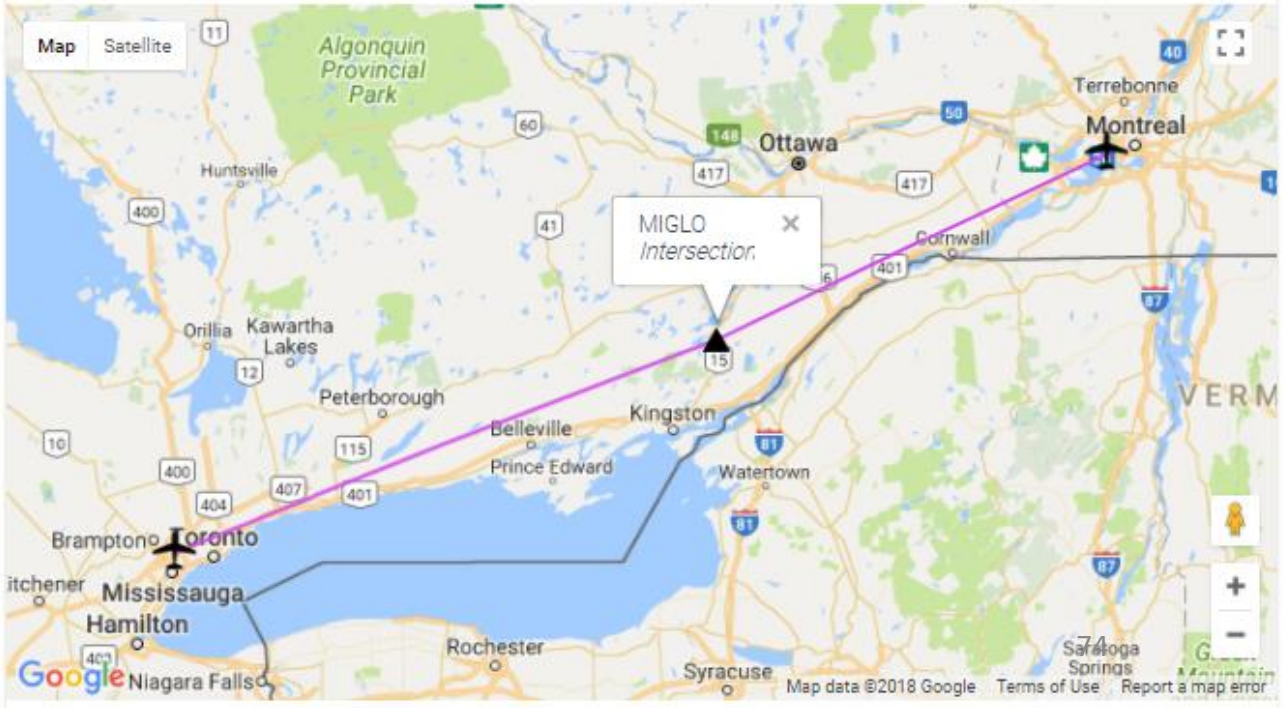
Departure: CYYZ 100500Z 21005KT 15SM BKN030 M01/M08 A3035 RMK SC7 SLP287
Destination: CYUL 100500Z 23005KT 200V280 15SM FEW240 M09/M13 A3035 RMK CI1 SLP282

Provided by AVIATION WEATHER CENTER

Fuel quantity for Canadair CRJ-700

	Fuel	Time
Fuel Usage	3330 lbs	01:02
Reserve Fuel	3970 lbs	01:15
Fuel on Board	7300 lbs	02:17

Provided by Fuelplanner.com

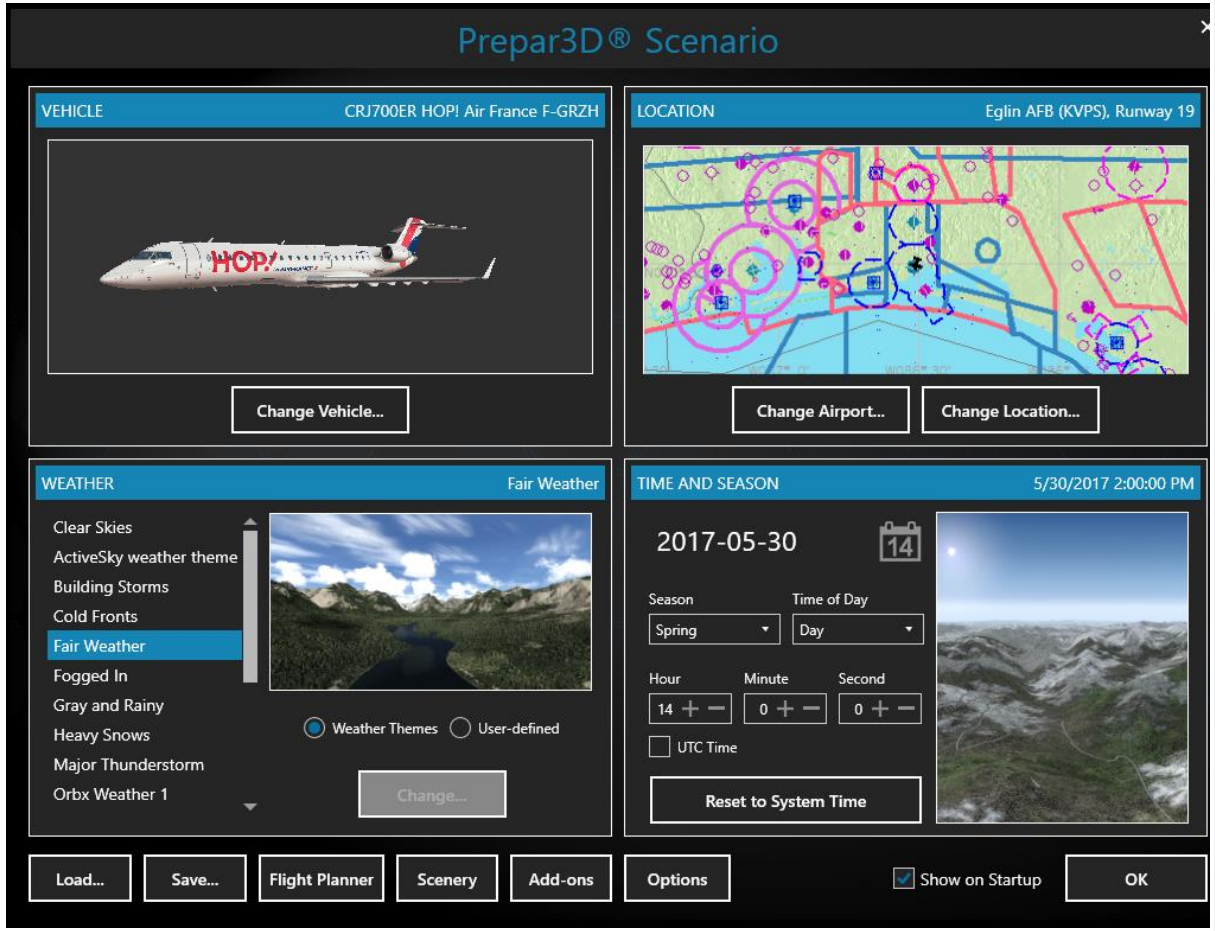


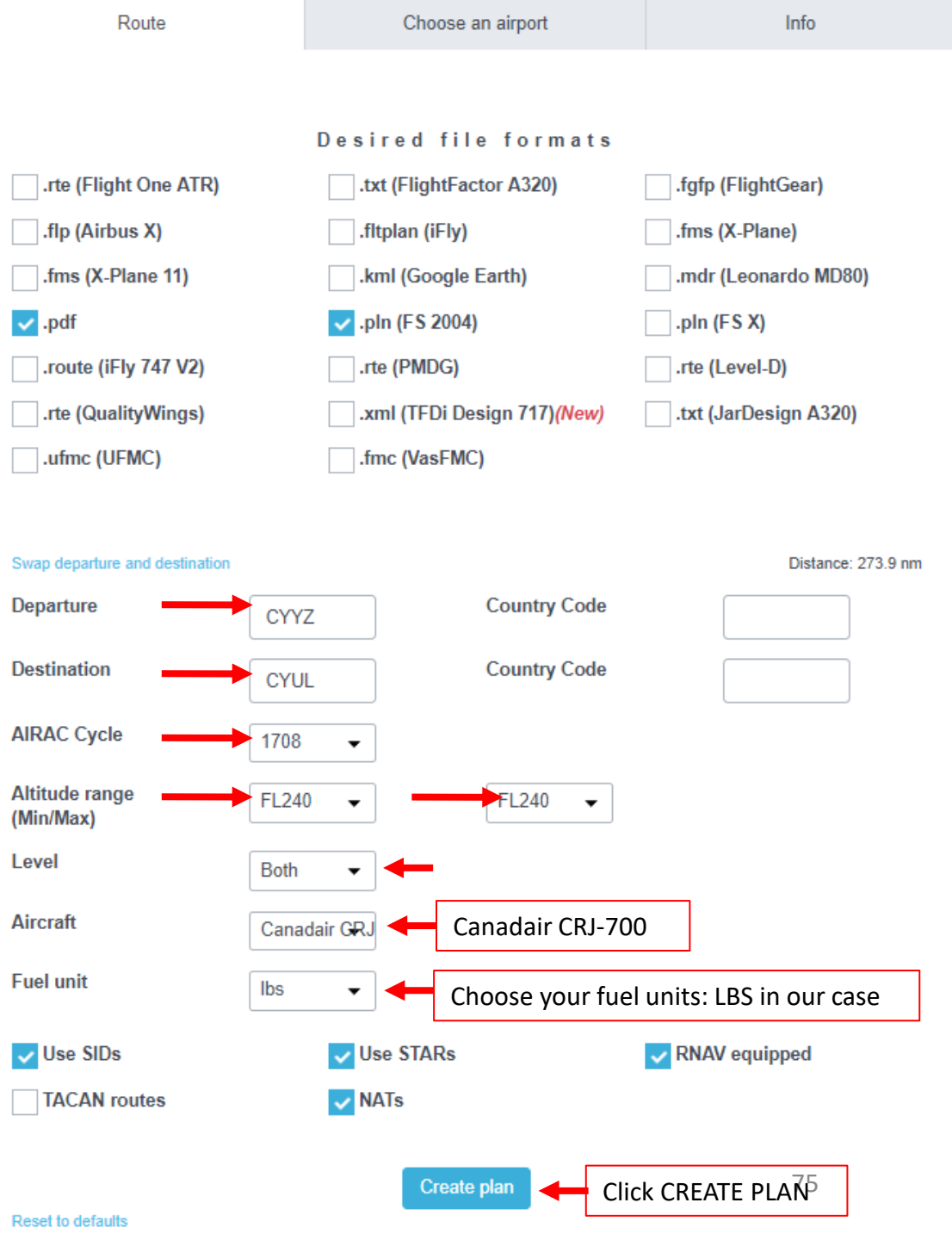
PLANNING THE FLIGHT

Today's flight will start from **TORONTO / LESTER B. PEARSON INTERNATIONAL AIRPORT (CYYZ)** and our destination will be **MONTREAL / PIERRE-ELLIOTT TRUDEAU INTERNATIONAL AIRPORT (CYUL).**

Using the "Online Flight Planner" available here: http://onlineflightplanner.org/ we will enter the Departure airport (CYYZ), the Destination airport (CYUL) and the AIRAC Cycle desired (we will use the **AIRAC cycle 1708** as explained on the next page).

Click on CREATE PLAN to generate a flight plan.





PLANNING THE FLIGHT

In aviation, an **Aeronautical Information Publication** (or **AIP**) is defined by the International Civil Aviation Organization as a publication issued by or with the authority of a state and containing aeronautical information of a lasting character essential to air navigation. It is designed to be a manual containing thorough details of regulations, procedures and other information pertinent to flying aircraft in the particular country to which it relates. It is usually issued by or on behalf of the respective civil aviation administration. AIPs are kept up-to-date by regular revision on a fixed cycle. For operationally significant changes in information, the cycle known as the **AIRAC (Aeronautical Information Regulation And Control)** cycle is used: revisions are produced every 56 days (double AIRAC cycle) or every 28 days (single AIRAC cycle). These changes are received well in advance so that users of the aeronautical data can update their flight management systems (FMS). (Source: https://en.wikipedia.org/wiki/Aeronautical_Information_Publication)

In other words, some Youtube tutorials might show you flight routes with certain waypoints that got changed with more recent AIRAC updates. Some waypoints or even airports may not exist anymore. Therefore, you have two options:

1. Plan your flight using the default AIRAC cycle programmed in the FMC when it was first released by Digital Aviation during late July, 2017 (period **08)** 20**17** (AIRAC cycle **1708**), which is what we will do for this tutorial. This option is free and simple if you fly alone. However, if you fly with online ATCs in multiplayer that use the latest AIRAC database, you should go for the second option.
2. Plan your flight using the latest AIRAC cycle. You will need to update your AIRAC, SID and STAR database by using a paid subscription service called "Navigraph", which is available here https://www.navigraph.com/FmsDataManualInstall.aspx .

AIRAC effective dates (28-day cycle) [edit]

The current AIRAC cycle is 1605 (effective 28 Apr 2016).

#	2003	2004*	2005	2006	2007	2008*	2009	2010	2011	2012*	2013	2014	2015	2016*	2017	2018	2019	2020*
01	23 Jan	22 Jan	20 Jan	19 Jan	18 Jan	17 Jan	15 Jan	14 Jan	13 Jan	12 Jan	10 Jan	9 Jan	8 Jan	7 Jan	5 Jan	4 Jan	3 Jan	2 Jan
02	20 Feb	19 Feb	17 Feb	16 Feb	15 Feb	14 Feb	12 Feb	11 Feb	10 Feb	9 Feb	7 Feb	6 Feb	5 Feb	4 Feb	2 Feb	1 Feb	31 Jan	30 Jan
03	20 Mar	18 Mar	17 Mar	16 Mar	15 Mar	13 Mar	12 Mar	11 Mar	10 Mar	8 Mar	7 Mar	6 Mar	5 Mar	3 Mar	2 Mar	1 Mar	28 Feb	27 Feb
04	17 Apr	15 Apr	14 Apr	13 Apr	12 Apr	10 Apr	9 Apr	8 Apr	7 Apr	05 Apr	4 Apr	3 Apr	2 Apr	31 Mar	30 Mar	29 Mar	28 Mar	26 Mar
05	15 May	13 May	12 May	11 May	10 May	8 May	7 May	6 May	5 May	03 May	2 May	1 May	30 Apr	28 Apr	27 Apr	26 Apr	25 Apr	23 Apr
06	12 Jun	10 Jun	9 Jun	8 Jun	7 Jun	5 Jun	4 Jun	3 Jun	2 Jun	31 May	30 May	29 May	28 May	26 May	25 May	24 May	23 May	21 May
07	10 Jul	8 Jul	7 Jul	6 Jul	5 Jul	3 Jul	2 Jul	1 Jul	30 Jun	28 Jun	27 Jun	26 Jun	25 Jun	23 Jun	22 Jun	21 Jun	20 Jun	18 Jun
08	7 Aug	05 Aug	4 Aug	3 Aug	2 Aug	31 Jul	30 Jul	29 Jul	28 Jul	26 Jul	25 Jul	24 Jul	23 Jul	21 Jul	20 Jul	19 Jul	18 Jul	16 Jul
09	4 Sep	02 Sep	1 Sep	31 Aug	30 Aug	28 Aug	27 Aug	26 Aug	25 Aug	23 Aug	22 Aug	21 Aug	20 Aug	18 Aug	17 Aug	16 Aug	15 Aug	13 Aug
10	2 Oct	30 Sep	29 Sep	28 Sep	27 Sep	25 Sep	24 Sep	23 Sep	22 Sep	20 Sep	19 Sep	18 Sep	17 Sep	15 Sep	14 Sep	13 Sep	12 Sep	10 Sep
11	30 Oct	28 Oct	27 Oct	26 Oct	25 Oct	23 Oct	22 Oct	21 Oct	20 Oct	18 Oct	17 Oct	16 Oct	15 Oct	13 Oct	12 Oct	11 Oct	10 Oct	8 Oct
12	27 Nov	25 Nov	24 Nov	23 Nov	22 Nov	20 Nov	19 Nov	18 Nov	17 Nov	15 Nov	14 Nov	13 Nov	12 Nov	10 Nov	9 Nov	8 Nov	7 Nov	5 Nov
13	25 Dec	23 Dec	22 Dec	21 Dec	20 Dec	18 Dec	17 Dec	16 Dec	15 Dec	13 Dec	12 Dec	11 Dec	10 Dec	8 Dec	7 Dec	6 Dec	5 Dec	3 Dec
14																		31 Dec

Note: * = leap year containing 29 Feb (2004, 2008, 2012, 2016, etc.)

MCDU INDEX – STATUS MENU

Lists Active Database Validity Date and Software Version.

PLANNING THE FLIGHT

FUEL (ESTIMATION METHOD 1)

For a flight of approx. **280 nm**, fuel planning can be estimated by using http://onlineflightplanner.org/.

We can also use a rule of thumb based on this relationship.

Imperial Units
Fuel for Flight = 1100 lbs x (number of 100 nm legs) = 1100 lbs x 3 = **3500 lbs**
Reserve Fuel = **4000 lbs** (approximative figure)
Total Fuel = Fuel for Flight + Reserve Fuel = **7500 lbs**

Metric Units
Fuel for Flight = 500 kg x (number of 100 nm legs) = 500 lbs x 3 = **1500 kg**
Reserve Fuel = **1800 kg** (approximative figure)
Total Fuel = Fuel for Flight + Reserve Fuel = **3300 kg**

Lester B. Pearson International Airport (CYYZ) ⇒ Montreal / Pierre Elliott Trudeau International Airport (CYUL)

ID	Frequency	Track	Distance (nm)	Coordinates		Name/Remarks
CYYZ	-	0	0	N43°40'36.18"	W079°37'50.36"	LESTER B. PEARSON INTL
MIGLO	-	72	158	N44°38'09.00"	W076°12'37.89"	MIGLO
CYUL	-	69	116	N45°28'13.67"	W073°44'27.35"	PIERRE-ELLIOTT-TRUDEAU INTL

A waypoint can be enabled/disabled by clicking on it (except first two and last two waypoints).

3 fixes, 274 nm.

Airways:
CYYZ *SID* ***MIGLO*** *STAR* ***CYUL***

Provided by RouteFinder

Fuel quantity for Canadair CRJ-700

	Fuel	Time
Fuel Usage	3330 lbs	01:02
Reserve Fuel	3970 lbs	01:15
Fuel on Board	7300 lbs	02:17

Provided by Fuelplanner.com

PLANNING THE FLIGHT

FUEL (ESTIMATION METHOD 2)

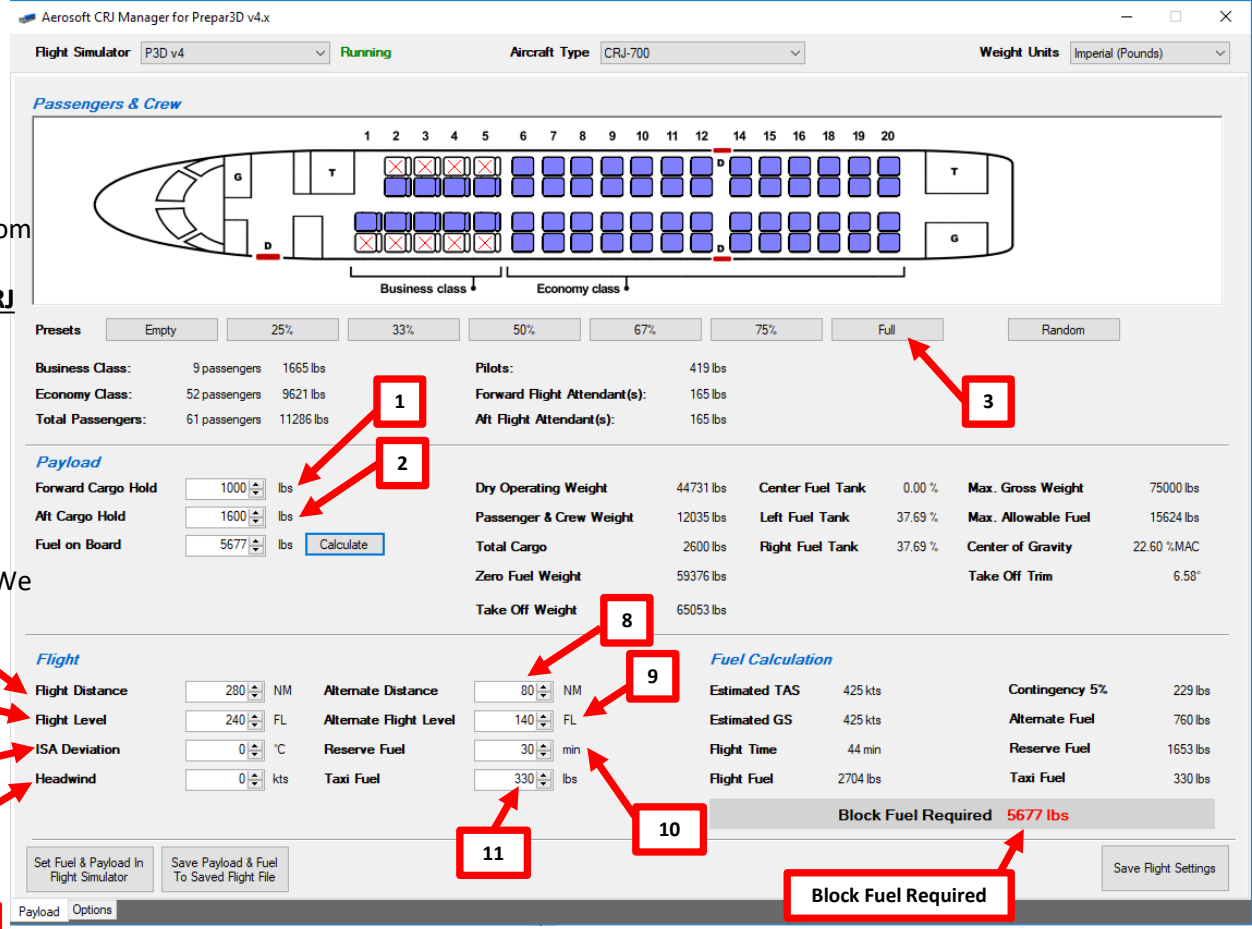
For a flight of approx. **280 nm**, fuel planning can be estimated with Digital Aviation's custom fuel calculator available in
C:\Program Files\Lockheed Martin\Prepar3D v4\Ecosystem\aerosoft\Digital Aviation CRJ

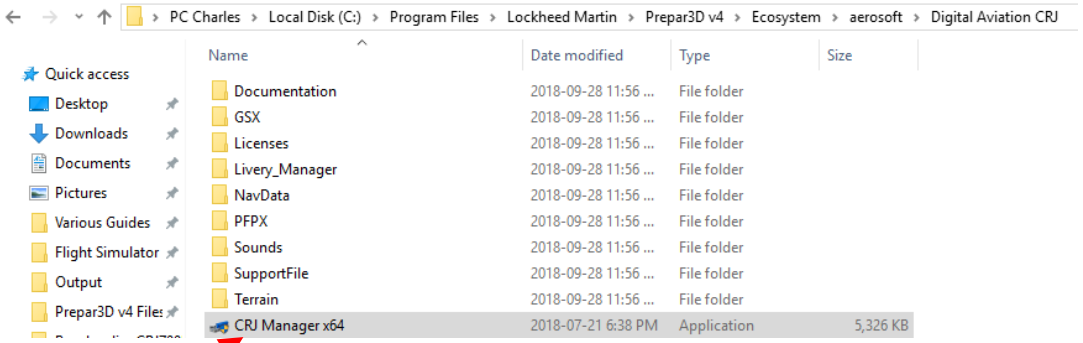
The calculator estimates a Block Fuel required based on the following input:

1. Forward Cargo Hold (we will assume 1000 lbs)
2. Aft Cargo Hold (we will assume 1600 lbs)
3. Number of Passengers (we will use a FULL preset)
4. Flight Distance (280 nm)
5. Flight Level (FL240, or a cruising altitude of 24000 ft)
6. ISA Deviation (deviation from a standard temperature of 15 deg C on the ground. We will simply use 0)
7. Headwind (we will assume 0 kts)
8. Alternate Distance (we will assume 80 nm)
9. Alternate Flight Level (we will assume FL140 or 14000 ft)
10. Reserve Fuel for 30 min
11. Taxi Fuel of 330 lbs

And that's it! We have a Required Block Fuel of **5677 lbs**

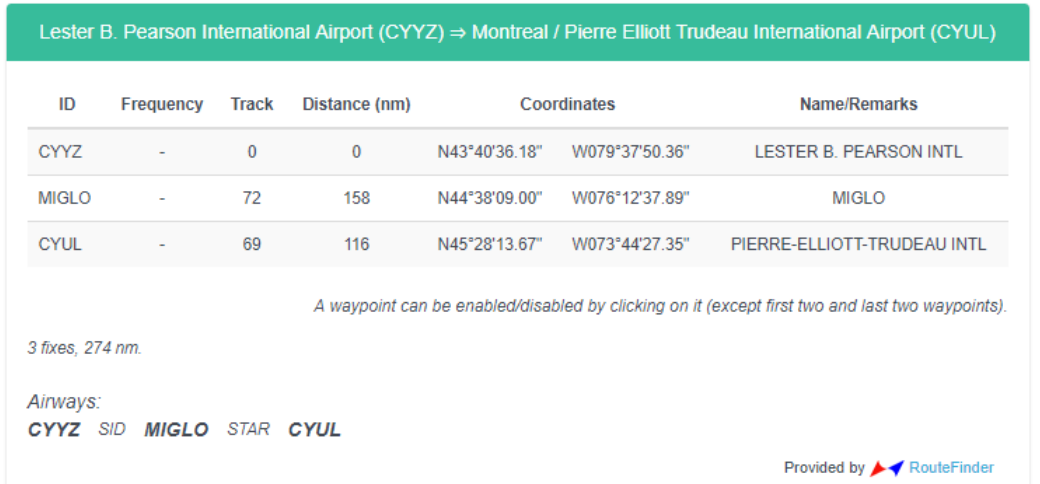
Write this fuel weight down!





CRJ Manager

This executable is available in:
C:\Program Files\Lockheed Martin\Prepar3D v4\Ecosystem\aerosoft\Digital Aviation CRJ



PLANNING THE FLIGHT

FLIGHT ROUTE (POTENTIAL)

The flight route we could take from onlineflightplanner.com is:
CYYZ SID **MIGLO** STAR **CYYZ**

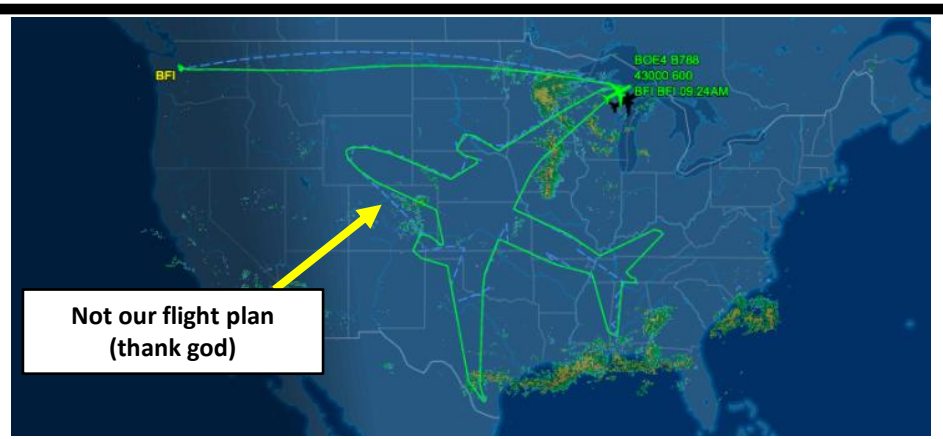
But what does it all mean? Here is a breakdown of this route:

- Depart from Toronto Lester B. Pearson Airport (CYYZ)
- Follow the SID (Standard Instrument Departure) route from CYYZ to MIGLO
- Navigate to MIGLO VOR
- Follow the STAR (Standard Terminal Arrival Route) from MIGLO to CYUL
- Land at Montreal Pierre-Elliott Trudeau Airport (CYUL)

WOAH, STOP RIGHT THERE!

Did you really think the flight plan would be that easy? No Sir/Madam! We will spice things up a bit and slightly modify the flight plan. Why? Because that simple flight plan will not force you to know how to plug in airways and use the FMS (Flight Management System) to do cool things like giving you lists of waypoints already stored in the database.

Relax, we won't do a complicated flight plan like Boeing's custom "787-shaped" flight plan. We will just modify a little bit the existing flight plan using Sky Vector, a great tool available for free online. See next page.



Lester B. Pearson International Airport (CYYZ) ⇒ Montreal / Pierre Elliott Trudeau International Airport (CYUL)

ID	Frequency	Track	Distance (nm)	Coordinates		Name/Remarks
CYYZ	-	0	0	N43°40'36.18"	W079°37'50.36"	LESTER B. PEARSON INTL
MIGLO	-	72	158	N44°38'09.00"	W076°12'37.89"	MIGLO
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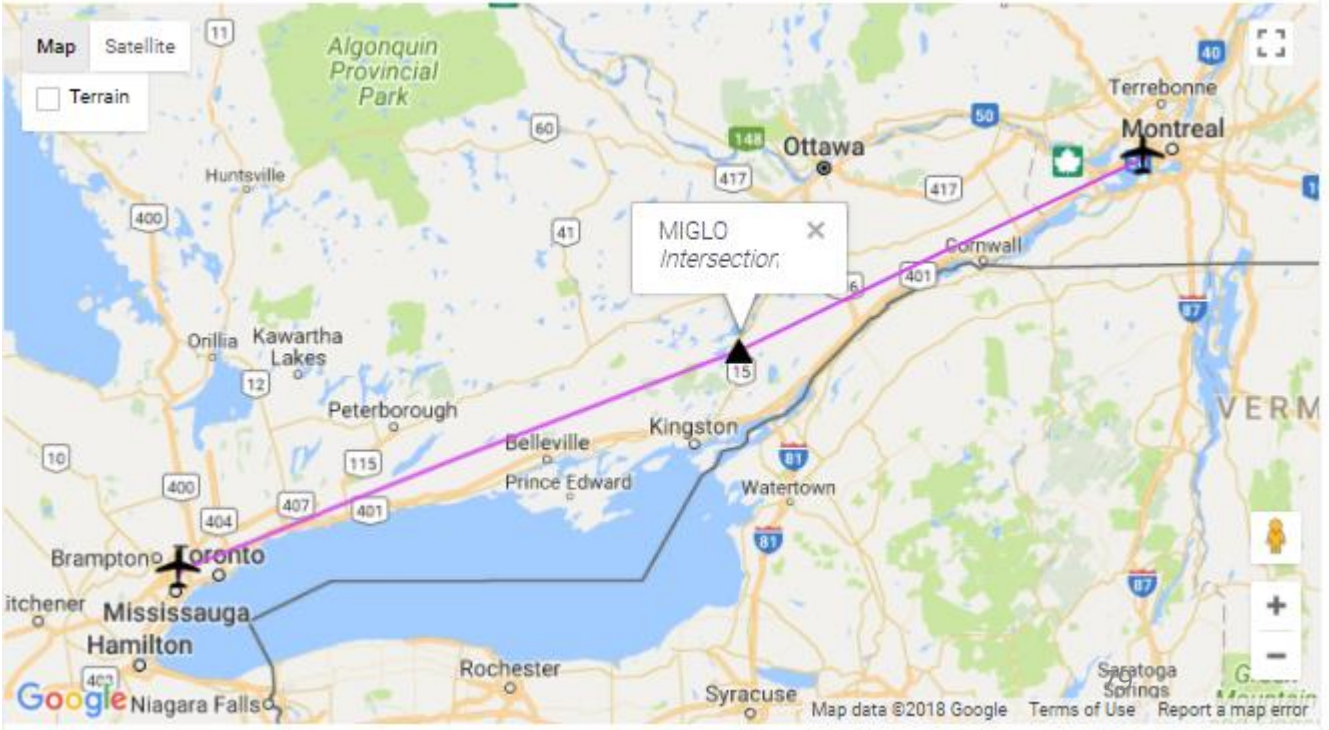
A waypoint can be enabled/disabled by clicking on it (except first two and last two waypoints).

3 fixes, 274 nm.

Airways:
CYYZ *SID* ***MIGLO*** *STAR* ***CYUL***

Provided by RouteFinder



PLANNING THE FLIGHT

FLIGHT ROUTE (ACTUAL) <- This is what we'll use

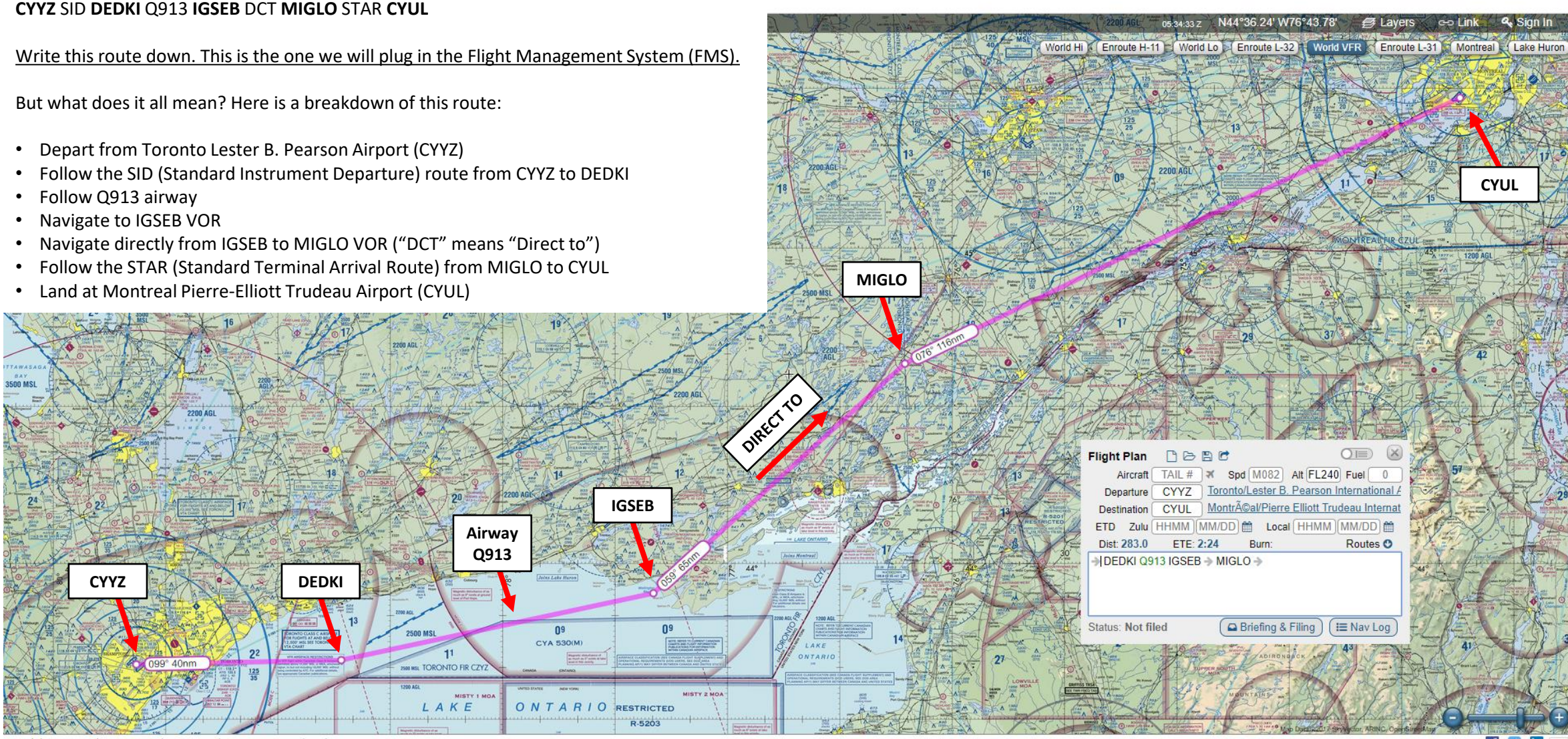
SKY VECTOR
https://skyvector.com/

The actual flight route we will take is:
CYYZ SID **DEDKI** Q913 **IGSEB** DCT **MIGLO** STAR **CYUL**

Write this route down. This is the one we will plug in the Flight Management System (FMS).

But what does it all mean? Here is a breakdown of this route:

- Depart from Toronto Lester B. Pearson Airport (CYYZ)
- Follow the SID (Standard Instrument Departure) route from CYYZ to DEDKI
- Follow Q913 airway
- Navigate to IGSEB VOR
- Navigate directly from IGSEB to MIGLO VOR ("DCT" means "Direct to")
- Follow the STAR (Standard Terminal Arrival Route) from MIGLO to CYUL
- Land at Montreal Pierre-Elliott Trudeau Airport (CYUL)



WHAT IS A **SID** AND A **STAR**?

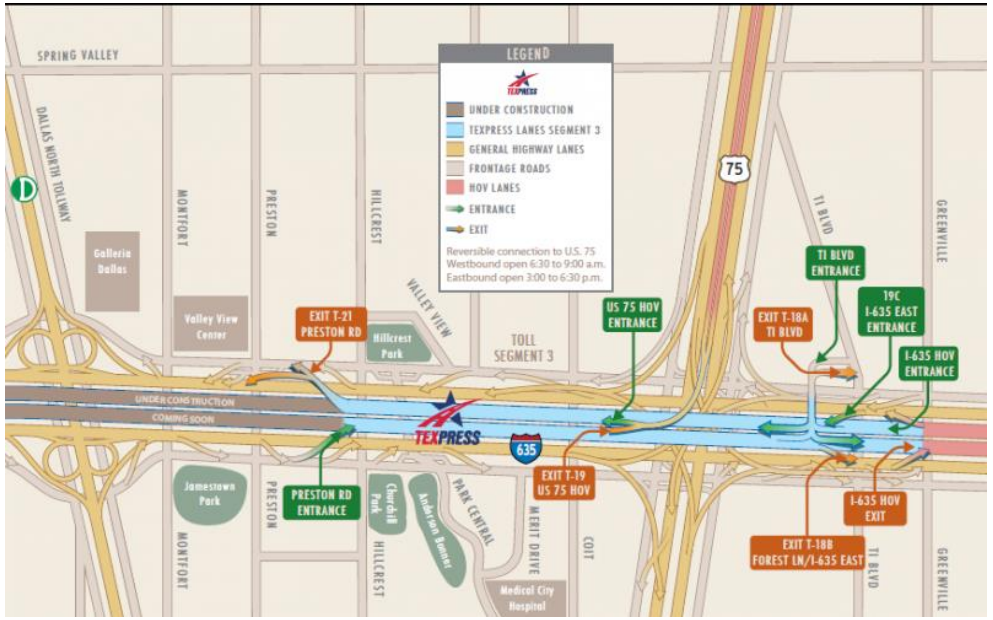
A **SID** (Standard Instrument Departure) is a small initial route which leads an aircraft from the runway they've just taken off from to the first point in his/her intended route. An airport usually has a lot of aircraft departing from it's runways. To save confusion (and for safety), a busy airport will publish standard routes from it's runways to the various routes away from that airport. This way a controller can be sure that even if a steady stream of aircraft is leaving the airport they will all be following in a nice neat line, one behind the other (that's the idea anyhow!).

Standard routes are the preferred method to fly from airport to airport. This is why we use a flight plan generator. Arriving at an airport is just the same. The **STARs** (STandard Arrival Routes) are also published in chart form and allow you to fly into an airport using standard procedures. This way, less communication is again needed with the controllers as (once you have declared your intention or been given a route to fly by name) the controller and you both know exactly how you are going to approach the airport. The end of the STAR route will normally leave your aircraft at a position where controllers can give you final instructions to set you up for a landing.

SIDs and STARs are quite similar to highways; they have speed limits and altitude restrictions at certain waypoints to make sure the air traffic is flying safely and on the same trajectory. The FMC (Flight Management Computer) will automatically try to respect these restrictions.

In other words, you can see SIDs and STARs like road junctions in the sky that lead to other waypoints and airways from or to your desired airport. One airport has many SIDs and STARs.

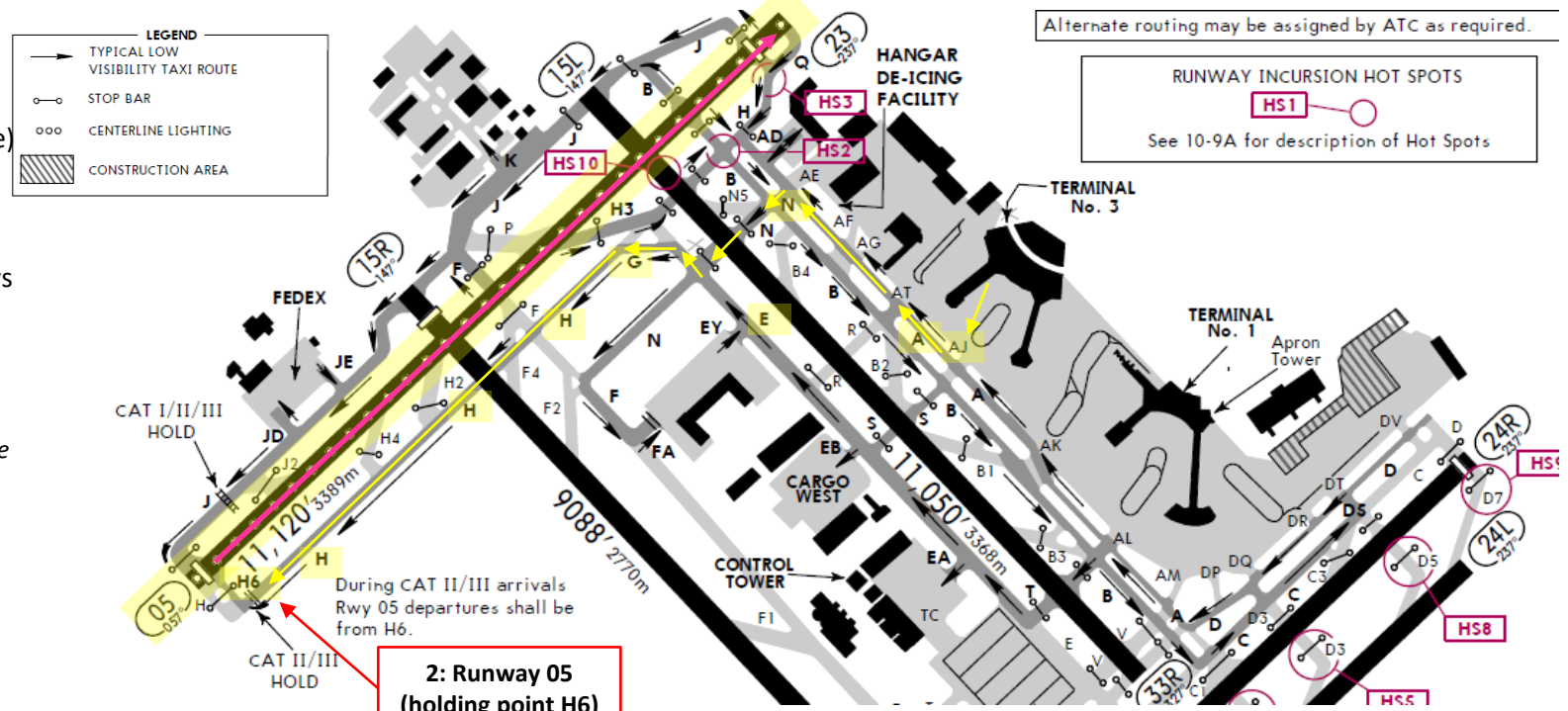
Typically, SIDs and STARs are provided by the ATC (Air Traffic Controller). Since we're doing a tutorial, I will just give you the SID and STAR to plug in the FMC.



PLANNING THE DEPARTURE - SID

These charts are for the SID (Standard Instrument Departure) from Toronto Pearson (CYYZ) to DEDKI. We intend to:

1. Spawn at Gate B22 (personal preference)
2. Taxi towards **runway 05** (orientation: 057) using taxiways 3, Alpha-Juliet (AJ), Alpha (A), November (N), Echo (E), Golf (G), Hotel (H) and holding point H6.
3. Depart from CYYZ using the SID from CYYZ to DEDKI (DEDKI4) to a target altitude of 3000 ft (FL030).
   ***NOTE**: the chart shows DEDKI3 (valid for November 2014) since I could not find the chart for DEDKI4 (valid for January 2018). Therefore, we will assume DEDKI3 and DEDKI4 are roughly the same for the purpose of this tutorial.*
4. Climb to a cruising altitude of 24,000 ft

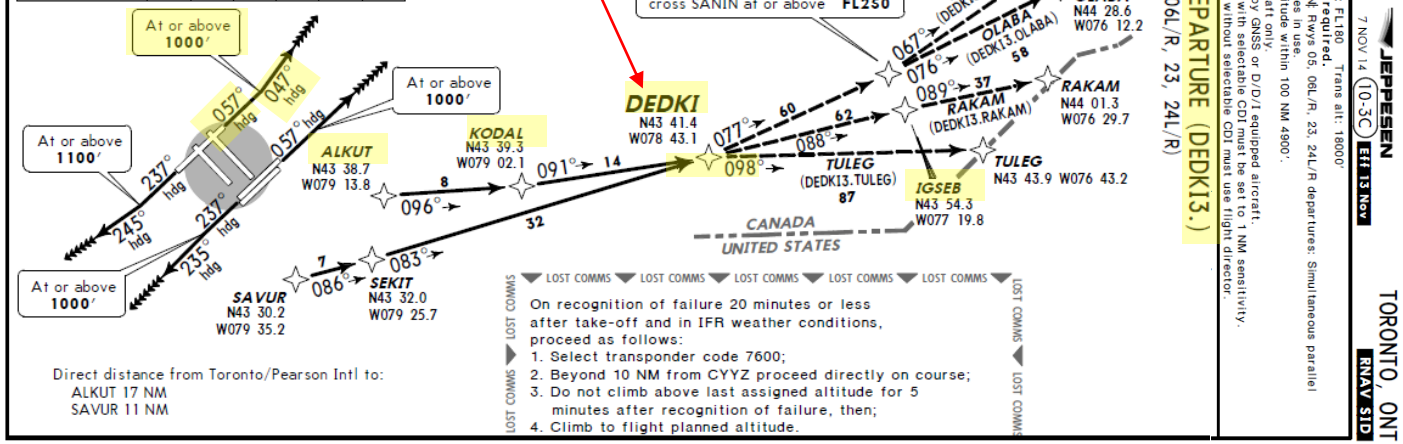


RWY	INITIAL CLIMB	ALTITUDE
05	Unless otherwise assigned by ATC: Climb heading 057° to 1000'. Climbing LEFT turn heading 047° or as assigned. EXPECT RADAR vectors to ALKUT (or as assigned), then proceed via depicted route.	Unless otherwise assigned by ATC: MAINTAIN 5000'
06L/R	Unless otherwise assigned by ATC: Climb heading 057° to 1000'. Continue climb heading 057° or as assigned. EXPECT RADAR vectors to ALKUT (or as assigned), then proceed via depicted route.	
23	Unless otherwise assigned by ATC: Climb heading 237° to 1100'. Climbing RIGHT turn heading 245° or as assigned. EXPECT RADAR vectors to SAVUR (or as assigned), then proceed via depicted route.	
24L/R	Unless otherwise assigned by ATC: Climb heading 237° to 1000'. Climbing LEFT turn heading 235° or as assigned. EXPECT RADAR vectors to SAVUR (or as assigned), then proceed via depicted route.	

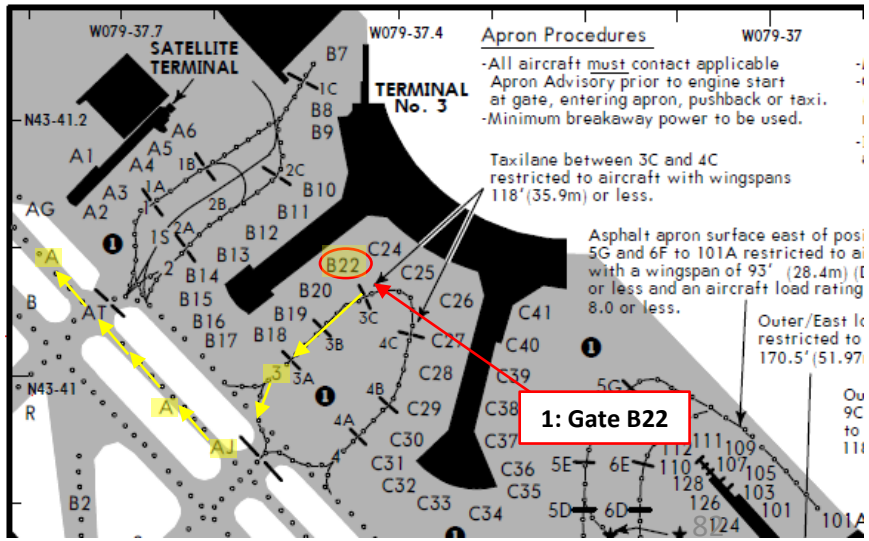
This SID requires minimum climb gradients of:
Rwy 06L: 220' per NM to 1100'.
Rwy 06R: 210' per NM to 1500'.

Gnd speed-KT	75	100	150	200	250	300
210' per NM	263	350	525	700	875	1050
220' per NM	275	367	550	733	917	1100

3: SID towards DEDKI



DEDKI THREE DEPARTURE (DEDKI3.) (RWYS 05, 06L/R, 23, 24L/R)
CYYZ/YYZ TORONTO/PEARSON INTL
JEPPESEN 7 NOV 14 (10-3C) Eff 13 Nov
TORONTO, ONT RNAV SID
TORONTO Departure 128.8 127.57
Apt Elev 569'
Trans level: FL180 Trans alt: 18000'
1. RADAR required.
2. CAUTION: Rwys 05, 06L/R, 23, 24L/R departures: Simultaneous parallel departures in use.
3. Safe Altitude within 100 NM 4900'.
4. Jet aircraft only.
5. For use by GNSS or D/D1 equipped aircraft.
6. Aircraft with selectable CDI must be set to 1 NM sensitivity. Aircraft without selectable CDI must use flight director.

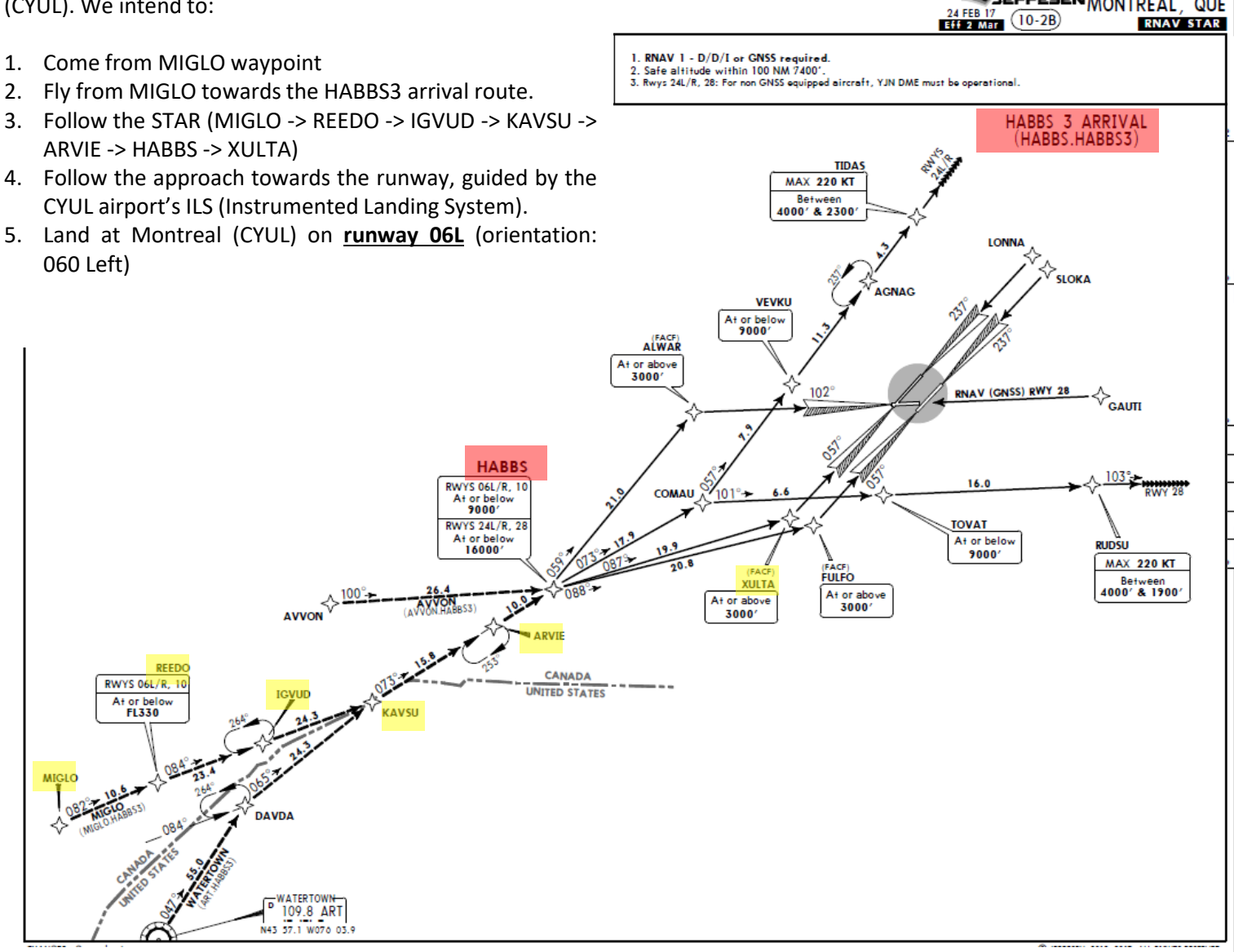


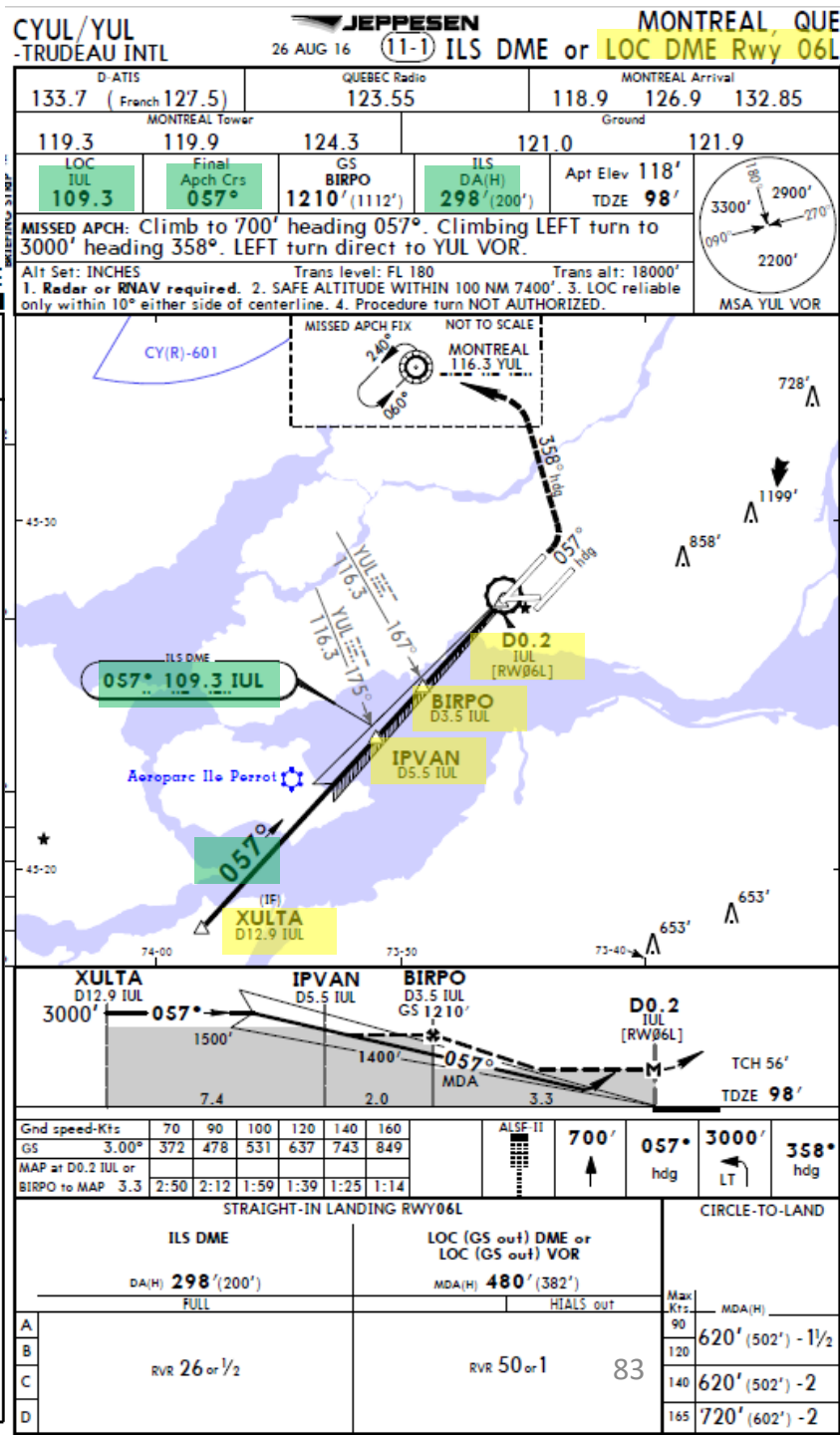
PLANNING THE APPROACH - STAR

Fun fact: The HABBS STAR name actually comes from the Montreal Canadiens hockey team, nicknamed the "Habs".

These charts are for the STAR (Standard Terminal Arrival Route) from MIGLO to Montreal Pierre-Elliott Trudeau (CYUL). We intend to:

1. Come from MIGLO waypoint
2. Fly from MIGLO towards the HABBS3 arrival route.
3. Follow the STAR (MIGLO -> REEDO -> IGVUD -> KAVSU -> ARVIE -> HABBS -> XULTA)
4. Follow the approach towards the runway, guided by the CYUL airport's ILS (Instrumented Landing System).
5. Land at Montreal (CYUL) on **runway 06L** (orientation: 060 Left)



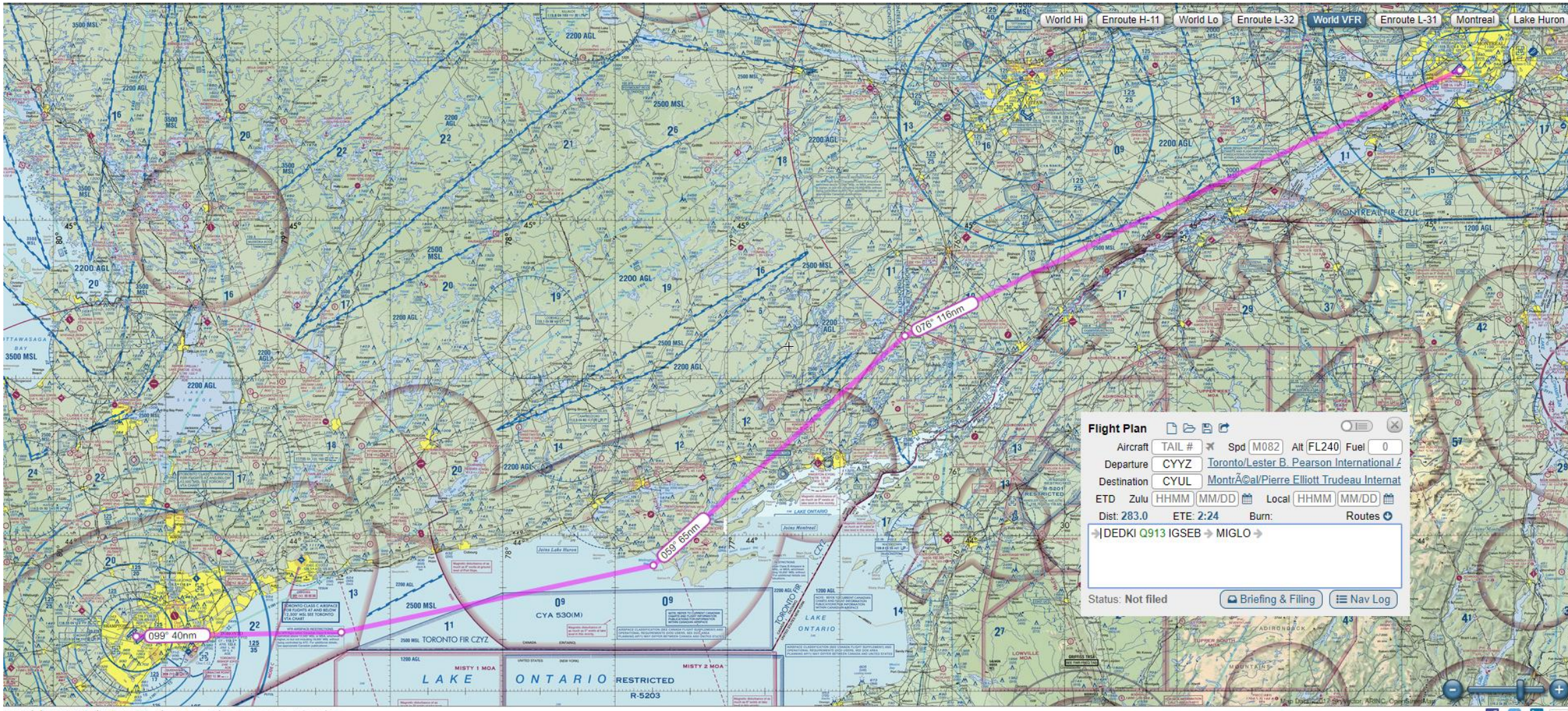


PLANNING THE FLIGHT - SUMMARY

So there it is! This is more or less all the information you need to plan your flight!

Flight Plan Input to FMC

CYYZ SID **DEDKI** Q913 **IGSEB** DCT **MIGLO** STAR **CYUL**



CDU/FMC IN A NUTSHELL

Most of the aircraft setup and flight planning will be done with the help of the CDU, which encompasses various systems such as the FMC system.

CDU: Control Display Unit (or MCDU, Multipurpose Control Display Unit)

MAIN MCDU MENU page:

- **FMC**: Flight Management Computer
  - Fundamental component of a modern airliner's avionics. The FMC is a component of the FMS (Flight Management System), which is a specialized computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew to the point that modern civilian aircraft no longer carry flight engineers or navigators. A primary function is in-flight management of the flight plan. All FMS contain a navigation database. The navigation database contains the elements from which the flight plan is constructed. The FMS sends the flight plan for display to the Electronic Flight Instrument System (EFIS), Navigation Display (ND), or Multifunction Display (MFD).

- **ACARS:** Aircraft Communication Addressing and Reporting System, not simulated
  - Digital datalink system for transmission of short messages between aircraft and ground stations via airband radio or satellite.

- **ACFT STATE:** Setup various aircraft states
  - Allows you to configure the aircraft setup (cold & dark state, engine startup state, turnaround state, engines running state) and other panel states. The DAVE EFB (Electronic Flight Bag) also has the same functionalities as this page.

Fun fact: FMS installed on the CRJ is the Collins FMS-4200. It differs significantly from the usual Thales or Rockwell Collins FMCs you might have already seen on Boeing or Airbus aircraft.

CDU MAIN MENU PAGE

CDU/FMC IN A NUTSHELL

FMC -> Flight Management Computer

- **DIR/INTC** : Direct intercept, modifies flight plan to track an interception course
- **FPLN** : Displays flight plan data
- **DEP/ARR** : Input or change departure and arrival procedures
- **HOLD** : Create and show holding pattern data
- **INDEX** : Opens INDEX page to access FMS functions which have no direct-access-keys
- **FIX** : Create reference points (fix) on map display
- **LEGS** : Modifies the Flight Plan's legs
- **SEC FPLN** : Displays secondary flight plan data
- **VNAV** : Vertical Navigation page allows a pilot to define a desired vertical flight profile along the flight plan route. It also computes deviation from that profile.
- **RADIO** : "Radio Navigation/Communication" page displays NAVAIDS (navigation aids like VOR beacons, NDBs, etc.) and communication radios selected by the pilot
- **PROG** : "Progress" page displays dynamic flight information and data related to the primary flight plan
- **PERF** : : "Performance" page provides performance data, speeds and various vertical predictions associated with each flight phase

- **MFD DATA** : Allows to switch between map and text display on the Multifunction Display
- **MFD MENU** : Allows to look deeper into the FMS data source regarding airports, navaids, fixes and modify data
- **MFD ADV** : Opens the DISPLAY ADVANCE page to move through the MFD text pages.

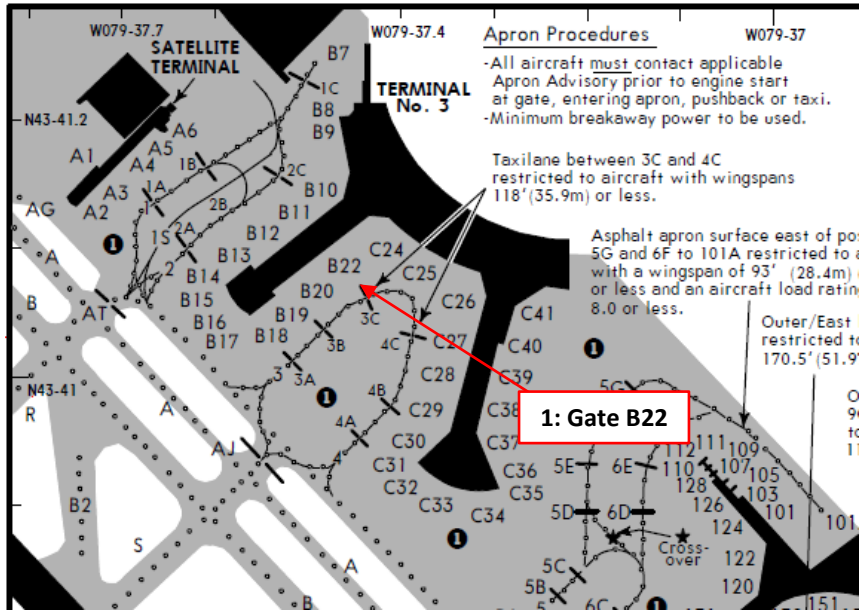
- **MCDU MENU** : Displays a list of alternate formats or options for the FUEL, FPL, NAV, VNAV or TUNE pages when selected. When the MENU key is active, the letter "M" will appear in a box on the title line of the selected page.
- **PREV/NEXT**: Cycles through previous and next page of selected FMC page
- **ARROWS**: Scrolls through menu of selected FMC page
- **MSG**: Displays messages
- **EXEC**: Enters data

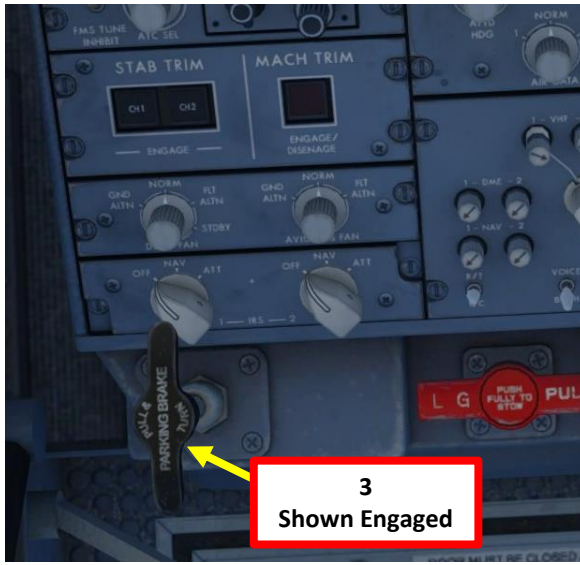
Sounds complicated? Don't worry, it's much simpler than it looks. We'll see how it works in the tutorial section.

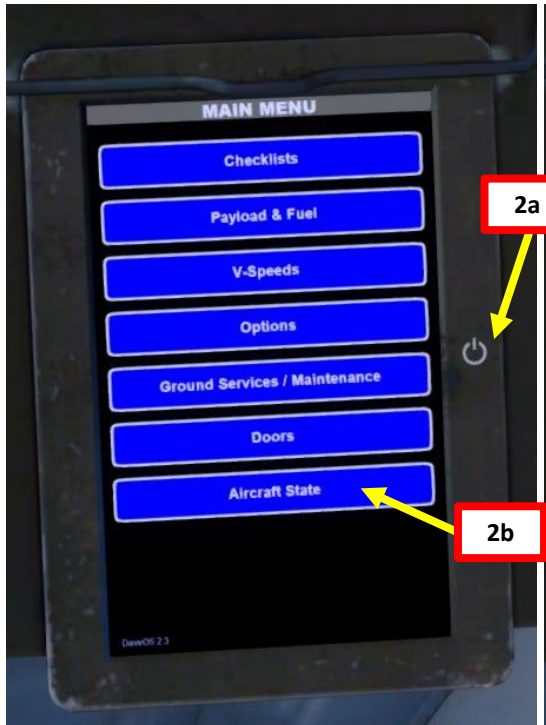
SPAWN COLD & DARK

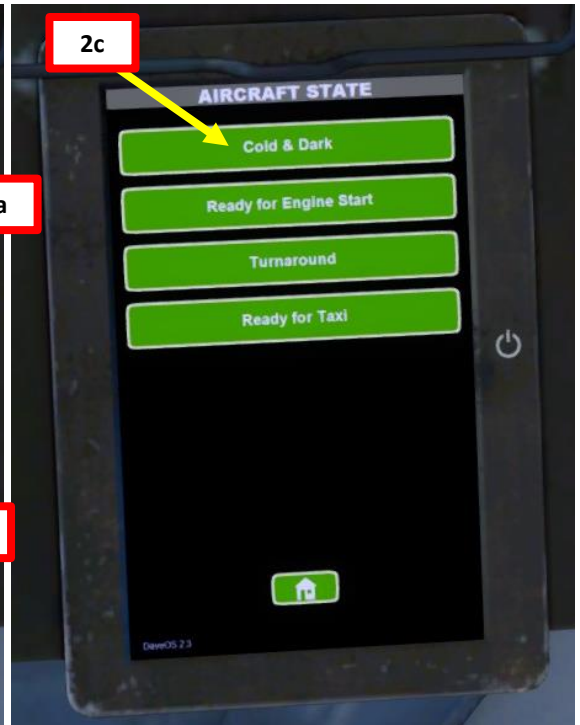
In Prepar3d or FSX, you will generally spawn with your engines running. A “cold & dark” start-up means that your aircraft is in an unpowered state with engines and every other system off. Here is the procedure to spawn in such a state:

1. Spawn like you normally would at Gate B22 in CYYZ (departure airport) in the CRJ700
2. Set cockpit in cold & dark state
   a) Click on the Power Button of the DAVE EFB (Electronic Flight Bag)
   b) Click on the “Aircraft State” menu
   c) Click on the “Cold & Dark” panel state
   d) And voila! You are now completely powered off.
3. Verify that the Parking Brake lever engaged (pulled and turned, as shown)









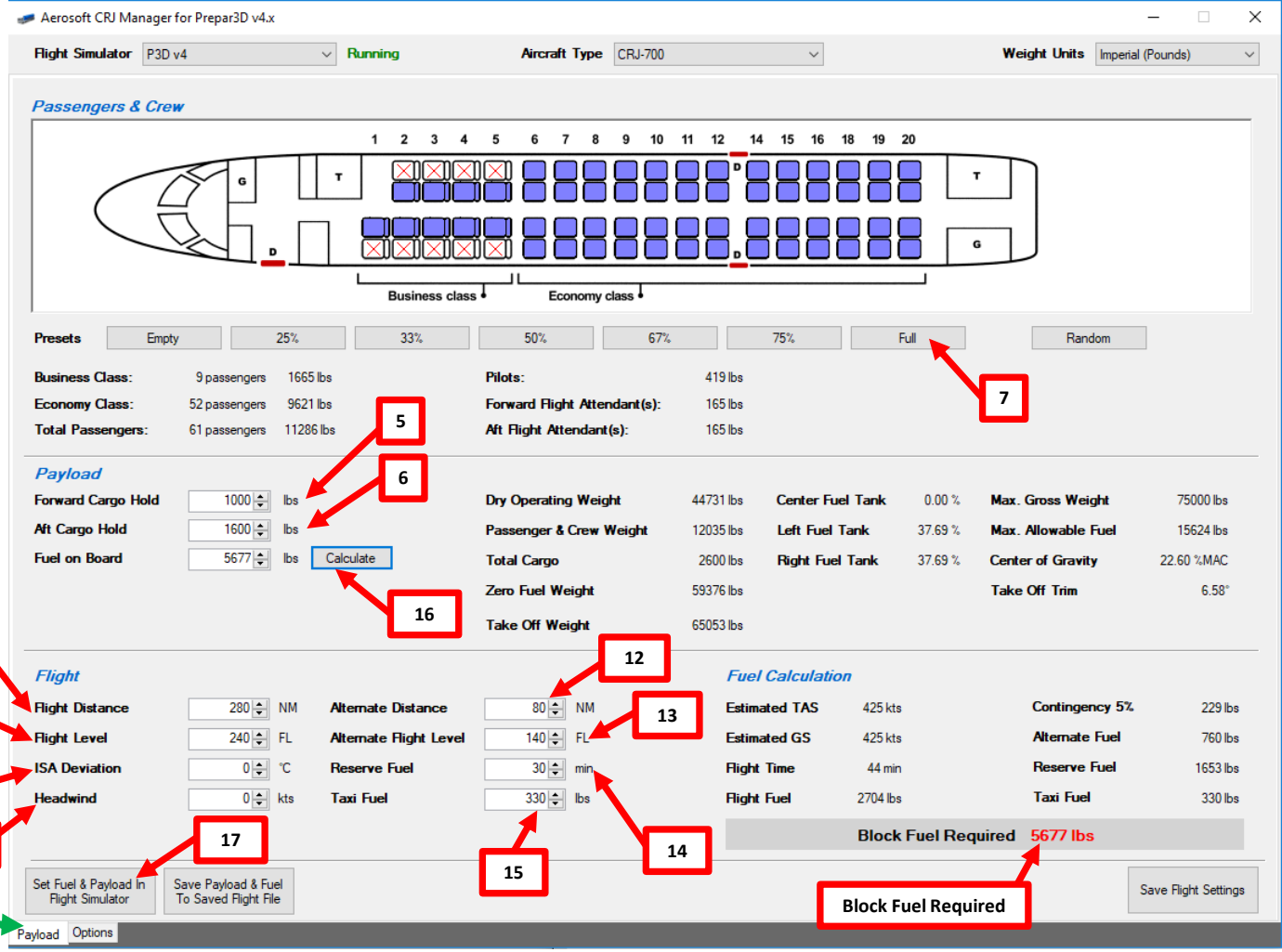
LOAD FUEL, CARGO & PASSENGERS

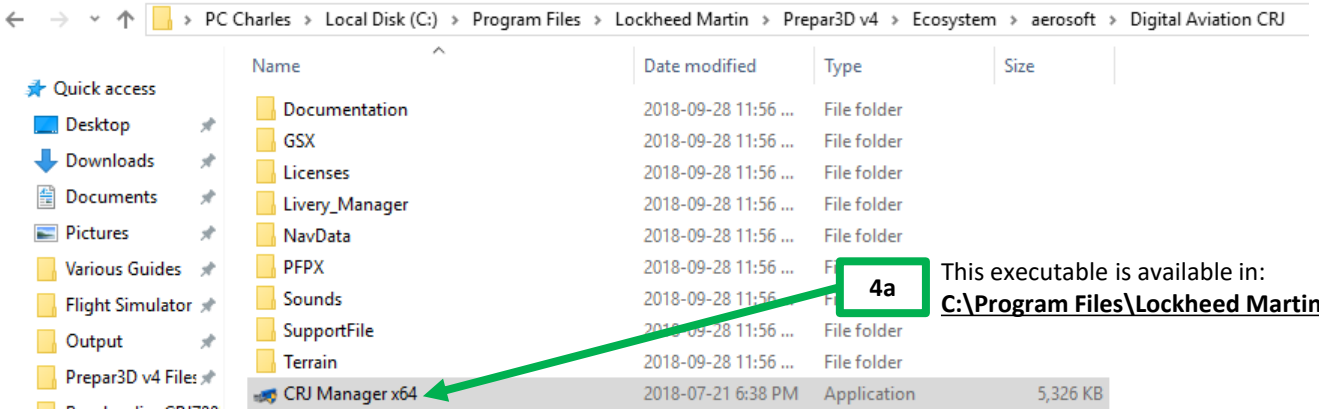
We will dynamically set our fuel, cargo and passenger loads using the CRJ Manager Control Panel.

4. Open the CRJ Manager control panel (CRJ Manager x64.exe file)
   a) Open "CRJ Manager x64.exe"
   b) Go in "Payload" tab

Set the following input parameters:

5. Forward Cargo Hold (we will assume 1000 lbs)
6. Aft Cargo Hold (we will assume 1600 lbs)
7. Number of Passengers (we will use a FULL preset)
8. Flight Distance (280 nm)
9. Flight Level (FL240, or a cruising altitude of 24000 ft)
10. ISA Deviation (deviation from a standard temperature of 15 deg C on the ground. We will simply use 0)
11. Headwind (we will assume 0 kts)
12. Alternate Distance (we will assume 80 nm)
13. Alternate Flight Level (we will assume FL140 or 14000 ft)
14. Reserve Fuel for 30 min
15. Taxi Fuel of 330 lbs
16. Click "Calculate"
17. Once Weight and Balance configuration is deemed correct, click on "Set Fuel & Payload in Flight Simulator" to set the loads on the aircraft.

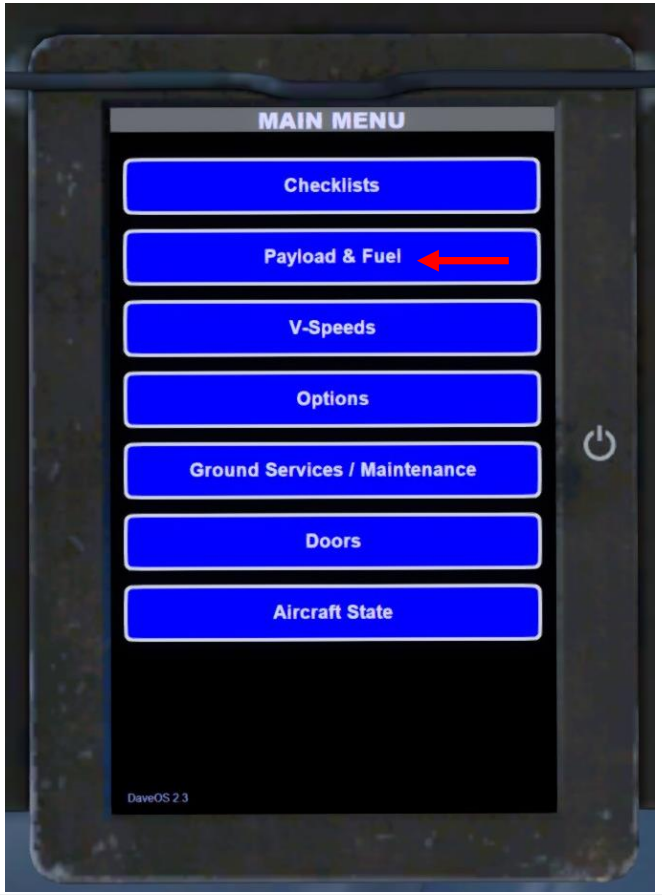




This executable is available in:
C:\Program Files\Lockheed Martin\Prepar3D v4\Ecosystem\aerosoft\Digital Aviation CRJ

LOAD FUEL, CARGO & PASSENGERS

Note: You can check on the DAVE EFB on the Payload & Fuel page if the fuel and payload were transferred correctly.



Payload

Forward Cargo Hold	1000 lbs		Dry Operating Weight	44731 lbs	Center Fuel Tank	0.00 %	Max. Gross Weight	75000 lbs
Aft Cargo Hold	1600 lbs		Passenger & Crew Weight	12035 lbs	Left Fuel Tank	37.69 %	Max. Allowable Fuel	15624 lbs
Fuel on Board	5677 lbs	Calculate	Total Cargo	2600 lbs	Right Fuel Tank	37.69 %	Center of Gravity	22.60 %MAC
			Zero Fuel Weight	59376 lbs			Take Off Trim	6.58°
			Take Off Weight	65053 lbs				

Flight

Flight Distance	280 NM	Alternate Distance	80 NM		
Flight Level	240 FL	Alternate Flight Level	140 FL		
ISA Deviation	0 °C	Reserve Fuel	30 min		
Headwind	0 kts	Taxi Fuel	330 lbs		

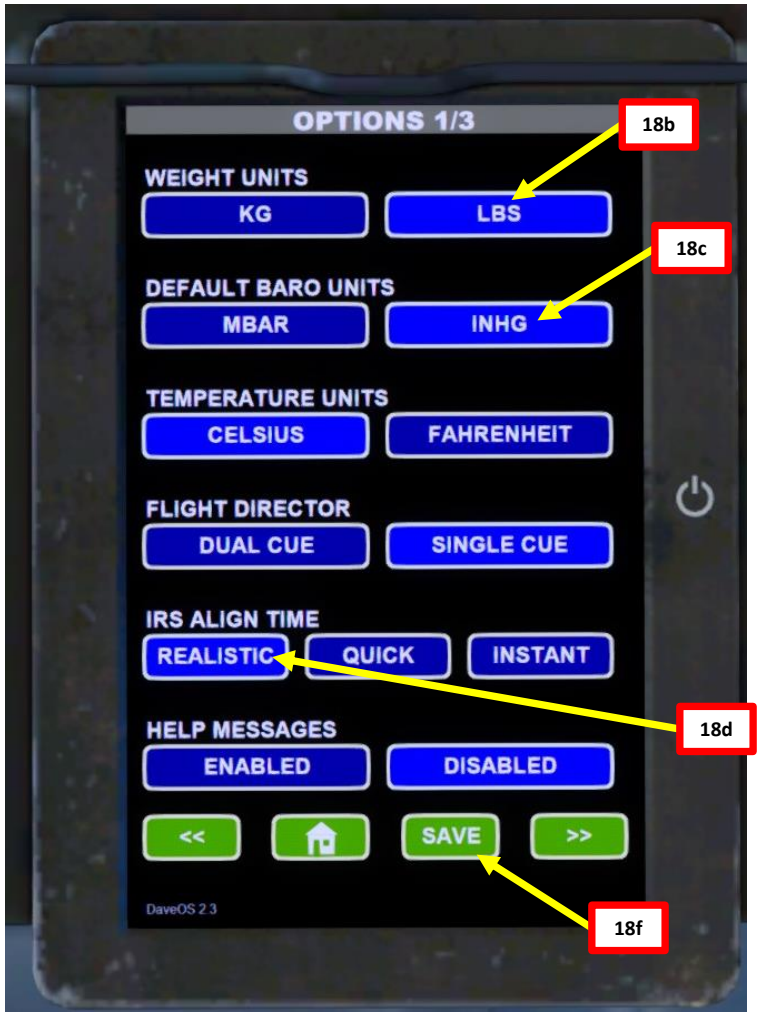
Fuel Calculation

Estimated TAS	425 kts	Contingency 5%	229 lbs
Estimated GS	425 kts	Alternate Fuel	760 lbs
Flight Time	44 min	Reserve Fuel	1653 lbs
Flight Fuel	2704 lbs	Taxi Fuel	330 lbs

Block Fuel Required 5677 lbs

SELECT DESIRED UNIT SYSTEM & OPTIONS

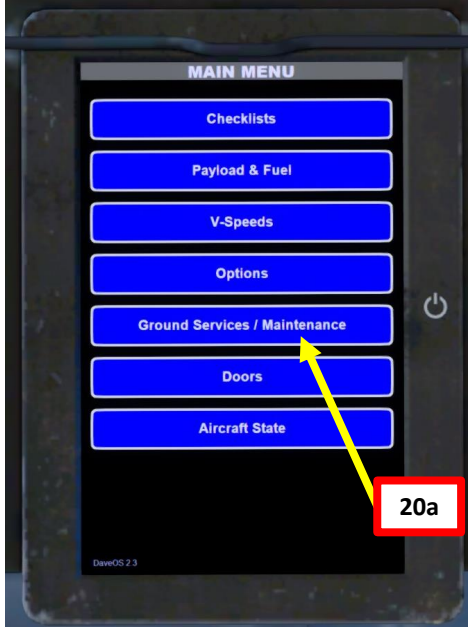
18. On the DAVE EFB
    a) Select “OPTIONS” page
    b) Select “LBS” for weight units
    c) Set Baro Units to In Hg (Inches of Mercury)
    d) Set IRS ALIGN TIME to REALISTIC
    e) Set remaining options if desired.
    f) Click SAVE.



POWER UP AIRCRAFT

19. On Overhead panel, turn on battery power
    a) Set BATTERY MASTER, MAIN BATT, AUX BATT and STBY BATT switches to ON (in that order)

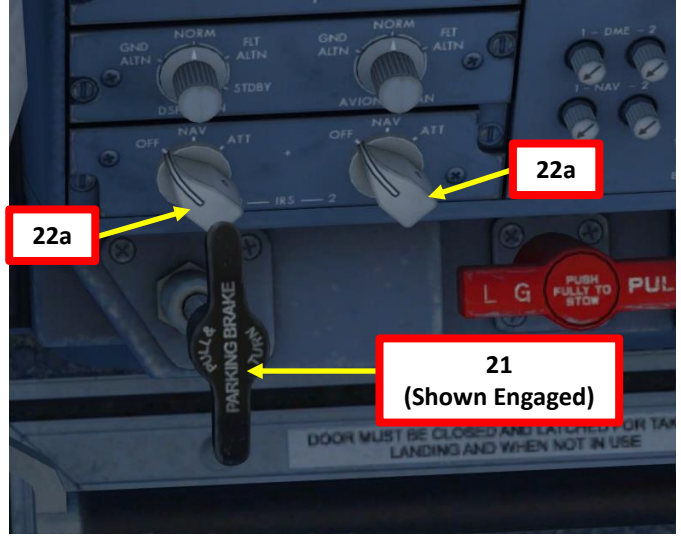
    Note: the aircraft will begin a series of Automatic BITs (built-in tests).
20. Go on DAVE EFB main menu to connect ground power unit (GPU) to the aircraft
    a) Select the "Ground Services / Maintenance" Menu
    b) Set "WHEEL BLOCKS"
    c) Set "GROUND POWER"
    d) The AC AVAIL light will illuminate when the GPU is connected
    e) Press the AC AVAIL button to use GPU Power
    f) The AC IN USE light should illuminate

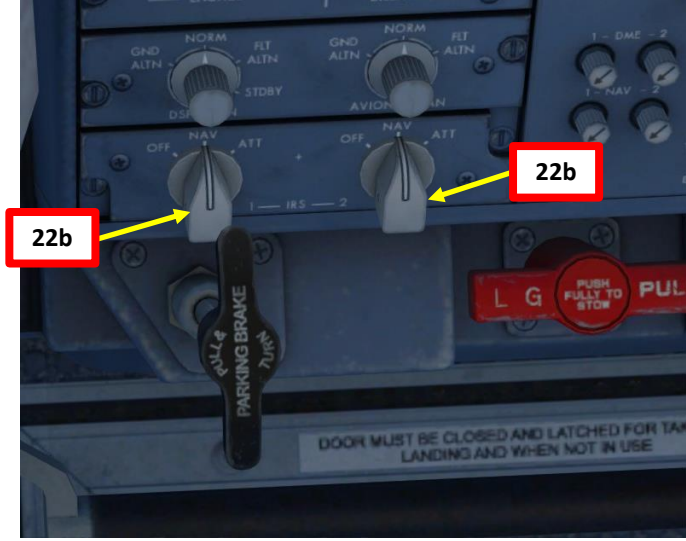


Note: In real life, when using external power, the pilot switches the battery switches OFF after switching to the external battery source. This helps protect batteries from depleting while the ground power unit is in use, or from GPU surges, or in the case of a weak GPU which will make the batteries "discharge" into the GPU. For simplicity's sake, we will simply leave the batteries ON.

START IRS ALIGNMENT

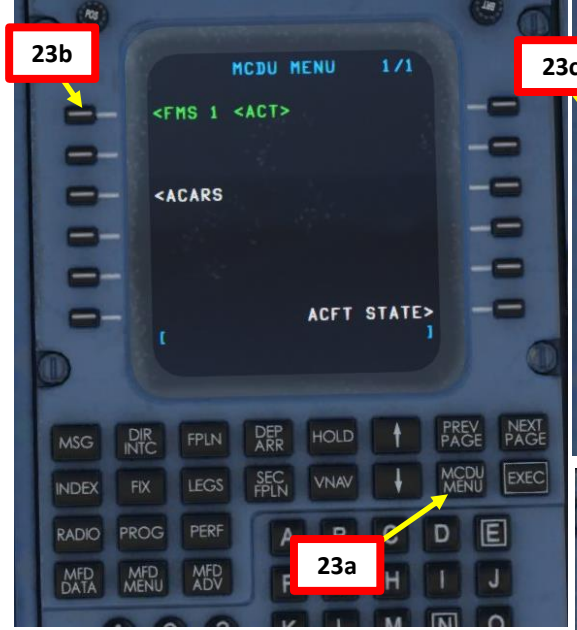
21. Engage Parking Brake (aircraft movement can screw up your navigation system alignment)
22. Set both IRS (Inertial Reference System) switches to NAV to start the IRS alignment process. This process can last between 6 and 17 minutes.





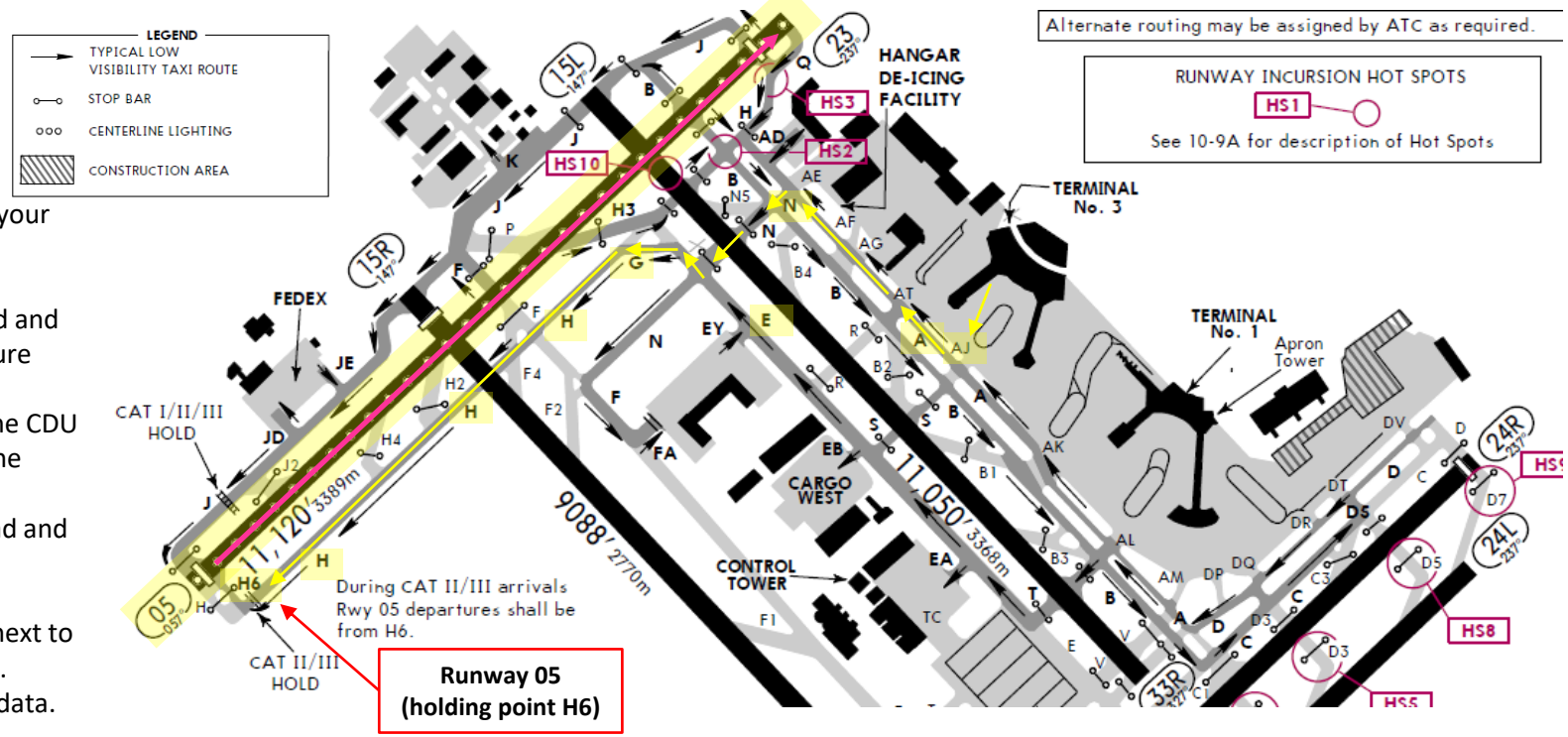
FMC SETUP - POSITION

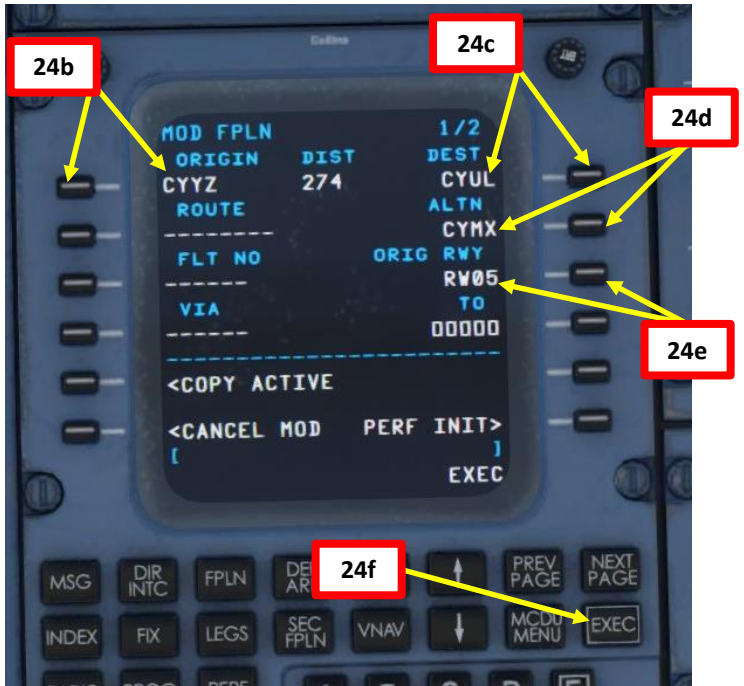
23. Go on FMC (Flight Management Computer) and set initial position for the IRS
    a) Select Main MCDU Menu
    b) Select FMS 1
    c) Select POS INIT (you can also access this menu by pressing the “INDEX” button, then selecting the POS INIT page)
    d) Your last aircraft coordinates recorded by the FMS (Flight Management System) are visible in the FMS POS field. We will have to update them to your current position.
    e) Type “CYYZ” on the CDU keypad and select LSK (Line Select Key) next to AIRPORT since we spawned at Pearson Airport (CYYZ)
    f) Type “B22” on the CDU keypad and select LSK next to GATE since we spawned at Gate B22
    g) The coordinates of your current position in the navigation database should appear in the POS INIT menu
    h) Select Gate Coordinates line to copy the coordinates to your keypad
    i) Click on the SET POS LSK to paste the coordinates, setting your IRS (Inertial Reference System) your initial reference position.
    j) Congratulations! Your aircraft’s navigation system now knows where you are.

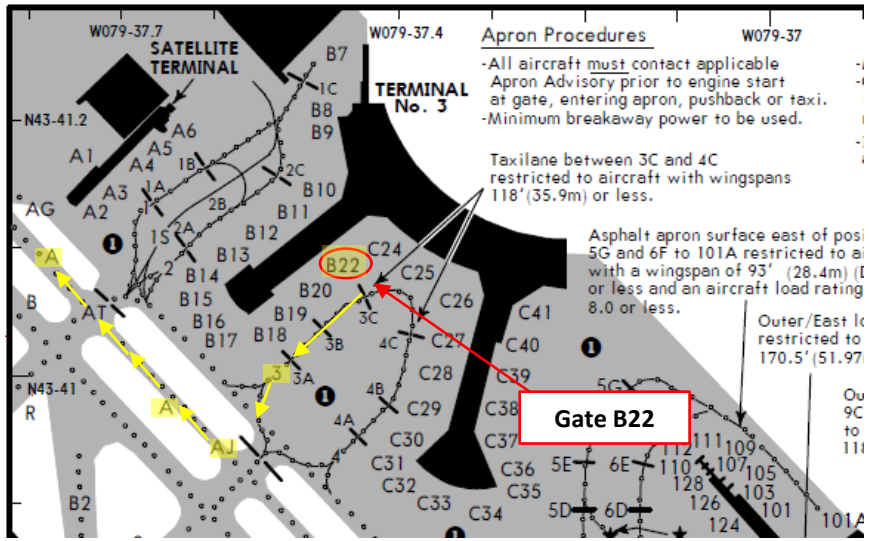


FMC SETUP – FLIGHT PLAN (ROUTE)

24. Go on FMC (Flight Management Computer) and initialize your flight plan
    a) Press the FPL page button
    b) Type “CYYZ” (Pearson Airport) on the CDU keypad and press the LSK next to ORIGIN to enter the departure airport.
    c) Type “CYUL” (Pierre-Elliott Trudeau Airport) on the CDU keypad and press the LSK next to DEST to enter the destination airport.
    d) Type “CYMX” (Mirabel Airport) on the CDU keypad and press the LSK next to ALTN to enter the alternate destination airport.
    e) Type “05” on the CDU keypad and press the LSK next to ORIG RWY to enter Departure Airport Runway 05.
    f) Press on the EXEC button to enter the flight plan data.

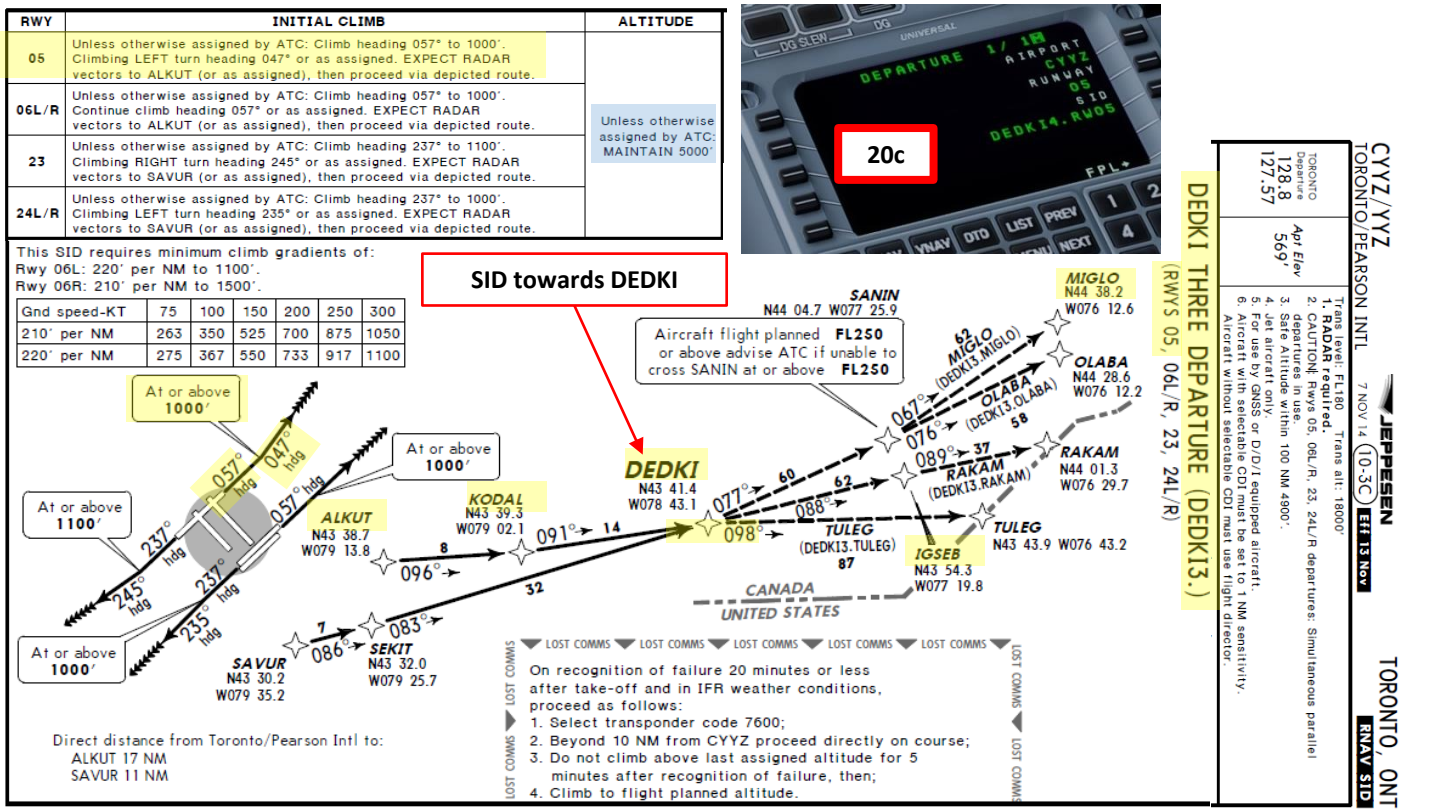






FMC SETUP – FLIGHT PLAN (DEPARTURE)

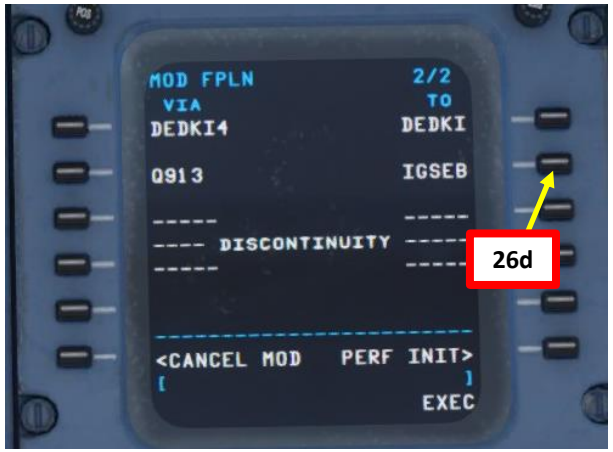
25. Go on FMC (Flight Management Computer) and set up your departure parameters for the SID (Standard Instrument Departure)
    a) Click on "DEP ARR" (Departure / Arrival) Button
    b) Click on "DEP – CYYZ" to set Toronto as our Departure Point
    c) Select Runway 05
    d) Find SID (Standard Instrument Departure) for DEDKI4 by pressing the NEXT PAGE button if required.
    e) Select SID (Standard Instrument Departure) for DEDKI4 as determined when we generated our flight plan.
    f) Click on EXEC button to enter data.
    g) All departure data is now entered in the FMC.



FMC SETUP – FLIGHT PLAN (WAYPOINTS & AIRWAYS)

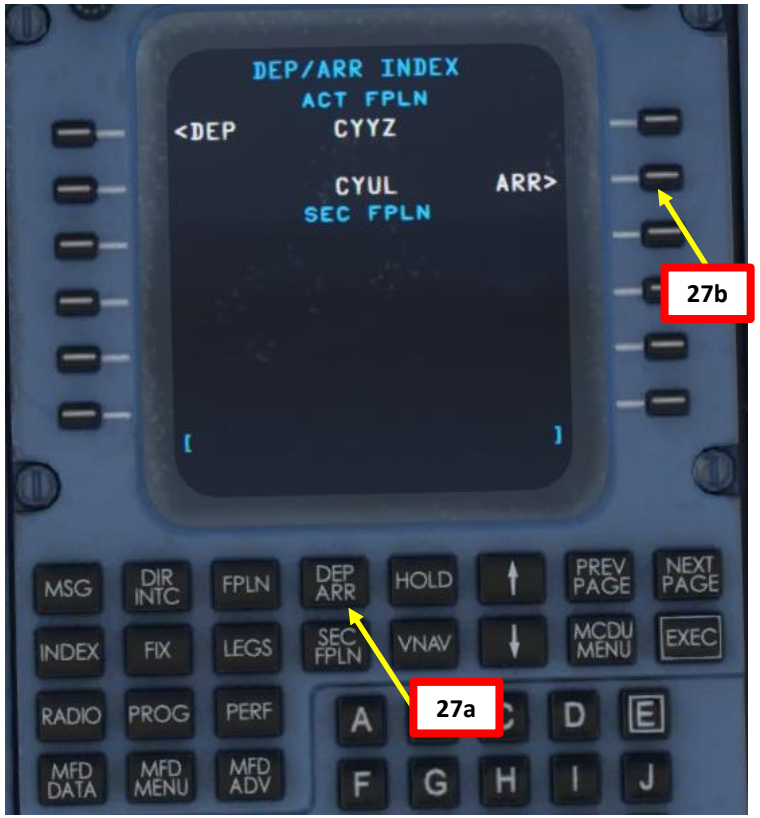
CYYZ SID **DEDKI** Q913 **IGSEB** DCT **MIGLO** STAR **CYUL**

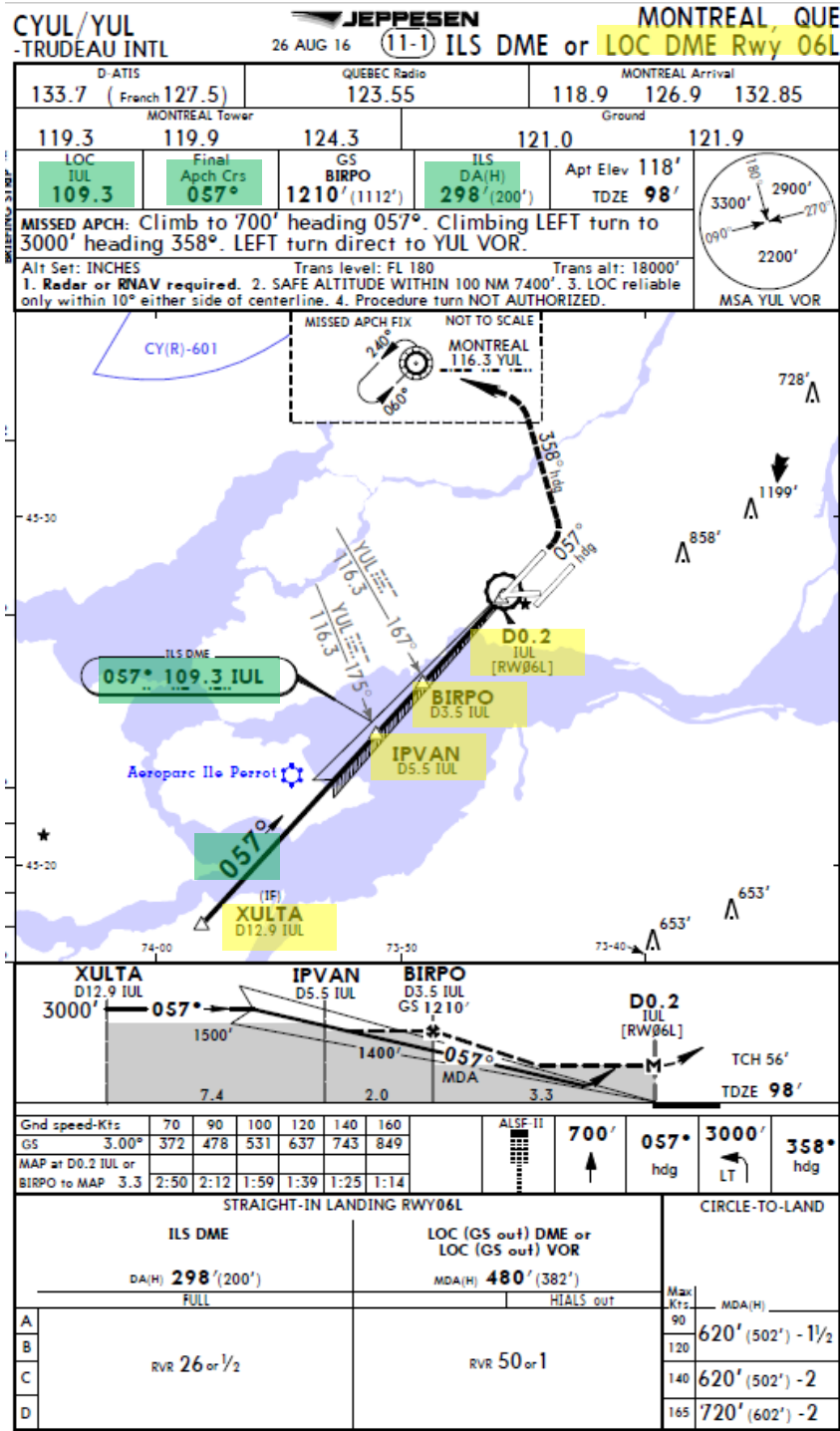
26. Go on FMC (Flight Management Computer) and set up your remaining waypoints and airways
    a) Press the FPL page button
    b) Click NEXT button to show page 2
    c) Type “Q913” on the CDU keypad and click on the LSK next to the dashed line on the left column (VIA/AIRWAYS) to set your next Airway.
    d) Type “IGSEB” on the CDU keypad and click on the LSK next to IGSEB squared line on the right column (TO/WAYPOINTS) to set your next Waypoint to IGSEB.
    e) IGSEB waypoint has now been added after DEDKI and will be accessible through airway Q913
    f) Type “MIGLO” on the CDU keypad and click on the LSK next to IGSEB dashed line on the right column (TO/WAYPOINTS) to set your next Waypoint to MIGLO.
    g) Take note that “DIRECT” will appear in the VIA/AIRWAYS column next to MIGLO since the FMC will automatically assume that you want to fly directly from IGSEB to MIGLO since you did not specify an airway.
    h) Press on the EXEC button to enter the flight plan data.



FMC SETUP – FLIGHT PLAN (ARRIVAL)

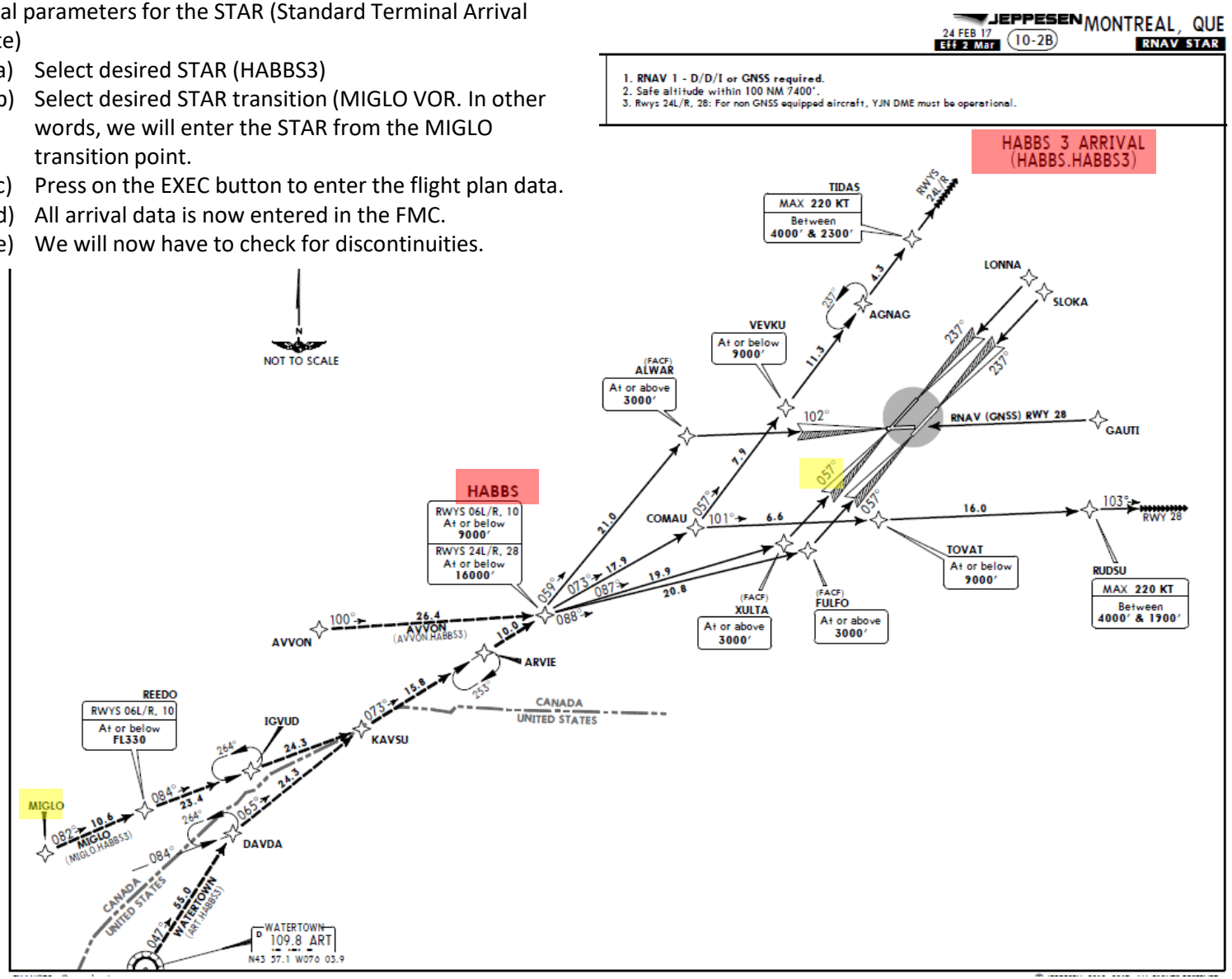
27. Go on FMC (Flight Management Computer) and set up your arrival parameters
    a) Click on “DEP ARR” (Departure / Arrival) Button
    b) Click on “CYUL – ARR” to set Montreal as our Arrival Point
    c) Select Runway 06L (06 Left) as our Approach





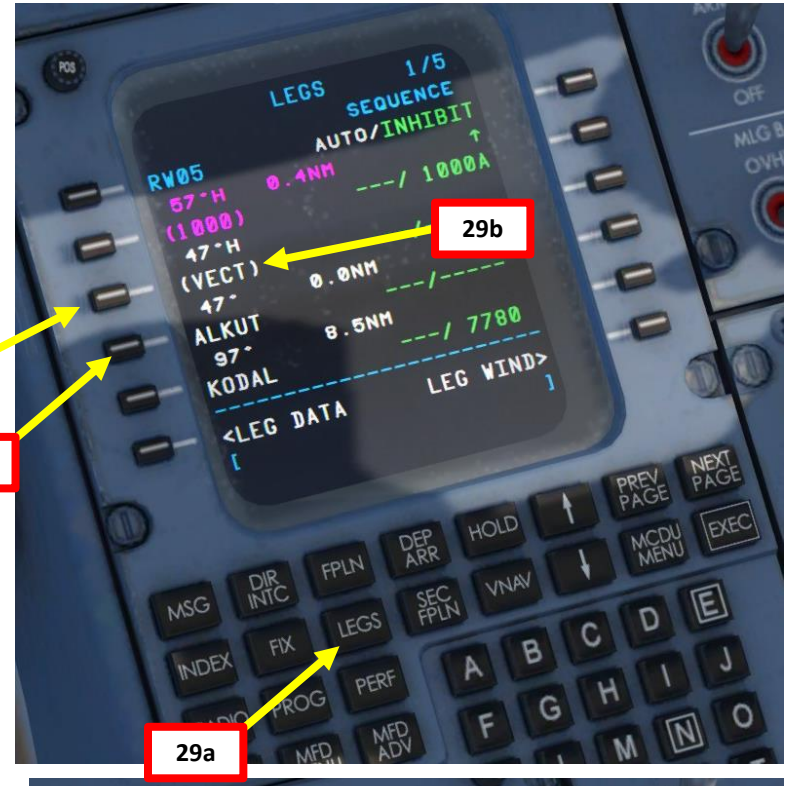
FMC SETUP – FLIGHT PLAN (ARRIVAL)

28. Go on FMC (Flight Management Computer) and set up your arrival parameters for the STAR (Standard Terminal Arrival Route)
    a) Select desired STAR (HABBS3)
    b) Select desired STAR transition (MIGLO VOR. In other words, we will enter the STAR from the MIGLO transition point.
    c) Press on the EXEC button to enter the flight plan data.
    d) All arrival data is now entered in the FMC.
    e) We will now have to check for discontinuities.



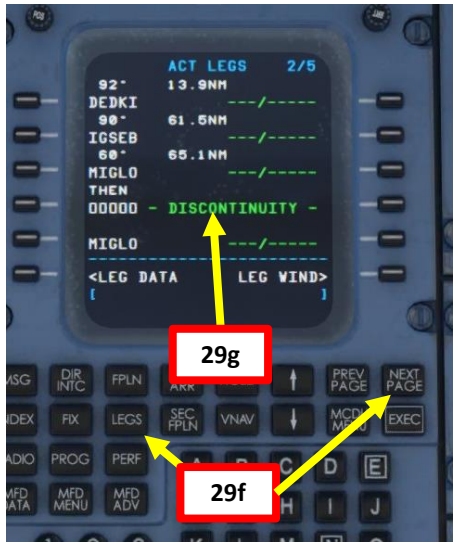
FMC SETUP – FLIGHT PLAN (CLEAN UP DISCONTINUITIES)

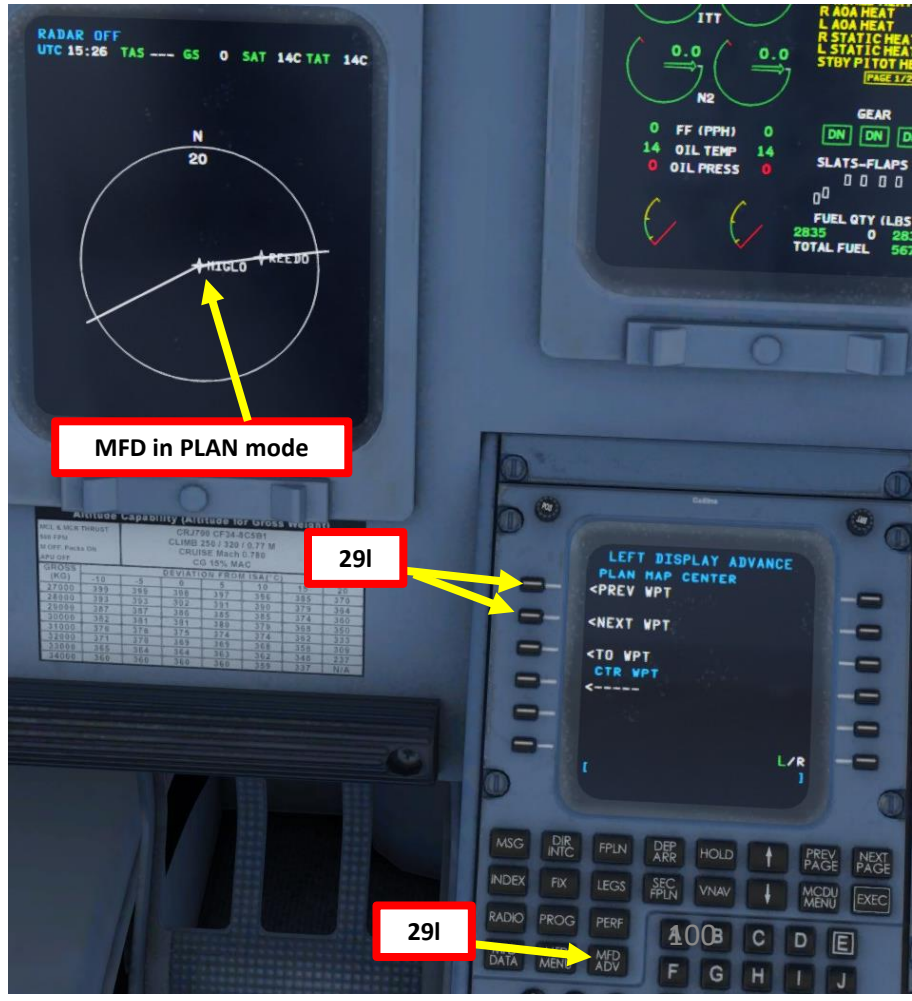
29. Go on FMC (Flight Management Computer) and remove remaining discontinuities from the flight plan
    a) Click on “LEGS”
    b) (VECT) after Runway 05 means that the FMS assumes the ATC (Air Traffic Controller) providing vectors to the next waypoint. We will assume that we won’t use vectors, so we can delete this segment of the flight plan.
    c) Click on LSK next to “ALKUT” to copy it.
    d) Click on the LSK next to the (VECT) line to replace the Vectors segment with a direct route to ALKUT.
    e) Press on the EXEC button to enter the flight plan data.

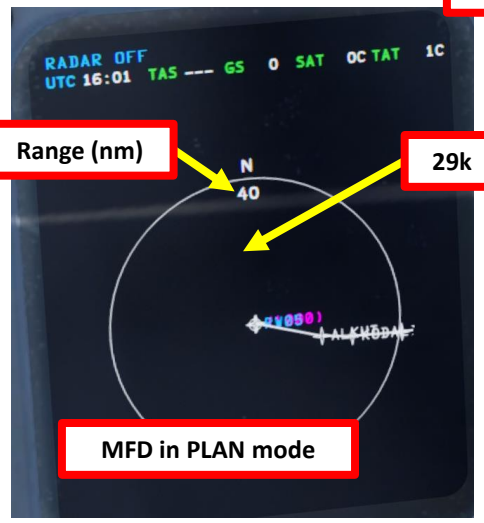


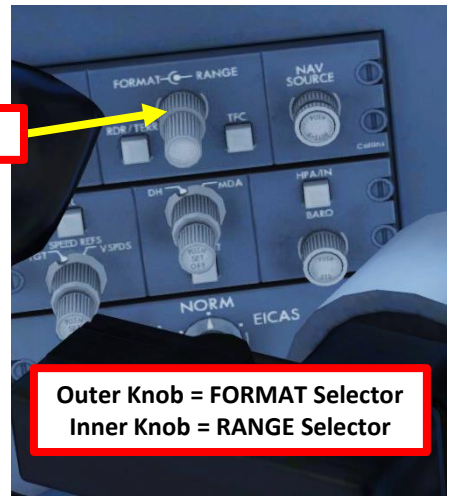
FMC SETUP – FLIGHT PLAN (CLEAN UP DISCONTINUITIES)

29. Go on FMC (Flight Management Computer) and remove remaining discontinuities from the flight plan
    - f) Click on NEXT PAGE to keep going through the flight plan
    - g) We can notice that there is a discontinuity since MIGLO is entered twice. Let's take care of it.
    - h) Click on LSK next to "MIGLO" to copy it.
    - i) Click on the LSK next to the squared line "THEN" to set MIGLO in the discontinuity space in order to fix flight plan discontinuity.
    - j) Press on the EXEC button to enter the flight plan data.
    - k) Most discontinuities should now be removed. You can cycle through waypoints by turning the "FORMAT" outer knob to set the MFD (Multifunction Display) to PLAN display mode and adjust the range with the "RANGE" inner knob.
    - l) Then, you can press the MFD ADV button to allow you to move through waypoints and check visually for discontinuities by pressing "NEXT" or "PREV" to cycle through waypoints on the MFD.
    - m) Turn the "FORMAT" knob again to return to the normal navigation MAP display mode on the MFD.







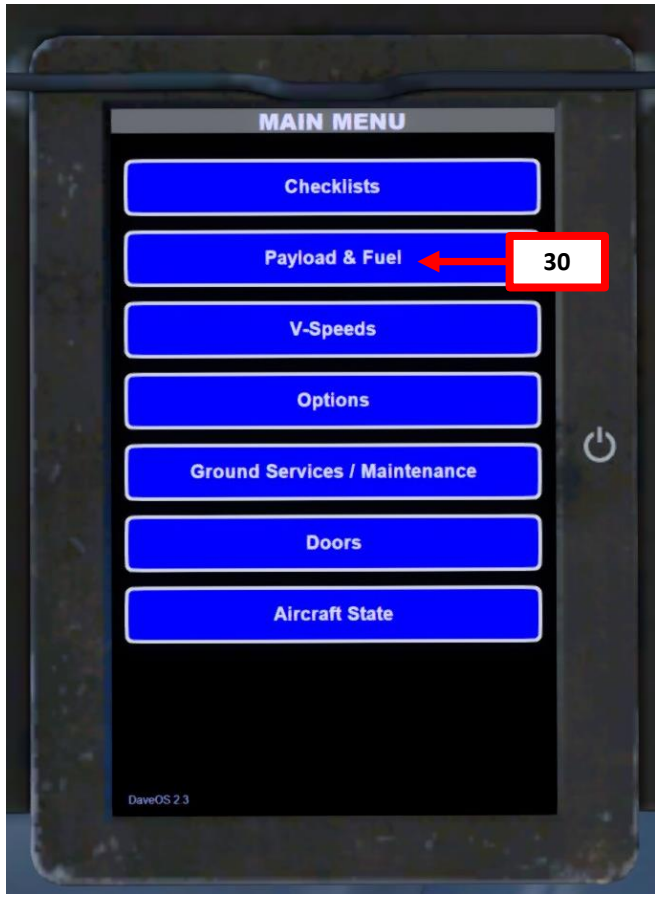


FMC SETUP – PERF INIT

Remember when we loaded up the fuel, passengers and cargo? Now, we need to enter this data in the FMC in order to get valid performance calculations.

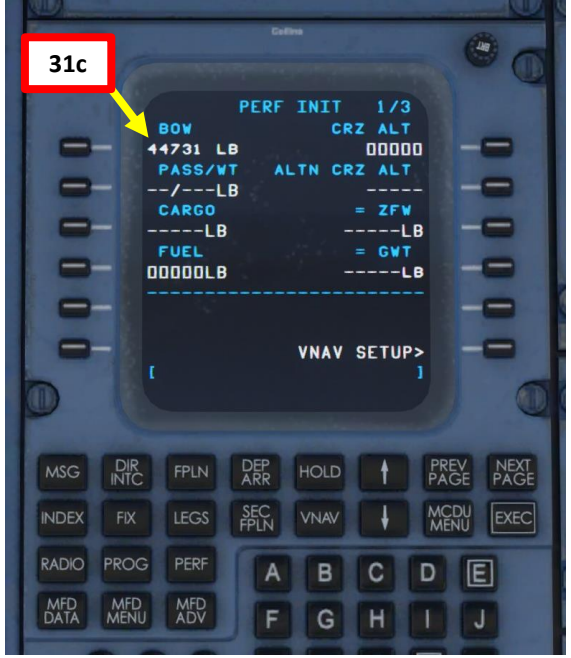
30. Check in the DAVE EFB on the Payload & Fuel page.

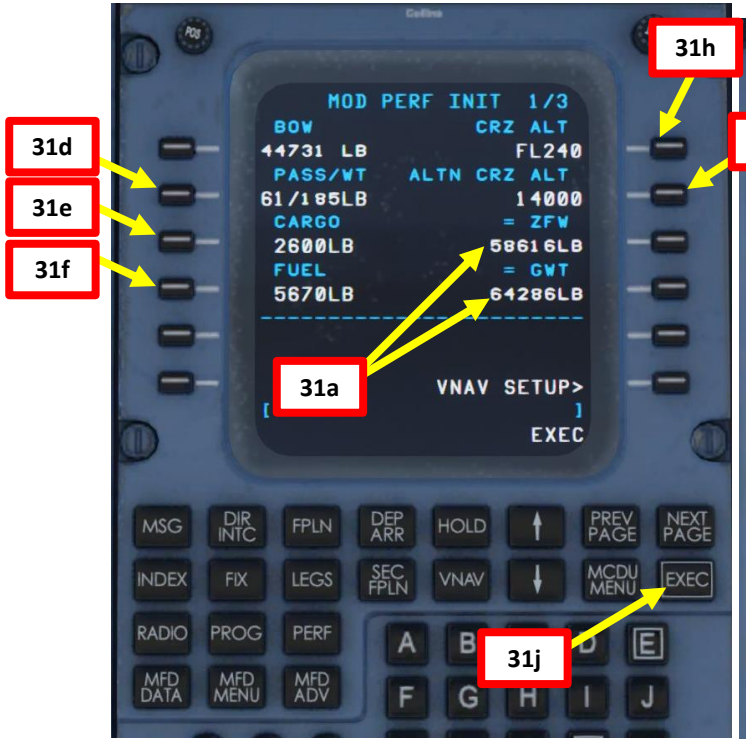
We have:
- 61 Passengers
- 2600 lbs of cargo (1000 lbs FWD + 1600 lbs AFT)
- 5670 lbs of fuel



FMC SETUP – PERF INIT

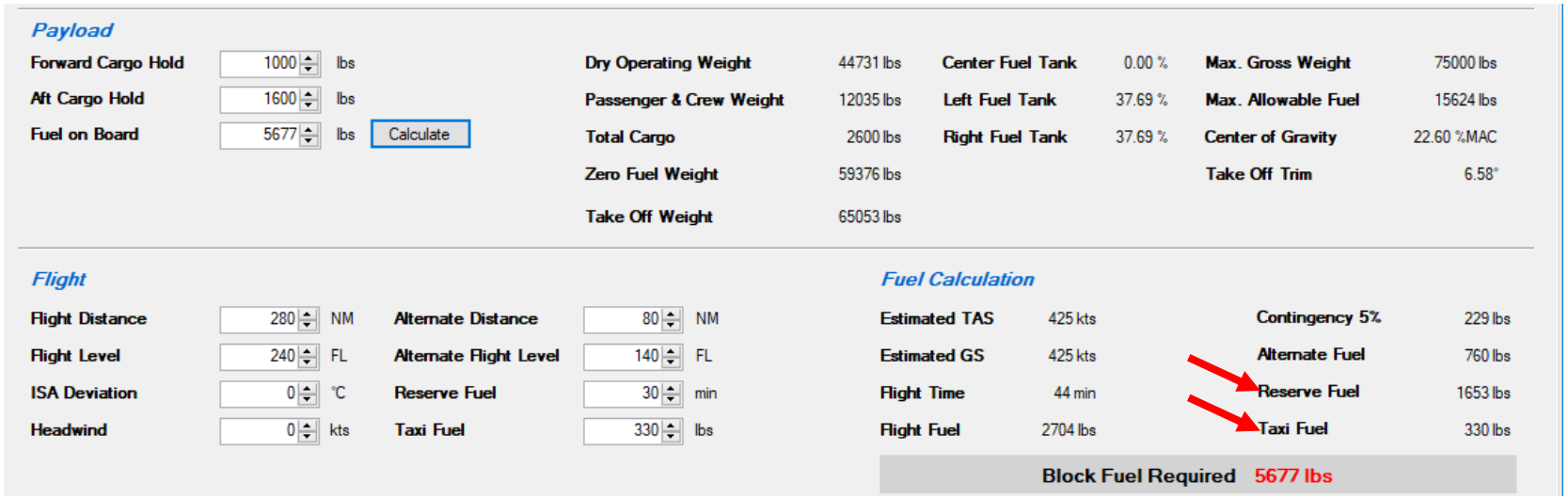
31. Enter Fuel & Weight information in FMC (Flight Management Computer)
    a) Click on "PERF" (Performance) Button to open up the FMC Performance Menu.
    b) Select the PERF INIT menu
    c) Our BOW (Basic Operating Weight or Dry Operating Weight) is already entered in the FMC.
    d) Type "61" on the CDU keypad, then press the LSK next to PASS/WT to enter the number of passengers. The Resulting weight will be calculated automatically.
    e) Type "2600" on the CDU keypad, then press the LSK next to CARGO to enter the cargo weight (1000 lbs FWD + 1600 lbs AFT)
    f) Type "5670" on the CDU keypad, then press the LSK next to FUEL to enter the fuel weight. You can also consult the FUEL QTY indicator on the MFD.
    g) The Gross Weight & Zero Fuel Weight will automatically be calculated based on the values (BOW, Passengers, Cargo & Fuel Weight) we entered previously.
    h) Type "FL240" on the CDU keypad, then press the LSK next to CRZ ALT to enter the cruising altitude (24000 ft).
    i) Type "FL140" on the CDU keypad, then press the LSK next to CRZ ALT to enter the alternate cruising altitude (14000 ft).
    j) Press on the EXEC button to enter the performance data.





FMC SETUP – PERF INIT

32. Review Fuel & Weight information in FMC (Flight Management Computer)
    a) You can review the other 2 PERF INIT pages by pressing the NEXT PAGE button on the CDU
    b) We will assume a standard temperature (ISA) deviation of 0 deg C
    c) We will assume no wind during climb, cruise and descent
    d) We will verify that the RESERVES fuel is 1650 lbs
    e) We will verify that the TAXI FUEL is about 330 lbs. If the value is incorrect, simply type in "330" on the CDU keypad, then click on the LSK next to TAXI FUEL.



FMC SETUP – VNAV SETUP

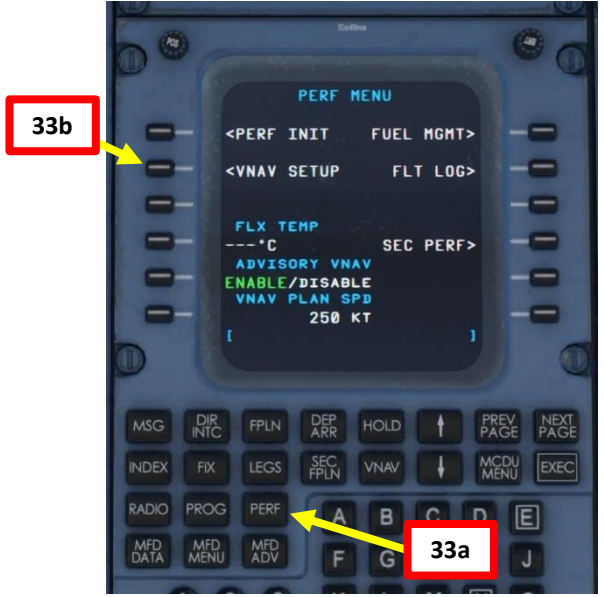
33. Enter and review VNAV (Vertical Navigation) information in FMC (Flight Management Computer)
    a) Click on "PERF" (Performance) Button to open up the FMC Performance Menu.
    b) Select the VNAV SETUP menu
    c) In the VNAV CLIMB page, verify that the TGT SPEED (Target Speed) is 290 kts / Mach 0.74, the SPD/ALT LIMIT (Speed / Altitude Limit) is set to 250 kts / 10000 ft, and the TRANS ALT (Transition Altitude) is set to 10000 ft.
    d) If any of the values above is incorrect, enter the correct value on the CDU keypad, press on the LSK next to the field you want to change, then press the EXEC button to save these changes.
    e) Click on the NEXT button to check the VNAV CRUISE page. Verify that the TGT SPEED is 300 kts / Mach 0.74 and the CRZ ALT (Cruising Altitude) is FL240 (24000 ft).
    f) Click on the NEXT button to check the VNAV Descent page. Verify that the TGT SPEED is Mach 0.74 / 290 kts, the SPD/ALT LIMIT is 250 kts / 10000 ft and the TRANS FL (Transition Flight Level) is FL180 (18000 ft).

Note:
The VNAV pages contain information on the basis / performance calculations and which flight profile (airspeed / altitude restrictions) you need to follow. Remember, there is no VNAV autopilot function and no auto-throttle on the CRJ, so these are just "friendly reminders" that the FMC generates for you. **You** are responsible for keeping the aircraft within these parameters.

Climb (250 / 290 / 0.74)
Throttle is set to climb detent and the aircraft's pitch is controlled in a way (most likely by autopilot using Speed mode) so that the aircraft flies 250 kts until reaching 10.000ft, then accelerates to 290 kts and continues to climb with 290 kts until reaching an altitude where 290 kts equal Mach 0.74. From here on climb is continued with Mach 0.74

Cruise (300 kts / 0.74)
Cruise is flown at 300 kts or Mach 0.74, whichever is slower. At higher altitudes 300 kts are most likely going to exceed Mach 0.74.

Descent (250 / 290 / 0.74 / 3.0°)
Things are somewhat similar during descent. The FMS calculates the needed descent rate through the speed and descend angle. The standard values are a 3.0° angle and descending with Mach 0.74 until it equals 290 kts, then continue with 290 kts until 10.000ft. Below 10.000ft descend is continued with 250 kts.



FMC SETUP – ENGINE FLEX TEMPERATURE

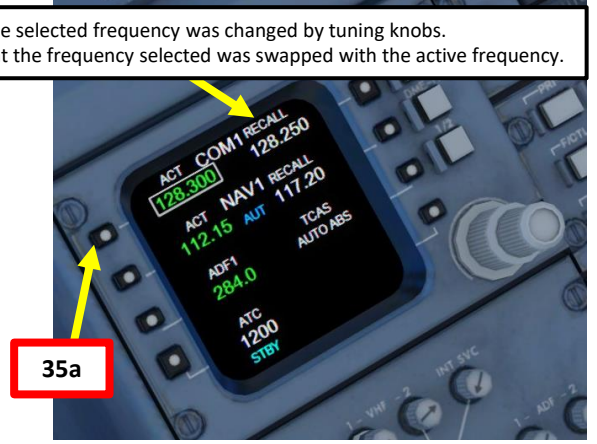
34. (Optional) Enter Derated Takeoff information in FMC (Flight Management Computer)
    a) Click on "PERF" (Performance) Button to open up the FMC Performance Menu.
    b) Set flex temperature to 58 degrees (ballpark figure for reduced thrust for noise abatement) by typing "58" on the CDU keypad, then pressing the LSK next to FLX TEMP (Flexible Temperature).
    c) The "FLX" Derated Takeoff Mode will appear next to the N1 indication. The engine N1 will be limited to this "FLEX" rating during takeoff.

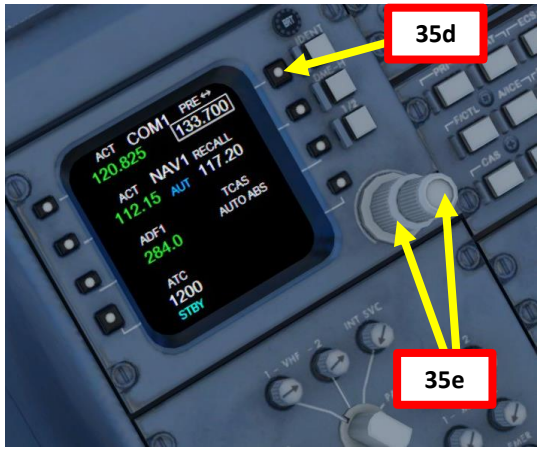
*Note: **FLEX** is the standard takeoff thrust setting used on the CRJ. FLEX means that the aircraft uses reduced thrust on takeoff in order to reduce noise, prevent engine wear and prolong engine life. "Flexible temperature" means that the engine controller will force the engine to behave as if outside air temperature was higher than it really is, causing the engines to generate less thrust since higher air temperatures diminish an aero-engine's thrust generating capabilities. FLEX is also known in other companies as "Assumed Temperature Derate", "Assumed Temperature Thrust Reduction" or "Reduced Takeoff Thrust" or "Factored Takeoff Thrust".*

COM RADIO TUNING & ALTIMETER SETTING

PRE means that the selected frequency was changed by tuning knobs.
RECALL means that the frequency selected was swapped with the active frequency.

35. Set COM1 Radio radio frequencies to CYYZ (Toronto) and CYUL (Montreal) airport ATIS (Automatic Terminal Information Service) in order to gather meteo conditions and atmospheric pressure
    a) Press the LSK next to the Active (green) COM1 frequency to select it. Selected frequency will be highlighted in white.
    b) Scroll mousewheel over tuning knobs to tune COM1 radio active frequency to the Toronto ATIS (120.825 MHz).
    c) Write down the altimeter setting broadcast by Toronto ATIS. In our case, altimeter setting is 30.06 in Hg (inches of mercury).
    d) Press the LSK next to the Standby (white) COM1 frequency to select it. Selected frequency will be highlighted in white.
    e) Scroll mousewheel over tuning knobs to tune COM1 radio standby frequency to the Montreal ATIS (133.700)
    f) Press LSK next to the Standby to cycle active frequency (in green) to CYUL ATIS (133.700). This will mute the CYYZ ATIS. Alternatively, you can also pop out the VHF1 Audio Receive Pushbutton.
    g) Set Backup COM1 RTU (Radio Tuning Unit) switch to ON and set COM/NAV selector to COM.





CYYZ/YYZ
Apt Elev **569′**
N43 40.6 W079 37.8

D-ATIS	*TORONTO Clearance	APRON ADVISORY North Apron	South Apron	Pad Control
120.825 133.1	121.3	122.275	122.075	131.17 130.87 131.95
Ground		**Tower**	**LONDON Radio**	**TORONTO Departure**
121.9 121.65 119.1		118.35 118.7	123.275	128.8 127.575

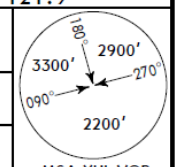
CYUL/YUL -TRUDEAU INTL
JEPPESEN 26 AUG 16 (11-1) **ILS DME or LOC DME Rwy 06L** MONTREAL, QUE

D-ATIS	QUEBEC Radio	MONTREAL Arrival
133.7 (French 127.5)	123.55	118.9 126.9 132.85
MONTREAL Tower		**Ground**
119.3 119.9 124.3		121.0 121.9

LOC IUL	Final Apch Crs	GS BIRPO	ILS DA(H)	Apt Elev 118′ TDZE 98′
109.3	057°	1210′ (1112′)	298′ (200′)	

MISSED APCH: Climb to 700′ heading 057°. Climbing LEFT turn to 3000′ heading 358°. LEFT turn direct to YUL VOR.

Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′
1. Radar or RNAV required. 2. SAFE ALTITUDE WITHIN 100 NM 7400′. 3. LOC reliable only within 10° either side of centerline. 4. Procedure turn NOT AUTHORIZED.



for CYYZ Wind: 280 at 3 knots Visibility: 10+ SM (9999+ m) Clouds: Overcast at 2700 feet Temperature: -2.0C Dewpoint: -7.0C Precipitation: None reported Altimeter: 1018 mb (30.06 inches)

35c

COM RADIO TUNING & ALTIMETER SETTING

36. Select desired Barometric Pressure Unit (HPa or Inches of Mercury) by pressing the HPA/IN button.
37. Set altimeter setting to 30.06 (30.06 inches of mercury) by rotating the BARO knob. Repeat the two previous steps for the First Officer's side.
38. Set Standby ADI (Attitude Director Indicator) altimeter setting to 30.06 (30.06 inches of mercury) by rotating the ADI BARO knob

NAV RADIO TUNING

39. Set NAV Radio Frequency to the ILS frequency of CYUL (Montreal) airport's runway 06L
    a) ILS frequency for Montreal runway 06L is 109.30 MHz.
    b) Press the LSK next to the Active (green) NAV1 frequency to select it. Selected frequency will be highlighted in white.
    c) Scroll mousewheel over tuning knobs to tune NAV1 radio active frequency to the Montreal ILS (109.30 MHz). Repeat steps b) and c) for the NAV2 radio active frequency as well on the right side of the central pedestal.
    d) Verify on the FMC RADIO TUNING page that both NAV1 and NAV2 frequencies are set to 109.30 and MAN (Manual) mode.

Note: the COM and NAV radio tuning can also be done from the RADIO TUNING page in the FMC. You can just press the "RADIO" button.

CYUL/YUL -TRUDEAU INTL — JEPPESEN 26 AUG 16 (11-1) — MONTREAL, QUE ILS DME or LOC DME Rwy 06L

D-ATIS	QUEBEC Radio	MONTREAL Arrival
133.7 (French 127.5)	123.55	118.9 126.9 132.85

MONTREAL Tower			Ground	
119.3	119.9	124.3	121.0	121.9

LOC IUL	Final Apch Crs	GS	ILS	
109.3	057°	BIRPO 1210′ (1112′)	DA(H) 298′ (200′)	Apt Elev 118′ TDZE 98′

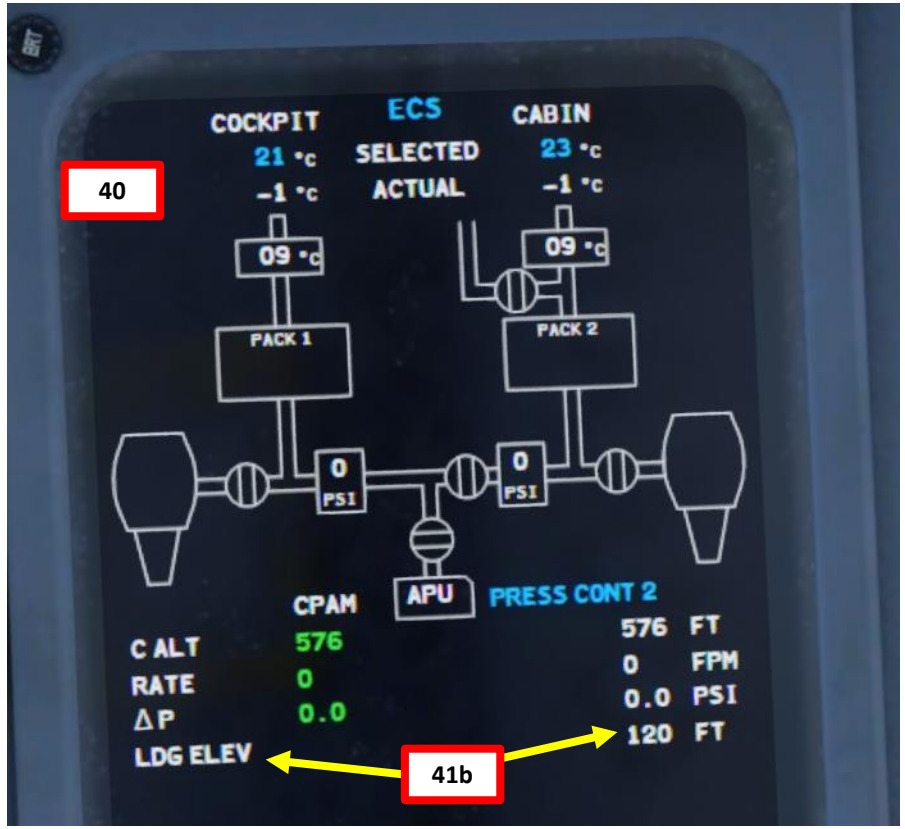
MISSED APCH: Climb to 700′ heading 057°. Climbing LEFT turn to 3000′ heading 358°. LEFT turn direct to YUL VOR.

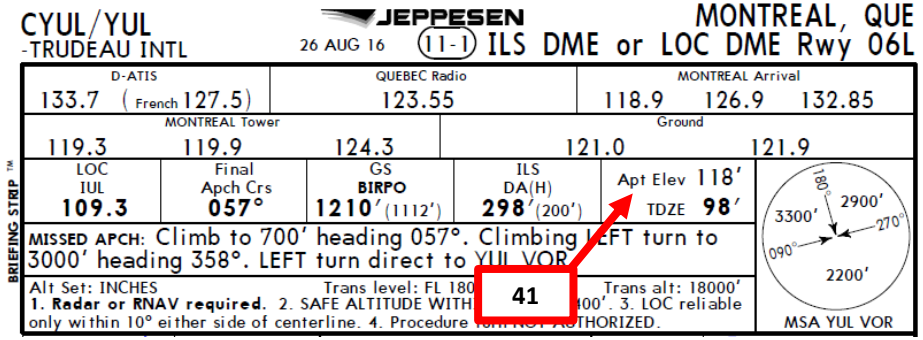
Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′

1. Radar or RNAV required. 2. SAFE ALTITUDE WITHIN 100 NM 7400′. 3. LOC reliable only within 10° either side of centerline. 4. Procedure turn NOT AUTHORIZED.

CABIN PRESSURE & ALTIMETER SETTING

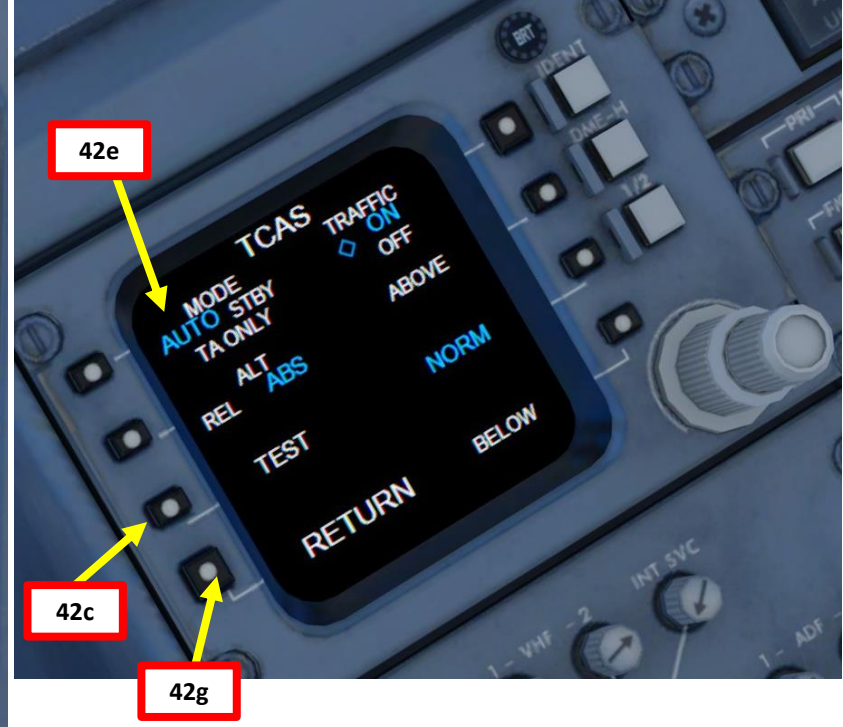
40. Set ECS (Environment Control System) page on the central MFD (Multifunction Display)
41. Set landing cabin pressure altitude setting to approx. 100 ft (CYUL airport elevation is 118 ft) by turning the CABIN PRESS knob on the overhead panel.

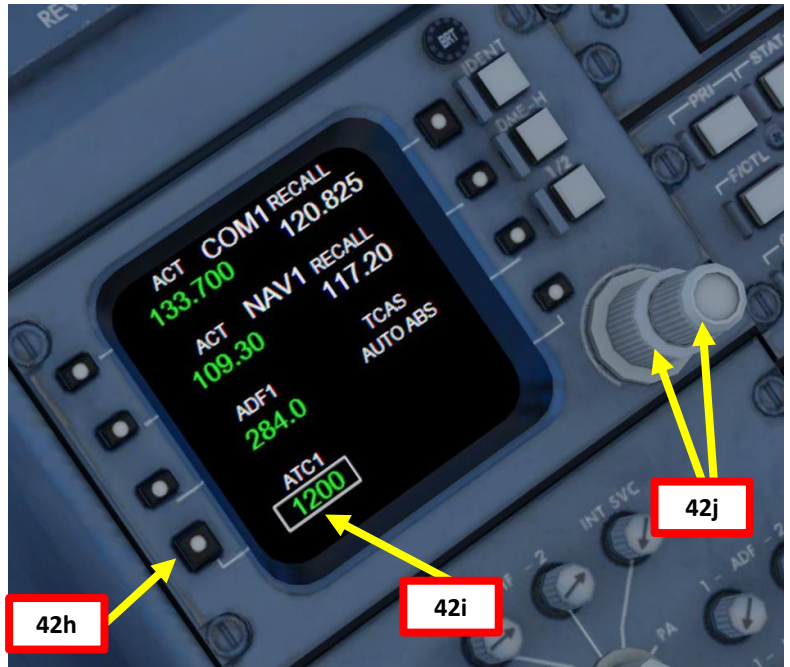




TCAS TEST & SETUP

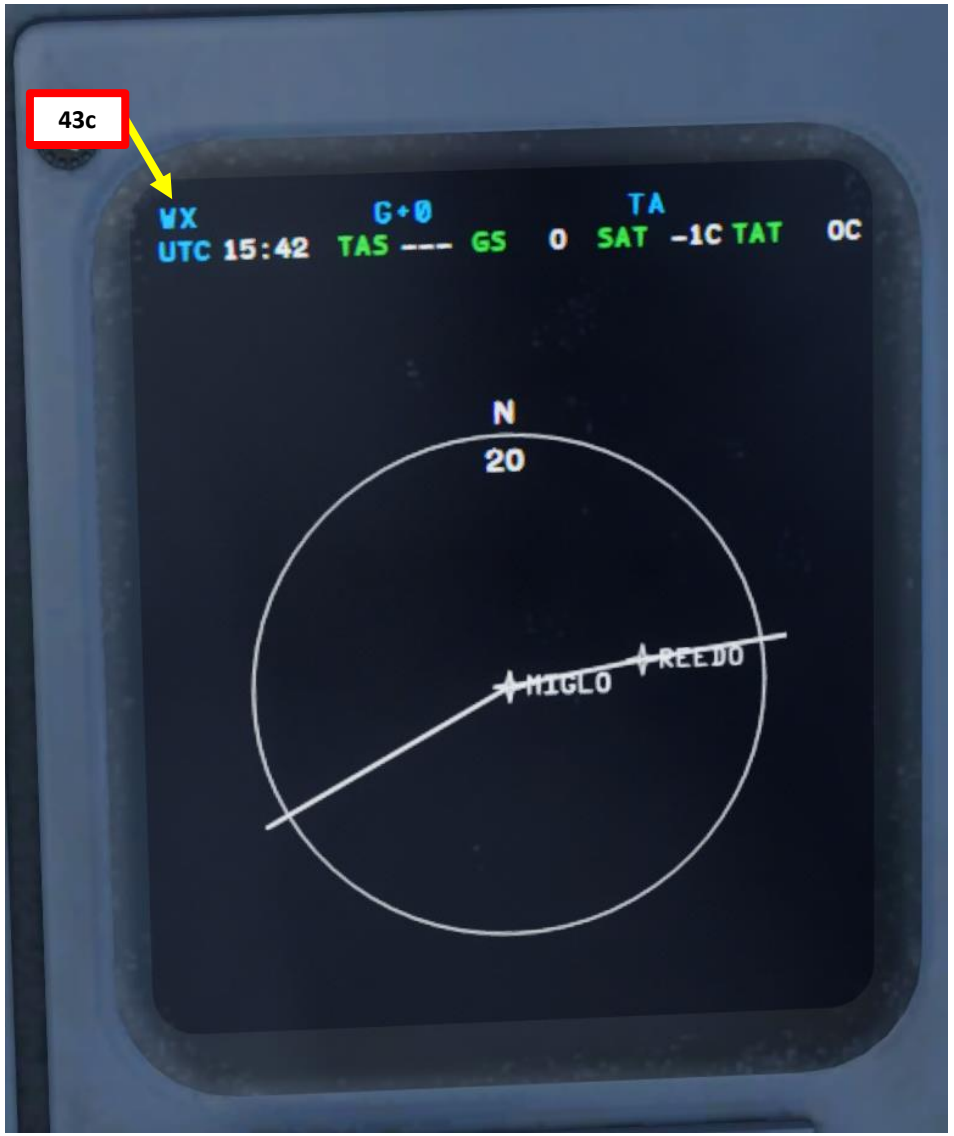
42. Power up and test TCAS (Traffic & Collision Avoidance System)
    a) Set Transponder Selector to 1.
    b) Click the LSK next to TCAS on the Radio Panel to expand TCAS menu
    c) Press the LSK next to the TEST option to start TCAS BIT (Built-In Test). Test symbology will appear on the PFD.
    d) Wait for the BIT to complete. An aural message « TCAS TEST OK » should be heard when test is complete.
    e) Verify that TCAS mode is set to AUTO. Click on LSK next to MODE to toggle the mode if that's not the case.
    f) Confirm that TCAS mode is set to TA ONLY (Traffic Advisory Only) on the PFD (Primary Flight Display) and ND (Navigation Display)
    g) Click on the LSK next to RETURN to return to the main Radio menu.
    h) Click the LSK next to ATC on the Radio Panel to select Transponder Frequency
    i) ATC1 transponder frequency will be highlighted in white when selected
    j) Use Tuning Knobs to set desired Transponder frequency (we will use 1200).





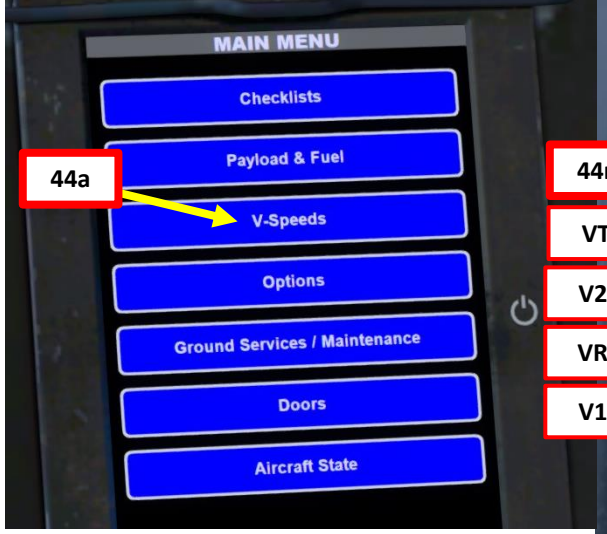
WEATHER RADAR SETUP

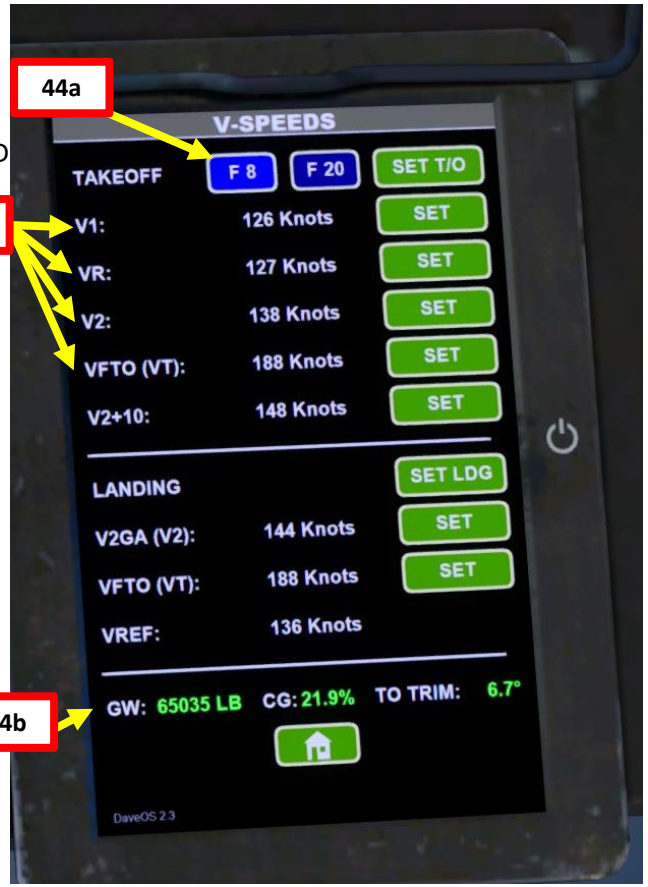
43. Power up Weather radar
    a) Set weather radar mode to WX
    b) Press the RDR/TERR button to toggle between TERRAIN MAP (GPWS, or Ground Proximity Warning System) and WEATHER RADAR display
    c) Confirm that WEATHER RADAR display shows WX



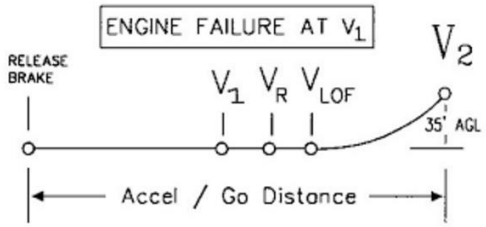
V-SPEEDS SETTING

44. Find V-Speeds
    a) Go on the DAVE EFB and select V-Speeds page and selecting our desired Takeoff Flaps setting. We will use Flaps 8 deg.
    b) Find our Gross Weight: 65035 lbs
    c) We can then find the resulting V-speeds values that we want to input for the Speed Tape Bugs.
    d) V_1: 126 kts
    e) V_R: 127 kts
    f) V_2: 138 kts
    g) $V_{FTO\ (VT)}$: 188 kts
    Target Speed (VT) for the Final Takeoff Speed (VFTO). This is similar to V_Y, or the « best airspeed » to attain the highest climb rate.
    h) Set the SPEED REFS outer knob to V-SPDS.
    i) Push the inner SPEED REFS knob IN to display currently selected V-Speed.
    j) Press the SEL button to select V1 and scroll mousewheel on SPEED REFS inner knob to set its value to 126 kts.
    k) Repeat previous step for VR (127 kts) and V2 (138 kts).
    l) Set the SPEED REFS outer knob to TGT (VT Target Speed)
    m) Scroll mousewheel on SPEED REFS inner knob to set VT to VFTO (188 kts).
    n) All your V-Speeds should now be set. You can now push the inner SPEED REFS knob IN again to hide the currently selected V-Speed.





V1 is the Decision Speed (minimum airspeed in the takeoff, following a failure of the critical engine at VEF, at which the pilot can continue the takeoff with only the remaining engines), **VR** is the rotation speed (airspeed at which the pilot initiates rotation to obtain the scheduled takeoff performance), and **V2** is Takeoff Safety Speed (minimum safe airspeed in the second segment of a climb following an engine failure at 35 ft AGL).



V-SPEEDS SETTING

Even if the DAVE EFB can calculate your V-Speeds for you, you can also calculate them yourself with performance charts available in the aircraft QRH (Quick Reference Handbook).

a) You can obtain your Gross Weight by using your ZFW (Zero Fuel Weight) and adding the Fuel Weight (65035 lbs, also available in the DAVE EFB)
b) The airport altitude at CYYZ (Toronto) is 173 m, or 567 ft
c) By checking the ND (Navigation Display), you can obtain the TAT (Total Air Temperature).
d) For a Gross Weight of 65035 lbs, an airport altitude of about 500 ft (we can round it down to 0 ft), a temperature of about 1 deg C and a takeoff flaps setting of 8 deg, we can obtain V1, VR, V2 and VFTO.

Note: QRH by Digital Aviation is available in:
C:/Program files/Lockheed Martin/P3D V4/Ecosystem/Aerosoft/Digital Aviation CRJ/Documentation
Document: Vol2_Quick Reference Guide.pdf

Gross Weight → 65'000lbs / 29'484 kgs

Landing

Flaps	0°	1°	8°	20°	30°	45°
Min Maneuvering	183	167	161	155	151	143
V_{REF}	173	157	151	145	141	133

Takeoff

Flaps Setting → Add 1 kt to V_1 & V_R for Wing & Cowl A/I ON

Flaps	8°					20°				
Press. Alt.	0	2'000	4'000	6'000	8'000	0	2'000	4'000	6'000	8'000
≤ 10°C	123	124	125	126	127	117	119	119	120	121
20°C	123	124	125	126	128	117	118	119	121	122
V_1 30°C	123	125	126	127	129	117	119	120	121	123
40°C	125	126	128	38° / 129	34° / 129	119	120	121	38° / 122	34° / 123
MAX TEMP	50° / 127	46° / 128	42° / 128			50° / 121	46° / 122	42° / 121		
≤ 10°C	124	124	125	126	127	118	119	119	120	121
20°C	124	125	125	126	128	118	119	119	121	122
V_R 30°C	124	125	126	127	129	118	119	120	121	123
40°C	125	126	128	38° / 129	34° / 129	119	120	121	38° / 122	34° / 123
MAX TEMP	50° / 127	46° / 128	42° / 128			50° / 121	46° / 122	42° / 121		
V_2 / V_{2GA}	135 / 140					129				
Flap Retraction	147 (Flaps 1)			170 (Flaps 0)		141 (Flaps 8)		149 (Flaps 1)		170 (Flaps 0)

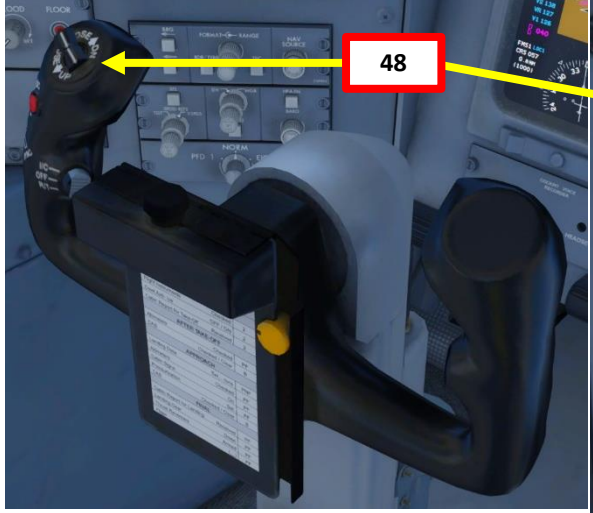
Additional speeds

Approximate Single Engine Drift down Altitude - FL310

Altitude (FL)	<10'000	210	230	250	270	290	310	330	350	370	390
V_{FTO} / V_{ENR}	185	189	192	196	198	201	204	207	210	213	217
V_{MD}/Min Hold	206	216	219	222	224	227	229	232	231	227	-

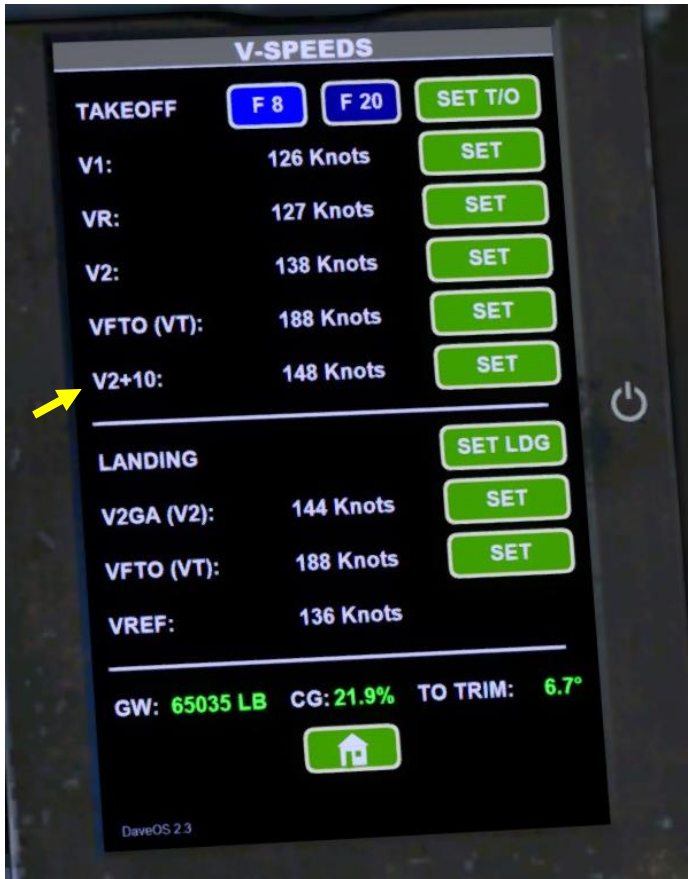
TAKEOFF TRIM SETTING

45. Set Hydraulic Pump 3A Switch – ON (UP)
46. Set Hydraulic Pumps 1, 2 and 3B – OFF (MIDDLE).
47. Check what the TO (Takeoff) Trim value is recommended by the DAVE EFB in the V-SPEEDS page. TO TRIM should be 6.7 deg Nose Up.
48. Use the Stab trim switches on the Yoke and set the Stabilizer trim to 6.7 deg Nose Up.
49. Press both YAW DAMPER buttons
50. Once Yaw Dampers are engaged correctly, the YAW DAMPER caution on the MFD should disappear.
51. Rotate the NAV SOURCE knob to make sure the navigation systems source is the FMS1 (pilot's Flight Management System)



AUTOPILOT SETUP

52. Rotate the SPEED knob and set the autopilot speed target to V2 + 10 kts (148 kts in our case according to the DAVE EFB).
53. Rotate the ALT knob and set the autopilot altitude target to 3000 ft
    Note: Canadian law restricts our speed below 3000 ft to 200kts.
54. Rotate the HDG knob and set the autopilot heading target to 057 (CYYZ runway 05 heading is 057 according to Jeppesen chart)
55. Verify if the flight directors are ON (you should see the FMA (Flight Mode Annunciators). Press both FD (Flight Director) switches ON if that's not the case.

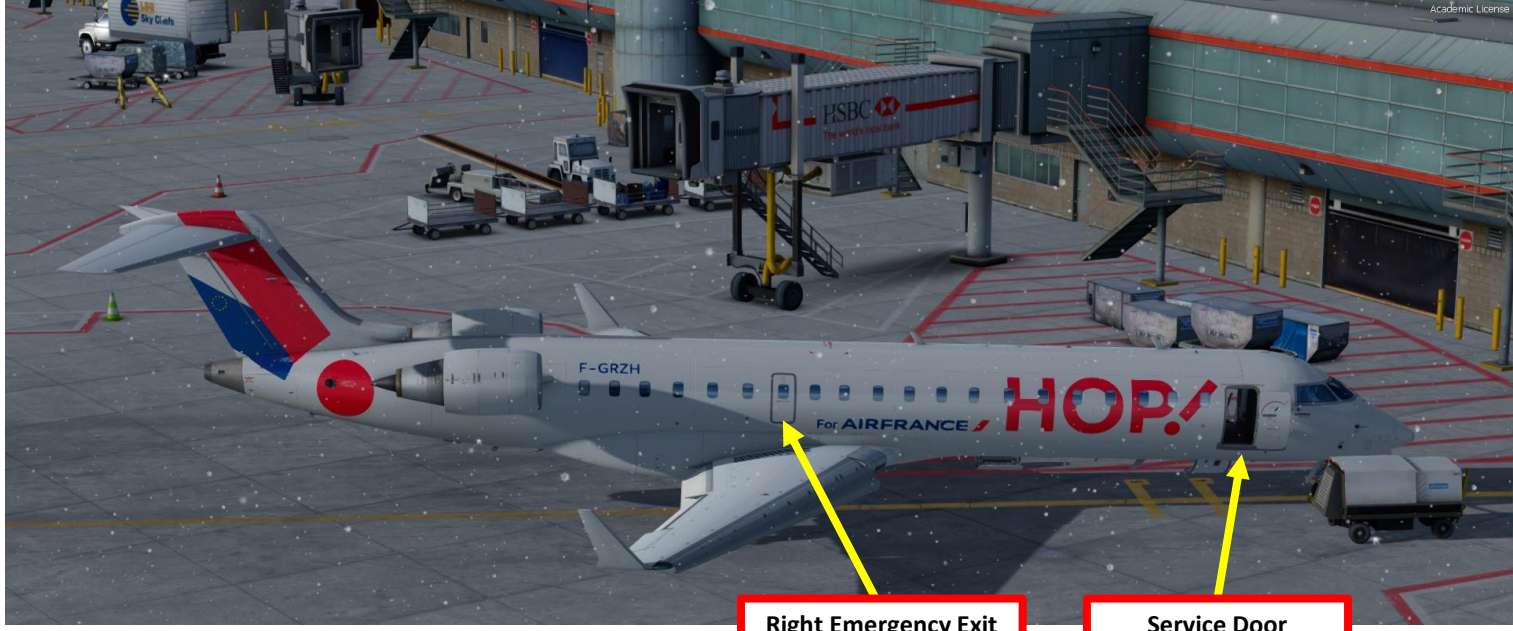


DOORS

56. Verify that all doors are closed
    a) Press the DOORS page
    b) Look for any door that is open (red/amber) on the central MFD page.
57. Close any door that is still open by going on the DAVE EFB “DOORS” page

All doors should be in green (closed).

DOORS


F-GRZH
HOP!
For AIRFRANCE
Right Emergency Exit
Service Door


Sheraton
HOP!
Passenger Door
Forward Cargo Door
Left Emergency Exit
Aft Cargo Door

ENGINE START-UP

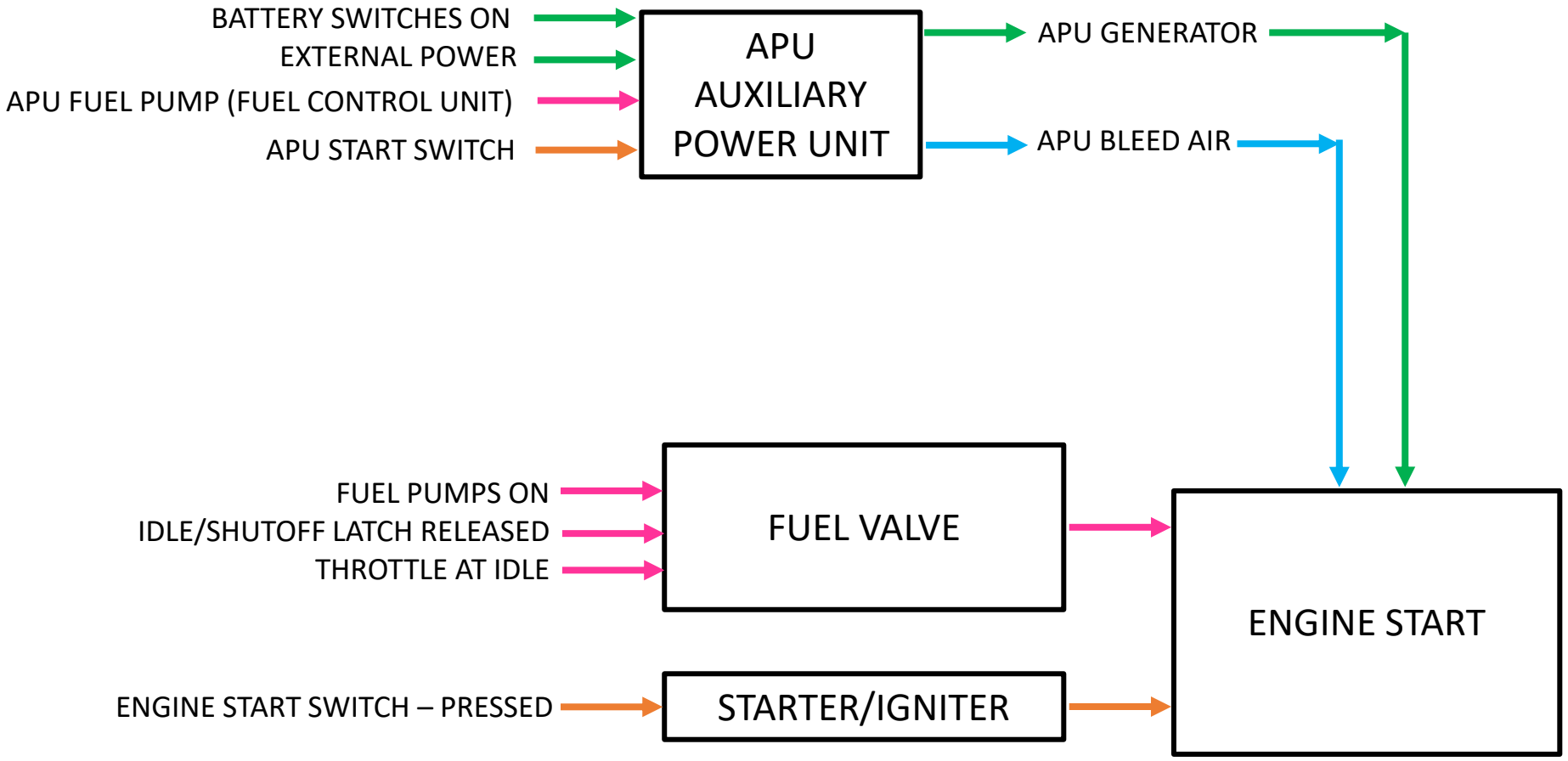
- APU AUXILIARY POWER UNIT
  - → APU GENERATOR
  - → APU BLEED AIR
- GROUND POWER CART → EXTERNAL POWER
- AIR PRESSURE CART → EXTERNAL AIR
- ENGINE (RUNNING)
  - → ENGINE GENERATOR (ENGINE CROSS-START)
  - → ENGINE BLEED (ENGINE CROSS-START)
- FUEL PUMPS → FUEL PUMPS ON
- THROTTLE POSITION → THROTTLE AT IDLE
- IDLE/SHUTOFF RELEASE LATCH → LATCH RELEASED
- ENGINE START SWITCH → ENGINE START SWITCH – PRESSED
  IGNITION CONTROLLED BY FADEC (**F**ULL **A**UTHORITY **D**IGITAL **E**NGINE **C**ONTROLLER)

- FUEL →
- IGNITION/STARTER →
- ELECTRICAL POWER →
- AIR PRESSURE →

→ ENGINE START

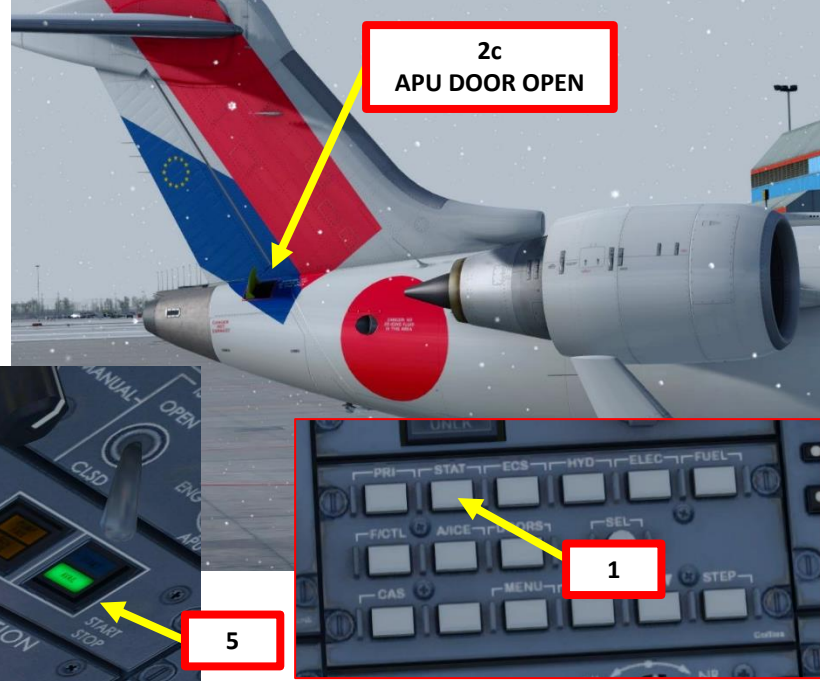
ENGINE START-UP

NOTE: It is usually common practice to start your engines during pushback.
We will start our engines before that for simplicity.



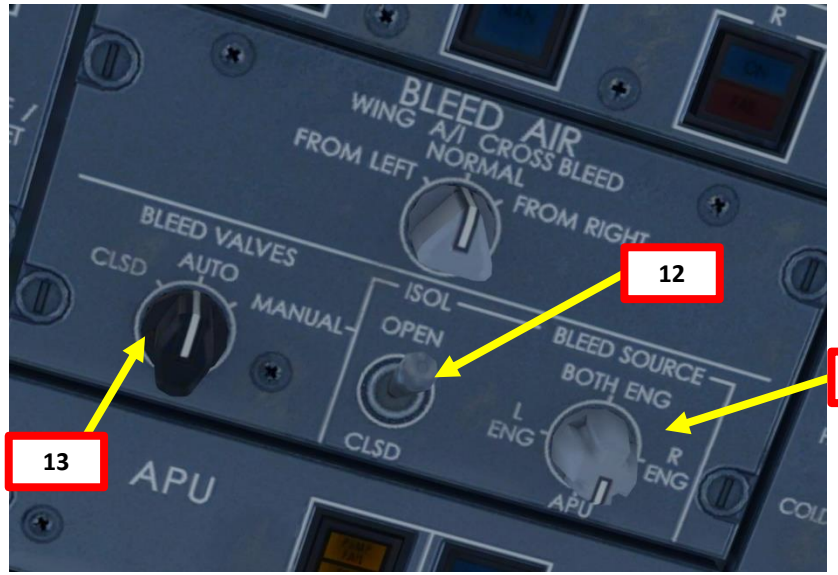
APU (AUXILIARY POWER UNIT) START

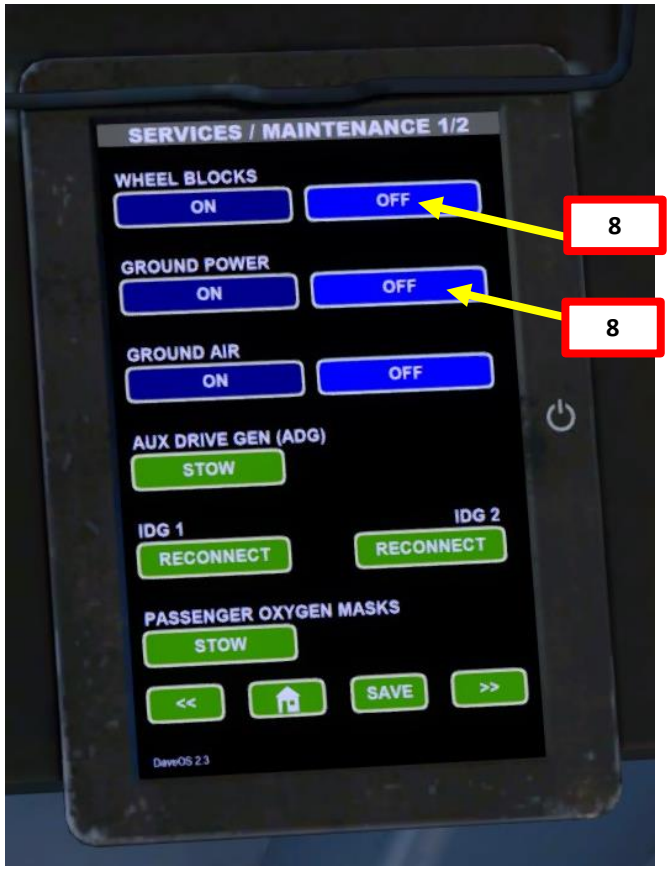
1. Select STAT (Status) page on the central MFD.
2. On Overhead Panel, press on the APU PWR switch. Wait 5-6 seconds for the APU BIT (Built-In Test) to complete. and the APU DOOR to open. The “APU SOV OPEN” (shutoff valve) message will appear.
3. Press the APU START/STOP switch.
4. The “START” light will illuminate and “APU START”, “APU LCV OPEN” (load control valve) messages will appear while the start sequence is active.
5. When APU is running (100 % RPM), the “LCV OPEN” message will still be displayed, the “APU SOV OPEN” message will disappear and the “APU AVAIL” light will be illuminated.

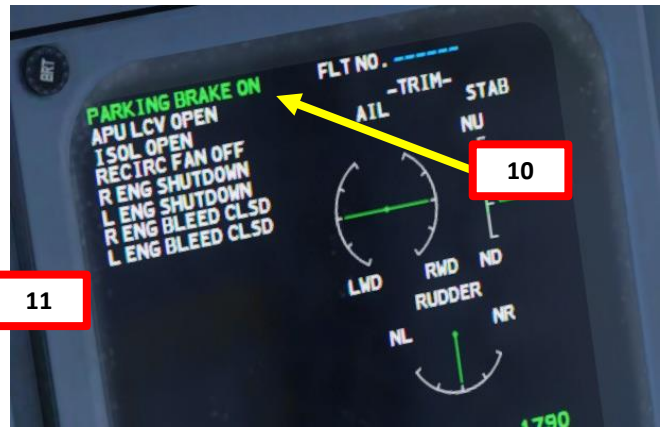


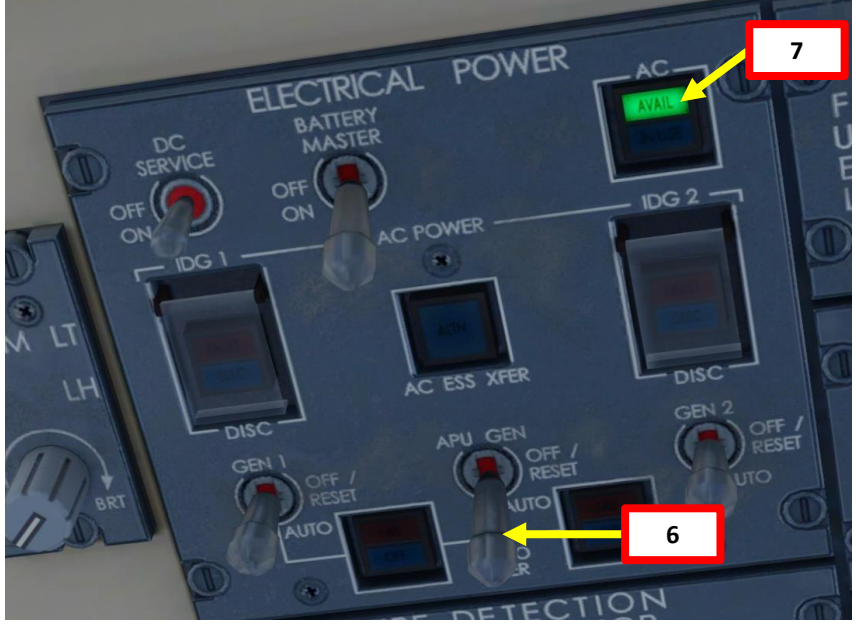
APU (AUXILIARY POWER UNIT) START

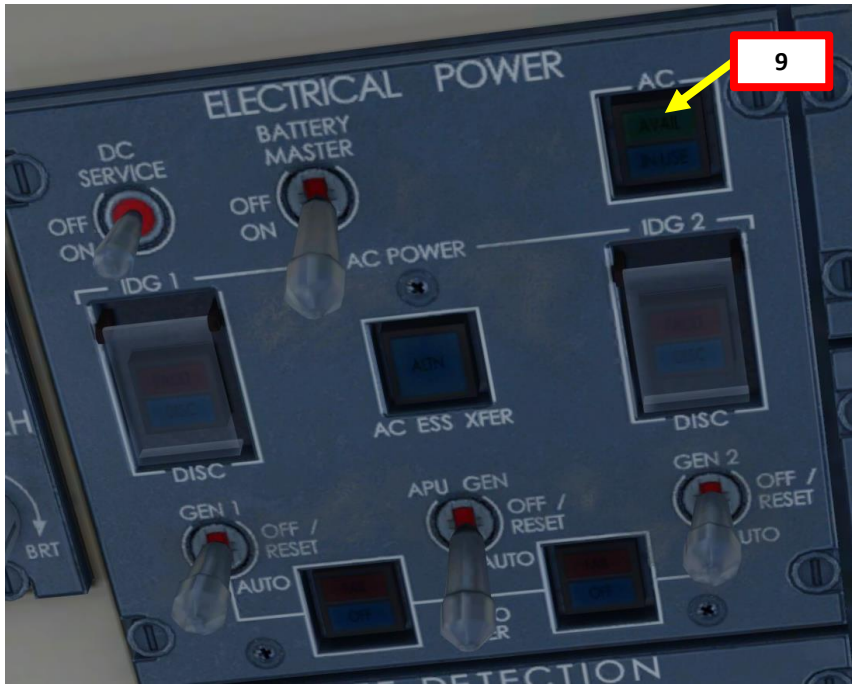
6. Once APU start cycle is finished, verify that the APU GEN (Generator) switch is set to AUTO.
7. If the APU Generator has kicked in properly (meaning the aircraft now runs on APU power), we should now see the AC Ground Power light turn from IN USE to AVAIL. We can then safely remove ground power.
8. With the DAVE EFB, set Ground Power and Wheel Blocks OFF.
9. Once Ground Power is disconnected, the AC Ground Power AVAIL light will extinguish.
10. Verify that the parking brake is ON
11. Set the Bleed Source Switch to APU
12. Set the ISOL (Isolation Valve) Switch to OPEN
    The ISOL switch is only active when the bleed valve switch is set to MANUAL. As soon as set to CLSD, only the left pack is supplied with bleed air (accordingly only the cockpit is supplied by the air condition). So leave it to OPEN so in case you need to switch to MANUAL the cockpit and the cabin are supplied with air conditioned air.
13. Set BLEED VALVES selector switch to AUTO





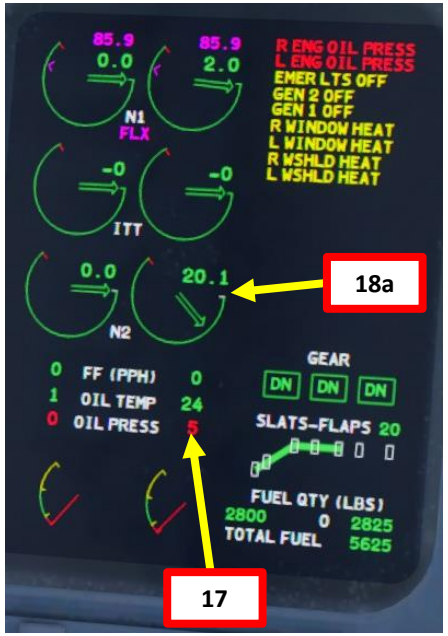


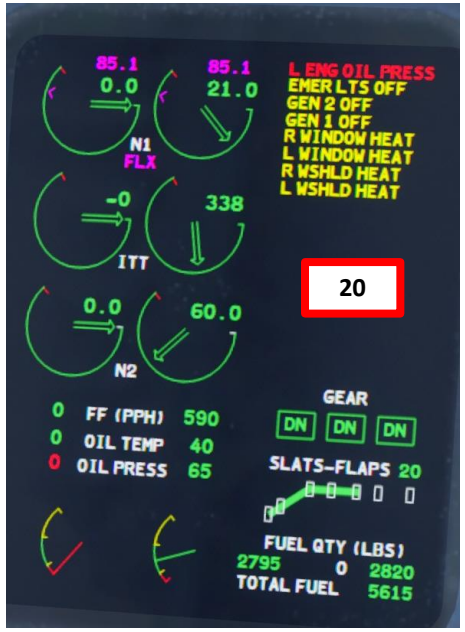


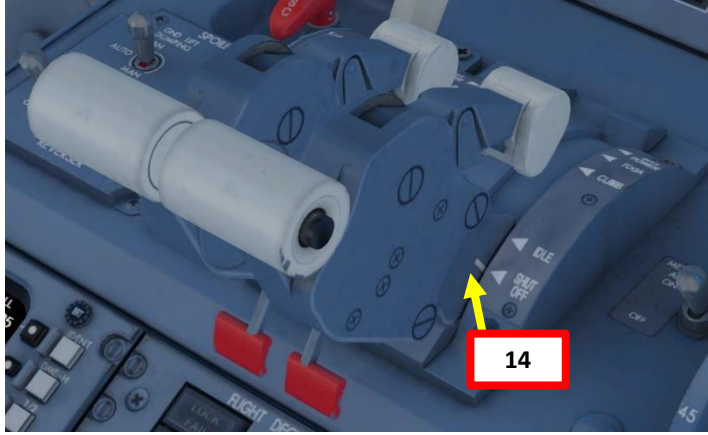


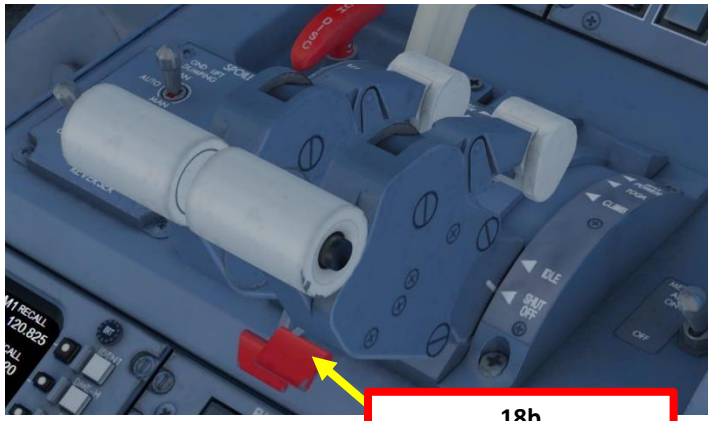
ENGINE START-UP

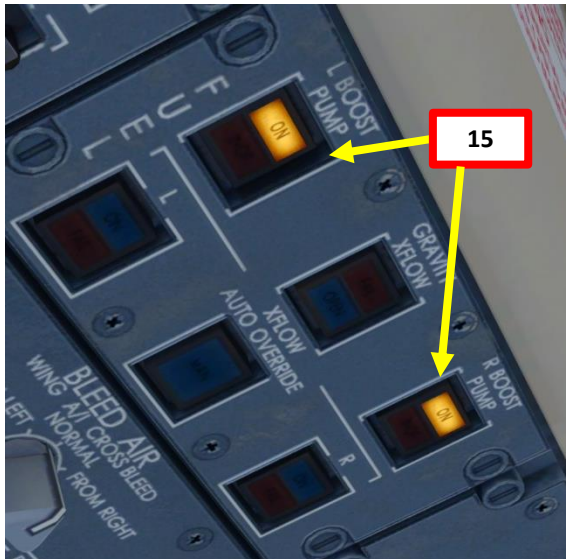
14. Set both throttles to SHUTOFF (Fully Aft)
15. Set Both LEFT & RIGHT FUEL BOOST PUMPs ON.
16. Press RIGHT START switch. START Light will illuminate and R ENG START message will be displayed.
17. Confirm oil pressure rise.
18. When Right Engine N2 indication (High Pressure Compressor Rotation Speed) reaches 20 %, raise Idle/Shutoff Release Latch Lever and push the Throttle Lever to forward to IDLE.
19. N1 indication (Fan Speed / Low Pressure Compressor Rotation Speed), FF (Fuel Flow) and ITT (Inter-Turbine Temperature), Oil Pressure & Oil Temperature for Right Engine should increase, and RPM will accelerate and stabilize.
20. When Right Engine parameters stabilize at about 20% N1 and 60% N2, RIGHT START switch will automatically reset and START light will extinguish.

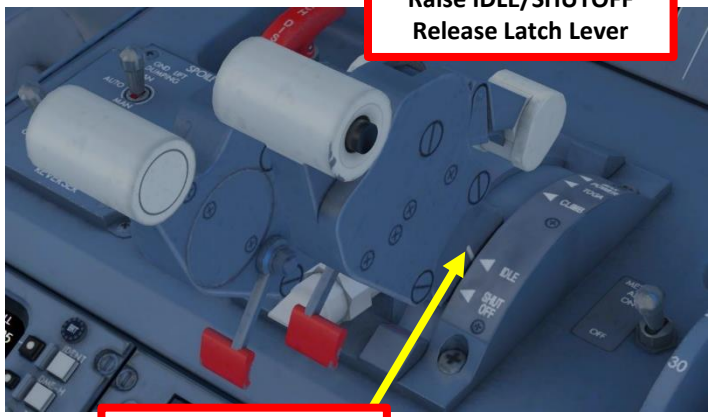






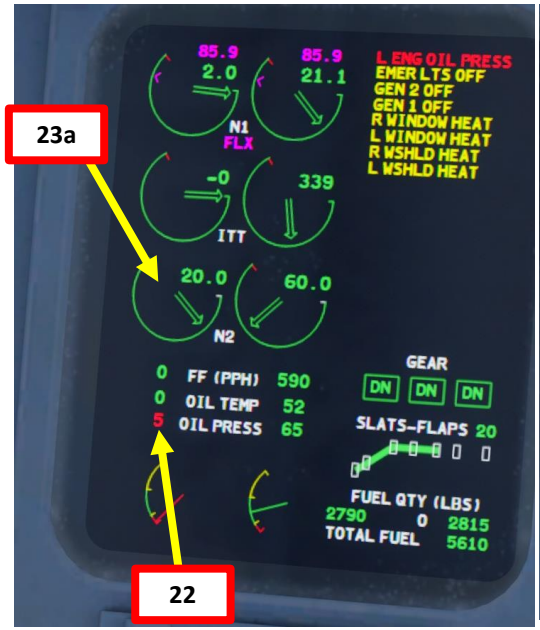


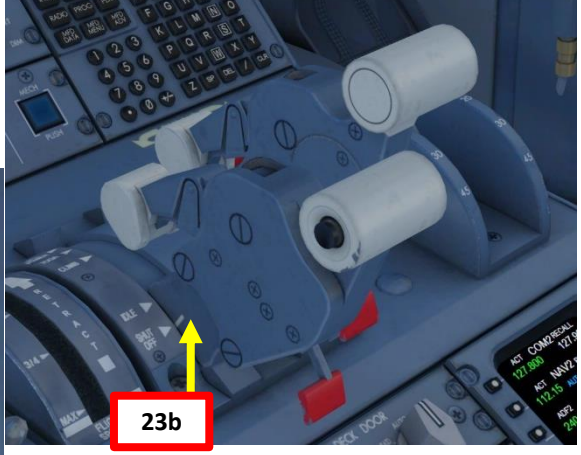


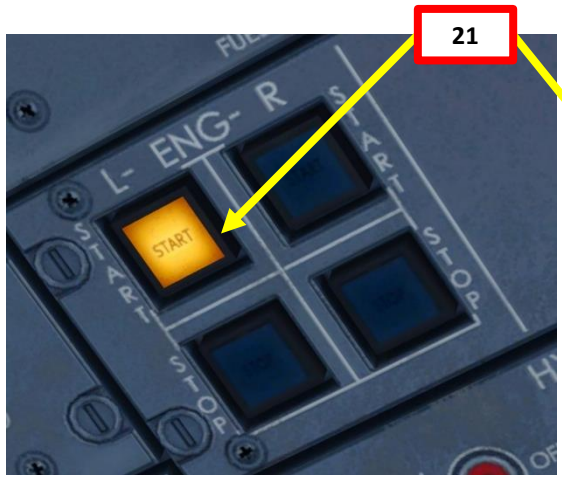


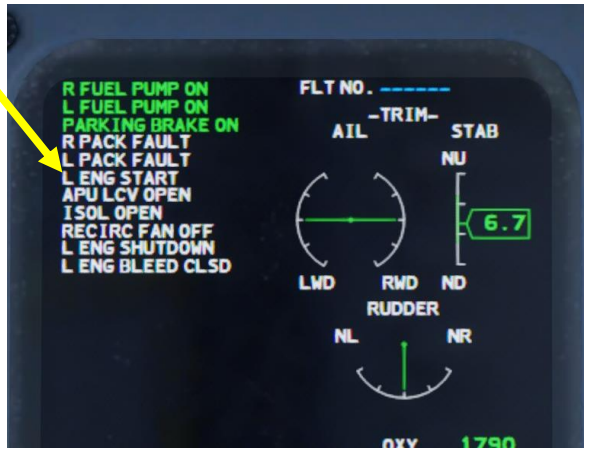
ENGINE START-UP

21. Press LEFT START switch. START Light will illuminate and L ENG START message will be displayed.
22. Confirm oil pressure rise.
23. When Left Engine N2 indication (High Pressure Compressor Rotation Speed) reaches 20 %, raise Idle/Shutoff Release Latch Lever and push the Throttle Lever to forward to IDLE.
24. N1 indication (Fan Speed / Low Pressure Compressor Rotation Speed), FF (Fuel Flow) and ITT (Inter-Turbine Temperature), Oil Pressure & Oil Temperature for Left Engine should increase, and RPM will accelerate and stabilize.
25. When Left Engine parameters stabilize at about 20% N1 and 60% N2, LEFT START switch will automatically reset and START light will extinguish.



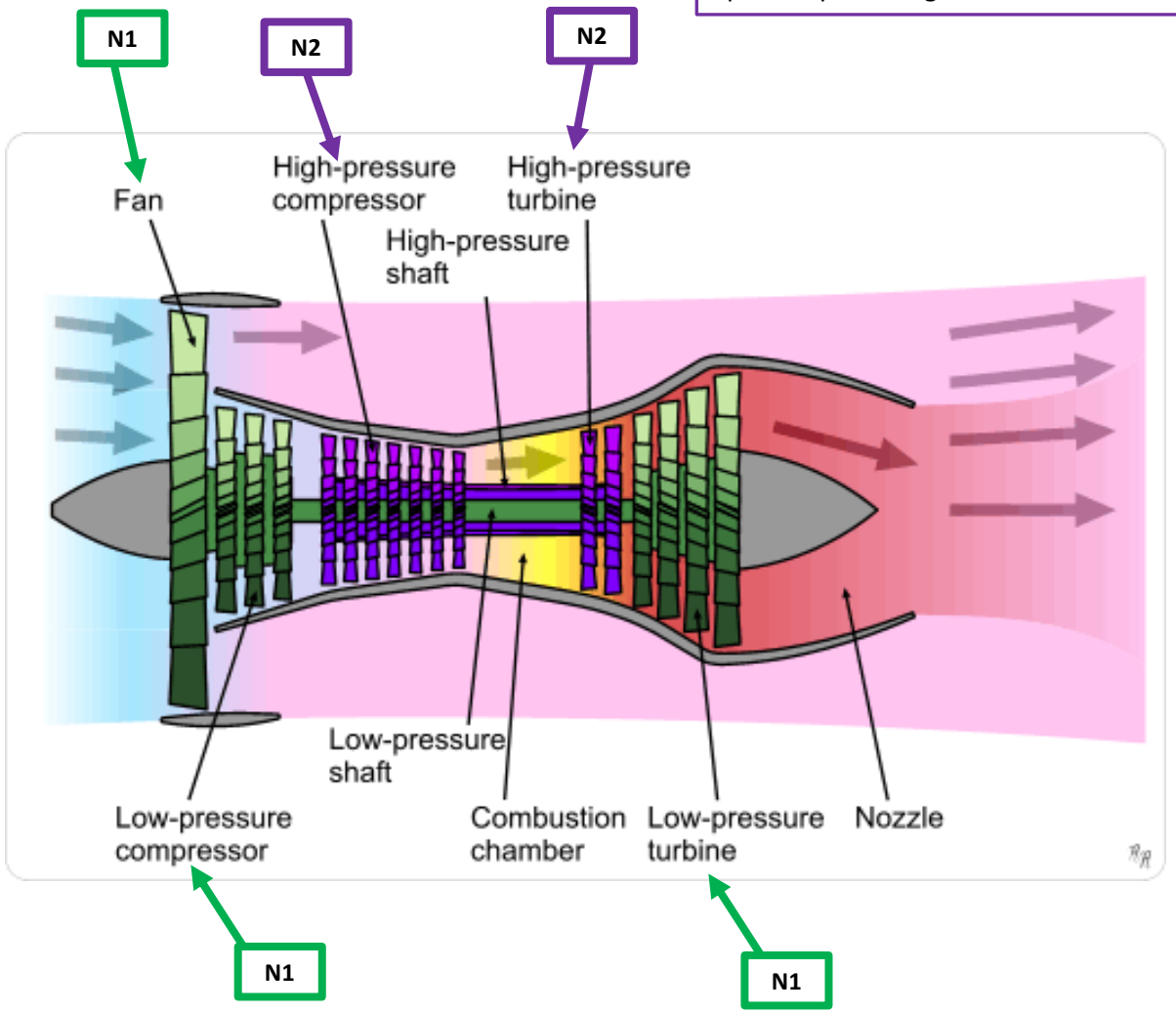




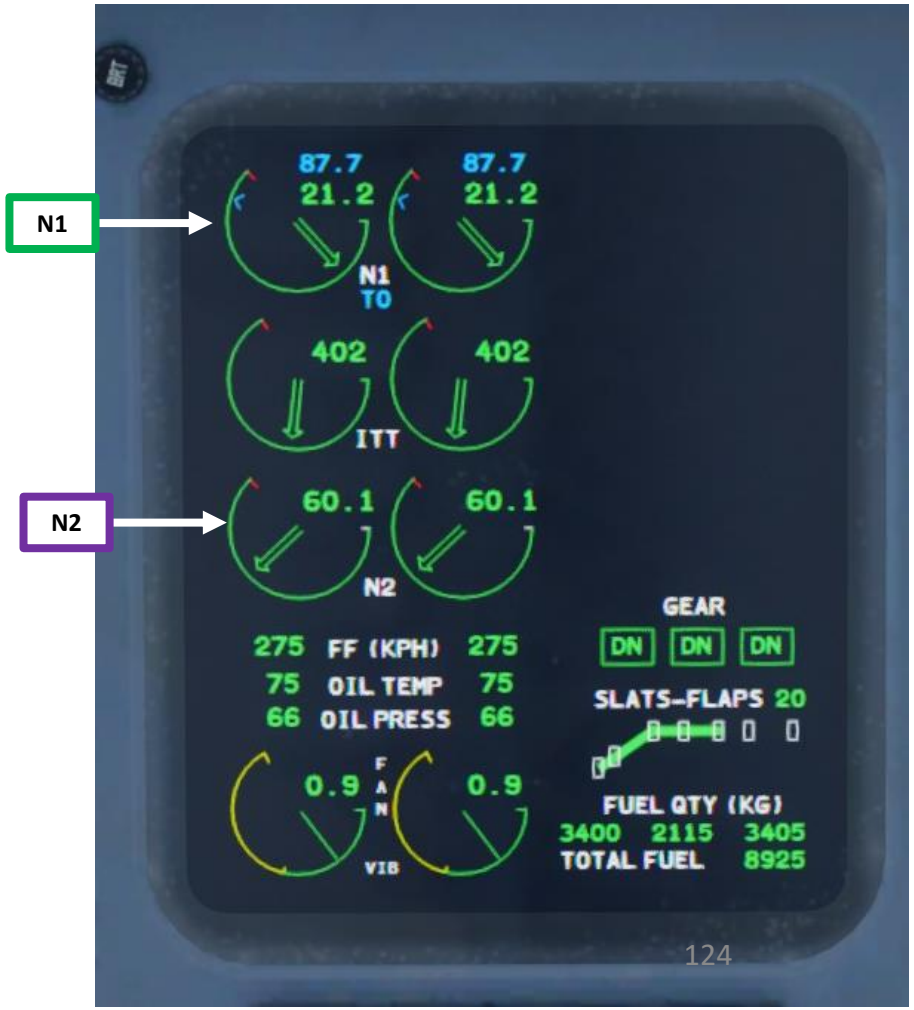


ENGINE START-UP

High-pressure compressor and high-pressure turbine are driven by the same shaft. This is N2 speed in percentage of maximum RPM.



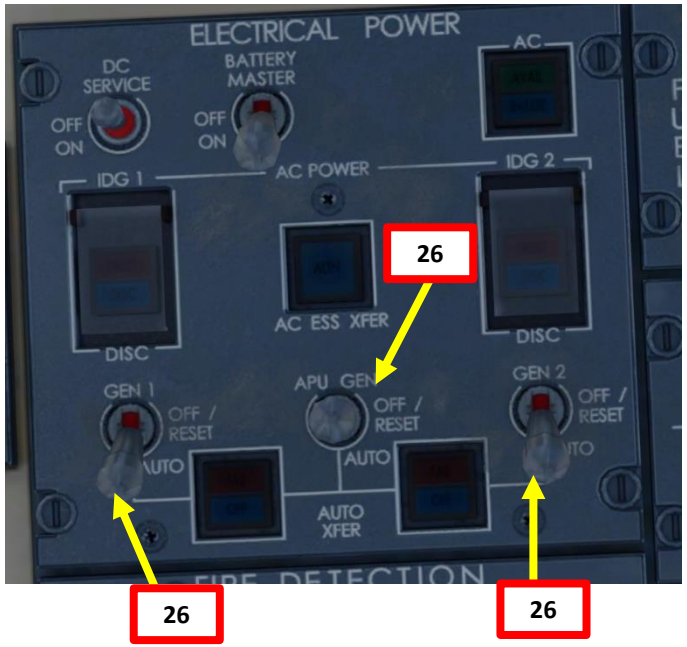
GE CF-34 8C1 Turbofan Engine

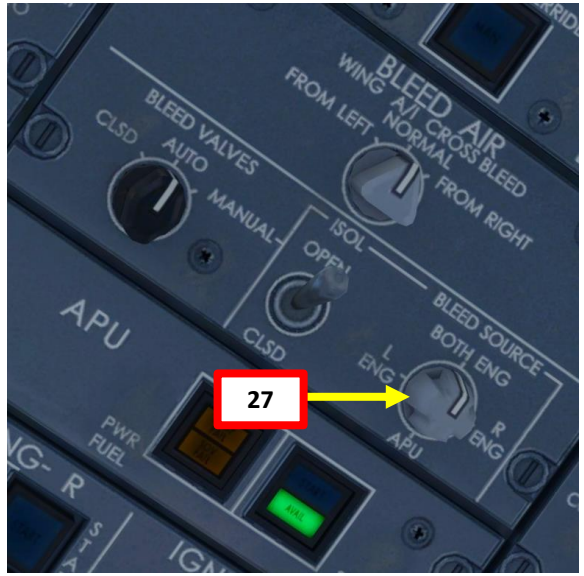


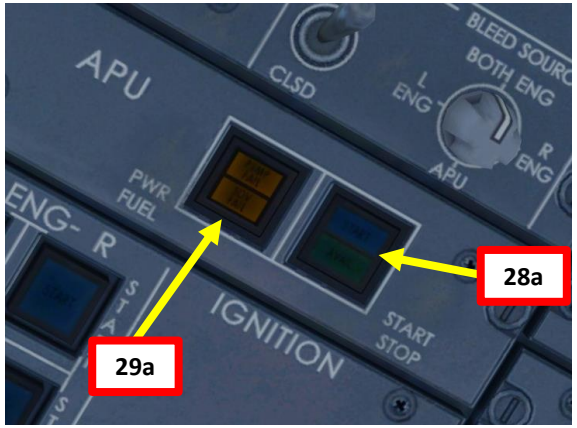
Fan, low-pressure compressor and low-pressure turbine are driven by the same shaft. This is N1 speed in percentage of maximum RPM.

ENGINE START-UP

26. Set GEN1 and GEN2 Switches to AUTO and set APU GEN switch to OFF/RESET
27. Set BLEED SOURCE selector to BOTH ENG.
28. Press the APU START/STOP switch to turn off the APU.
29. Once the APU has cooled down and RPM has reached 0, press the APU PWR switch to close the APU door.
30. Set Hydraulic Pumps 1, 2 and 3B – AUTO.

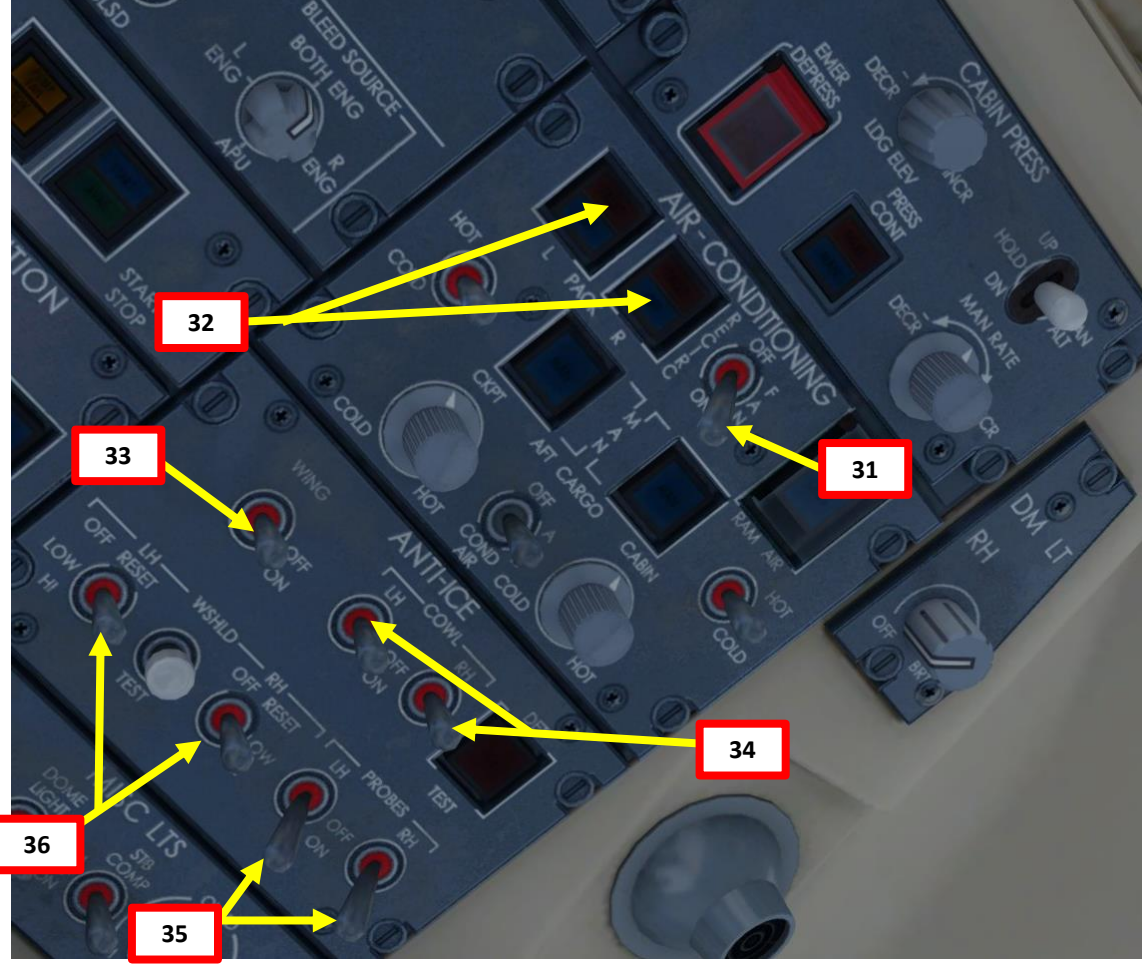


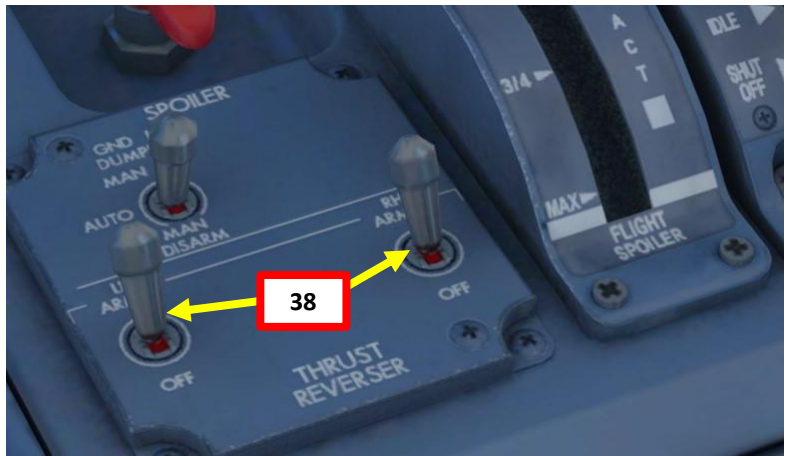




COMPLETE PRE-FLIGHT

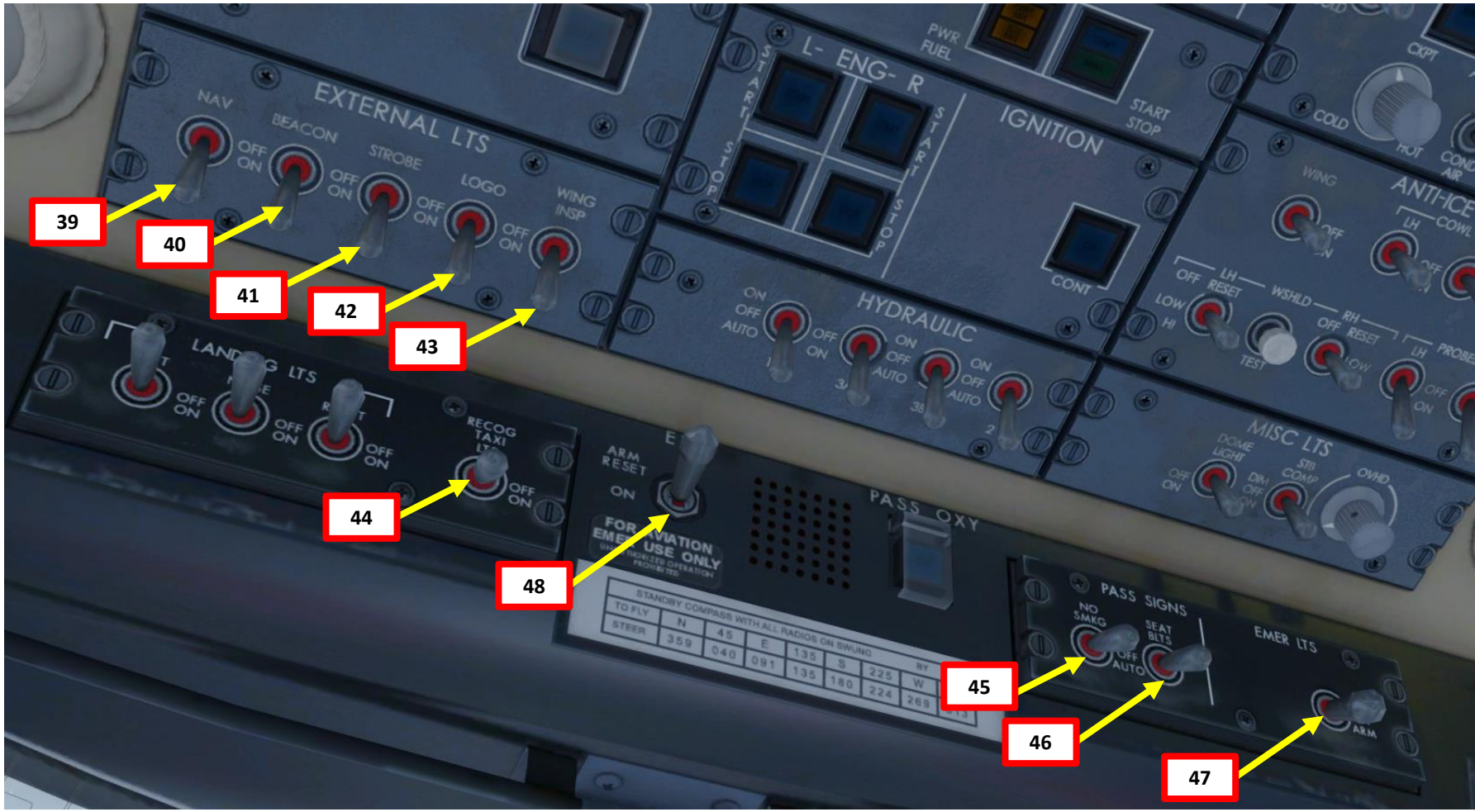
31. Set RECIRCULATION FAN switch – ON
32. Set PACK (Pneumatic Air Conditioning Kit) switches – AUTO
33. Set Wing Anti-Ice – As Required. *Note: Wing anti ice won't be used on the ground until just before takeoff roll.*
34. Set Engine Cowl Anti-Ice Switches – As Required
35. Set Left & Right Pitot Probe Heating Switches – ON
36. Set Left & Right Windshield Heating Switches – LOW for normal operations, HI during cold weather
37. If the MACH TRIM and STAB TRIM indications appear on the PFD (Primary Flight Display), set the MACH TRIM switch to ON and the STAB TRIM ENGAGE CH1 & CH2 switches to ON.
38. Set Thrust Reverser Arming Switches – ARM (FWD)





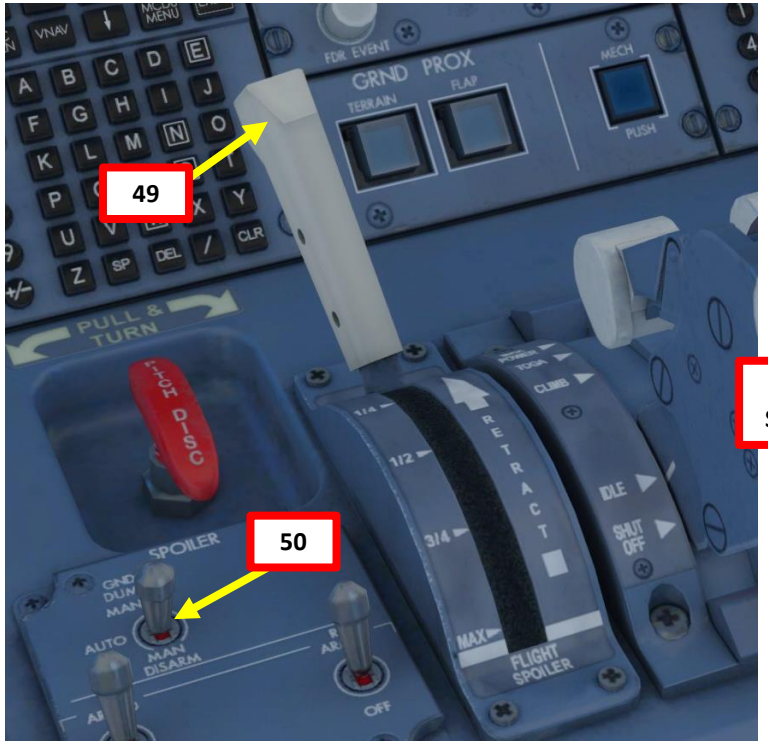
COMPLETE PRE-FLIGHT

39. Set Navigation Lights – ON
40. Set Beacon Lights – ON
    Note: In real life, the beacon should have been set prior to engine start.
41. Set Strobe Light – ON
42. Set Logo Lights – ON
43. Set Wing Inspection Lights – ON
44. Set Recognition/Taxi Light – ON
45. Set NO SMOKING switch – ON
46. Set SEAT BELTS switch – ON
47. Set EMERGENCY LIGHTS switch - ARM
48. Set ELT (Emergency Locator Transmitter) Switch – ARM (UP)

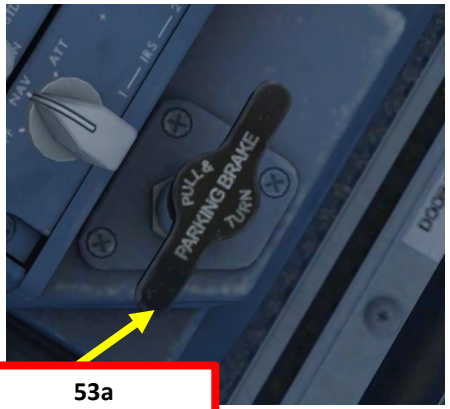


COMPLETE PRE-FLIGHT

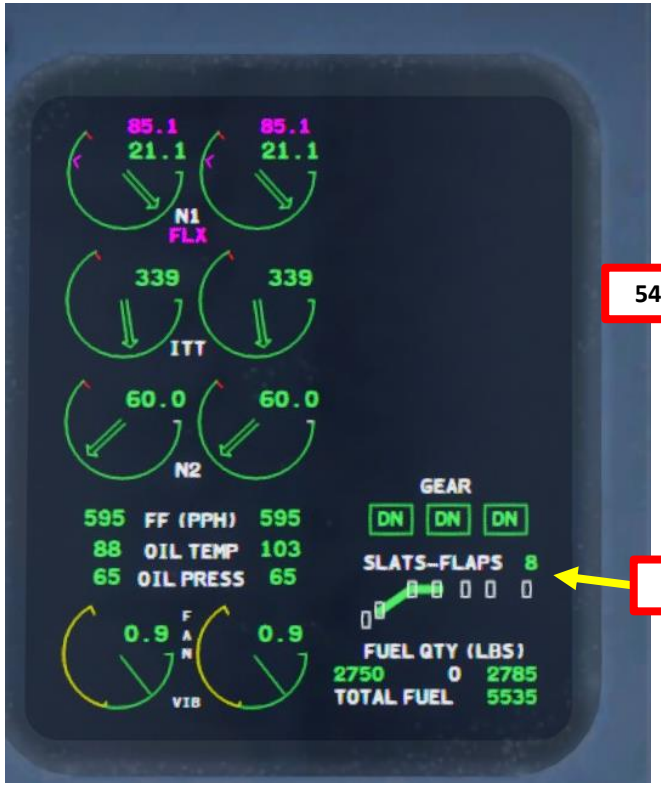
49. Set Flight Spoilers lever to OFF (Fully Forward)
50. Set GROUND LIFT DUMPING switch – AUTO
51. Set Flaps/Slats Lever to 8 deg for takeoff
52. In real life, both PACK switches always remain in the ON position for takeoff unless one of them is MEL'd (Minimum Equipment List'd). If you need extra performance then you start the APU and perform a "Bleeds closed" takeoff, then turn it off when in the air.
53. Release Parking Brake
54. Verify that the T/O CONFIG OK message is displayed on the STATUS page on the MFD.



53a
Shown ENGAGED

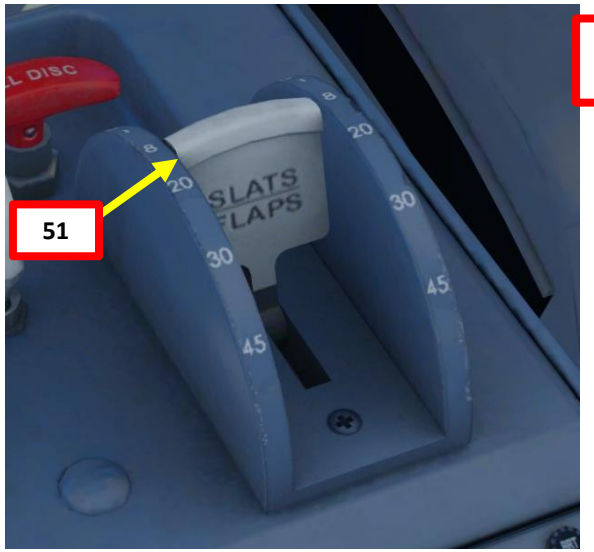


53a
Shown RELEASED



51

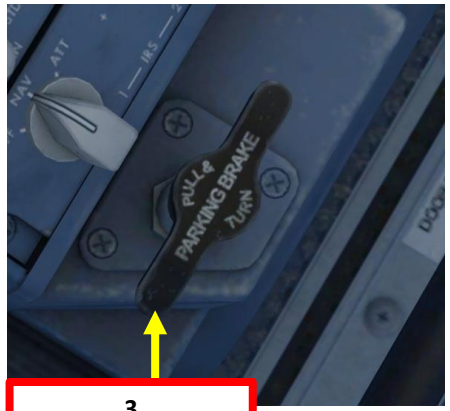
54



51

PUSHBACK

1. Set Nosewheel Steering switch – OFF
2. Set Anti-Skid switch – ARMED
3. Make sure parking brake is released
4. Begin Pushback by holding LSHIFT and P to initiate pushback. Once you have enough room to steer the aircraft away from the gate, hold LSHIFT and P a second time to stop the push.
5. Set Nosewheel Steering switch – ARMED




PUSHBACK
Academic License

TAXI

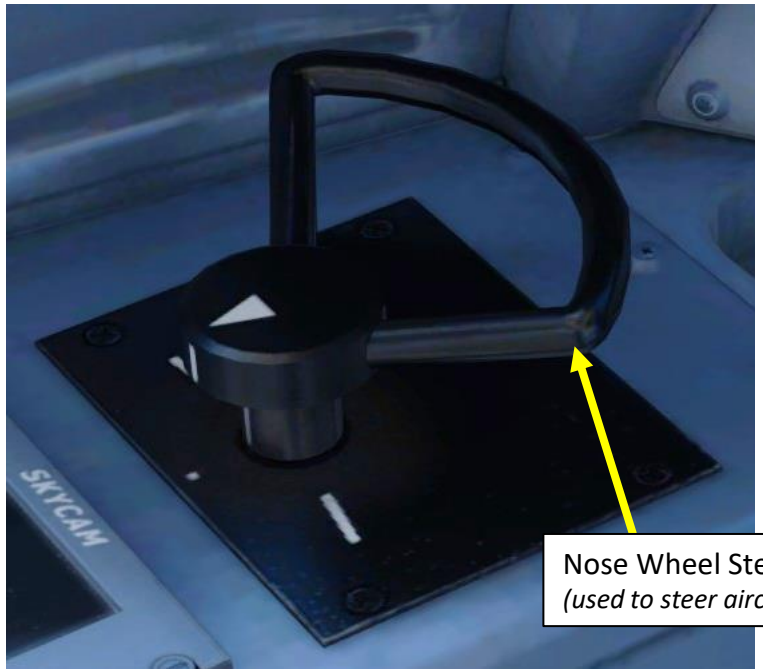
The CRJ is steered on the ground by using a tiller.

However, in FSX or P3D you cannot map a joystick axis to your nosewheel steering tiller: it's a limitation of the sim itself. In order to steer the aircraft, Digital Aviation mapped the tiller axis directly on the rudder axis. If you move your rudder pedals while on the ground, the aircraft will have its full steering range as if you were using the tiller.

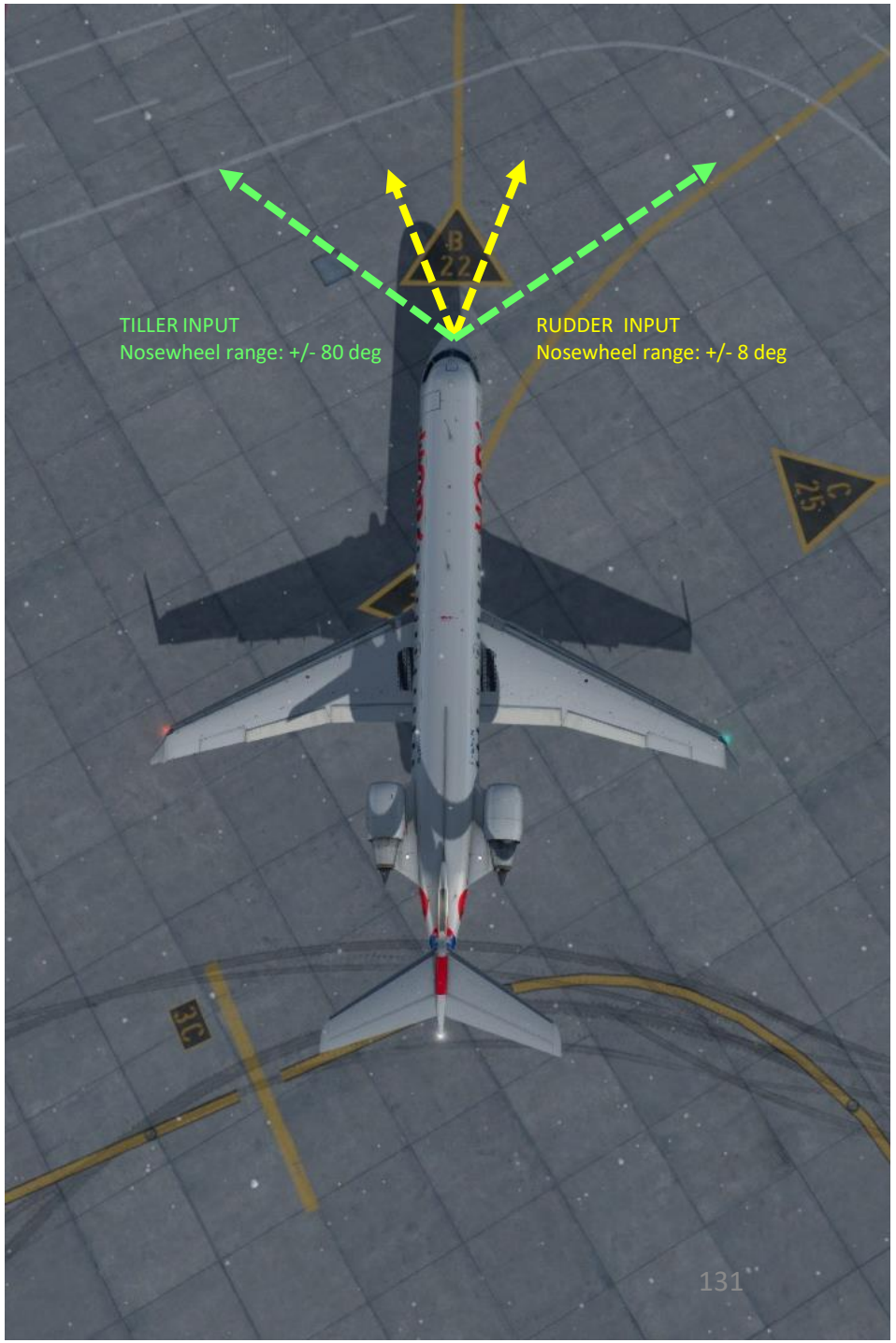
In real life:

Steering the aircraft with the nosewheel steering tiller alone will give the nosewheel a range up to +/- 80 degrees turn. The rudder doesn't physically move, but nosewheel does.

Steering the aircraft with the rudder alone will give the nosewheel a range of up to +/- 8 degrees turn. Rudder and nosewheel both move, but with less range.

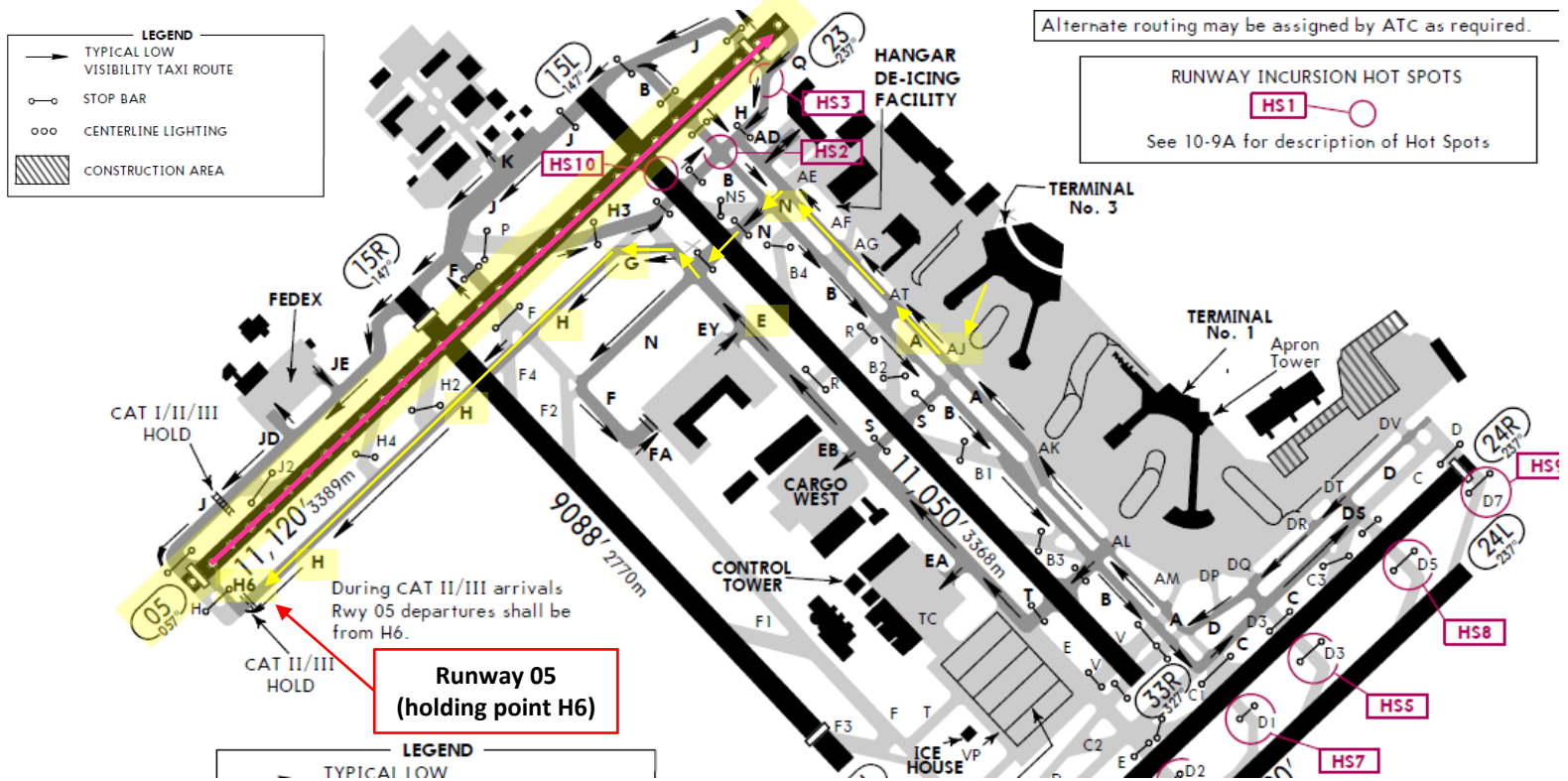


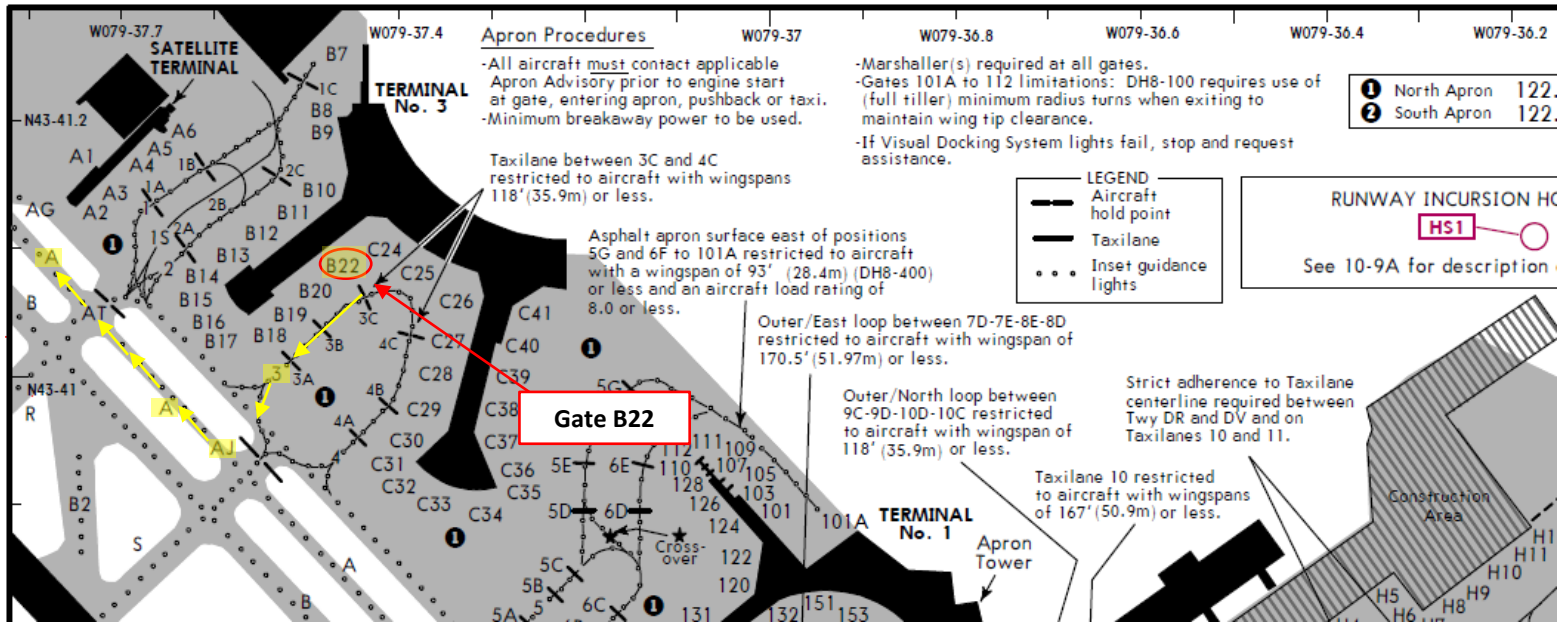
Nose Wheel Steering Tiller
(used to steer aircraft on the ground)



TAXI

- Our Flight Number for today will be ACA119 and we spawned at gate B22.
- After we performed pushback from gate B22, we would typically contact the tower for guidance by saying « ACA119, requesting taxi. »
- The tower would then grant you taxi clearance by saying « ACA119, taxi to holding position H6 Runway 05 via taxiways 3, Alpha-Juliet (AJ), Alpha (A), November (N), Echo (E), Golf (G), Hotel (H).
- This means that we will follow the A line, then turn left to the N line, then follow G and H line until holding point H6… and then hold there until we get our clearance for takeoff.
- Throttle up to maximum 40 % N1 and maintain a taxi speed of 15 kts maximum. Slow down to a maximum of 10 kts before making a 90 deg turn.





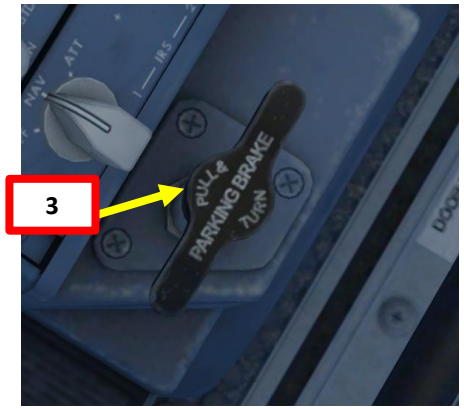
Check signs to follow the taxi route towards the holding point (H6)

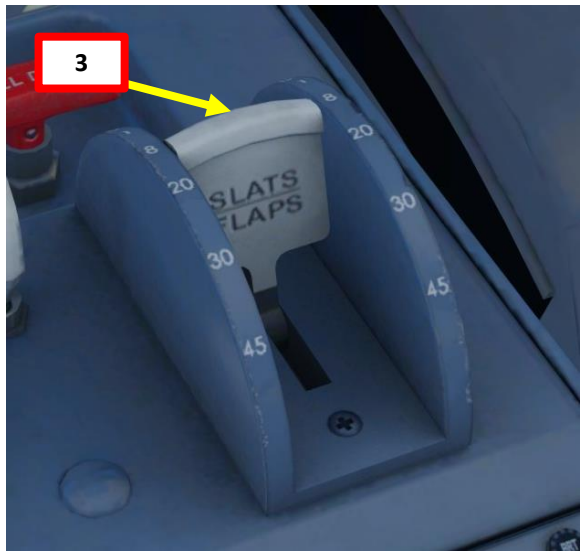

-33L H
ZH
HOP!


5-23 H6
F-GRZH
MAIN MENU
Checklists
Payload & Fuel
N/W STRG
LIGHTING
FLOOD

TAKEOFF

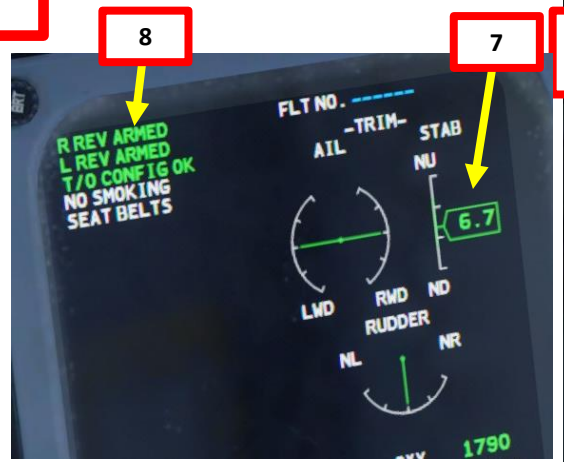
1. Line up on the runway
2. Set Terrain/Radar display to either TERRAIN for mountain areas or to WEATHER RADAR for storms. In our case, we will use the weather radar.
3. Check that parking brake is off and flaps lever is at 8 deg (takeoff configuration)

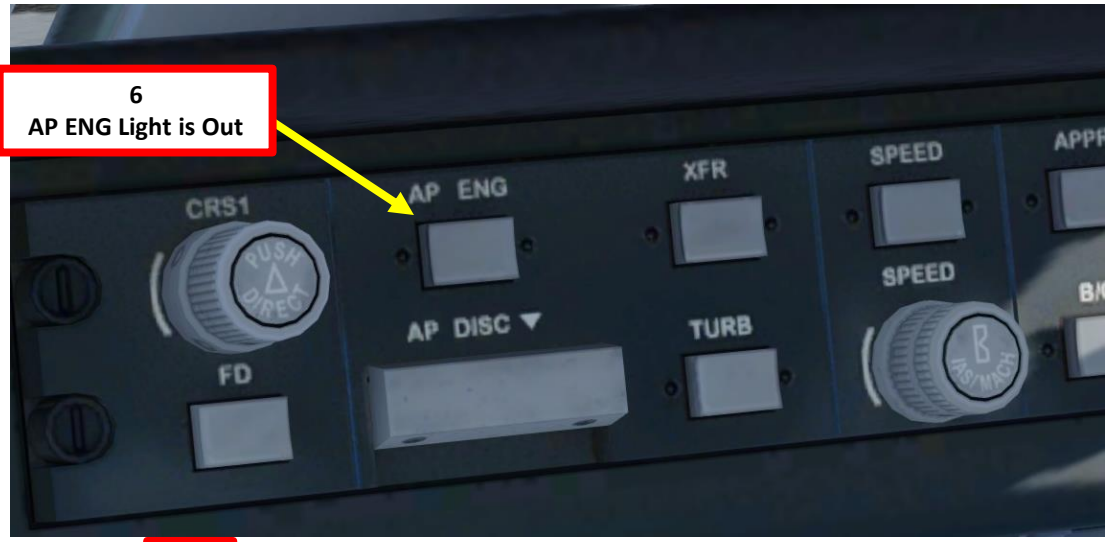


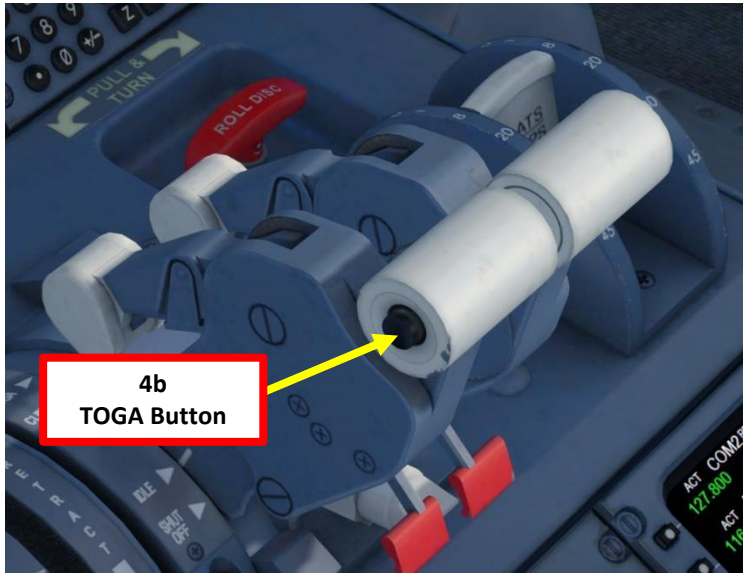


TAKEOFF

4. Press the TO/GA (Takeoff / Go Around) Button on the throttles to arm Flight Director Takeoff mode. « TO » should be visible for both lateral and vertical modes.
5. Verify that autopilot Heading bug is synced with the runway heading.
6. Verify that Autopilot is OFF.
7. Verify that Takeoff Trim is set
8. Verify that Thrust Reversers are armed in case of a rejected takeoff

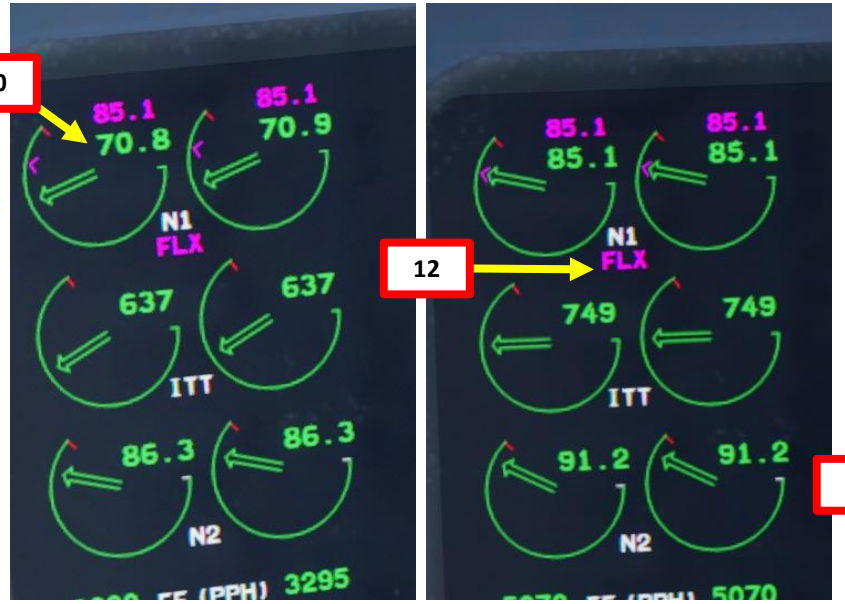


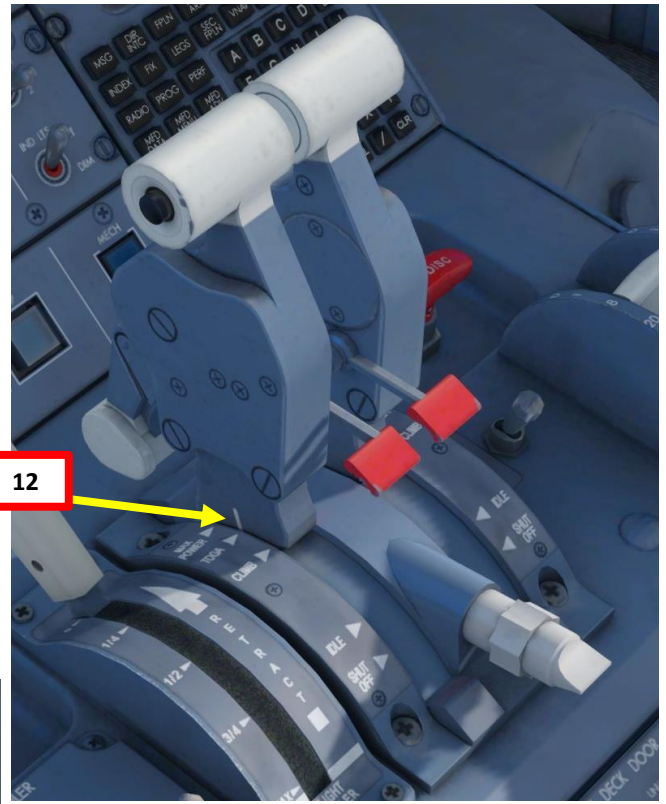


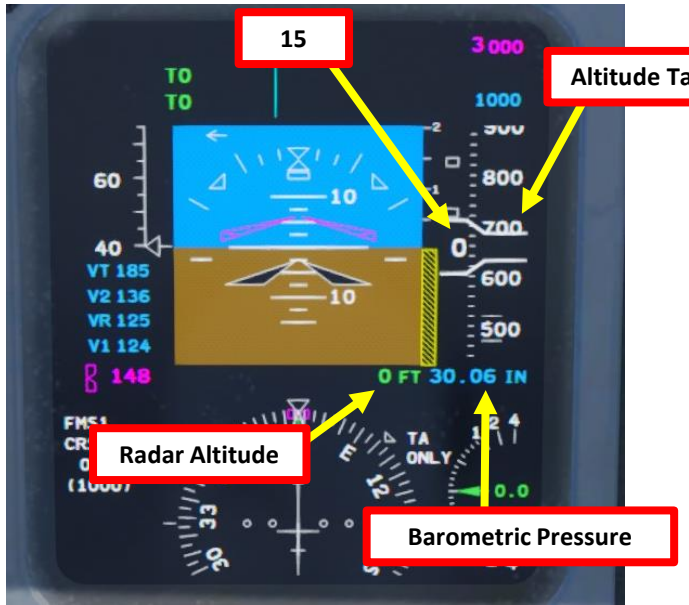


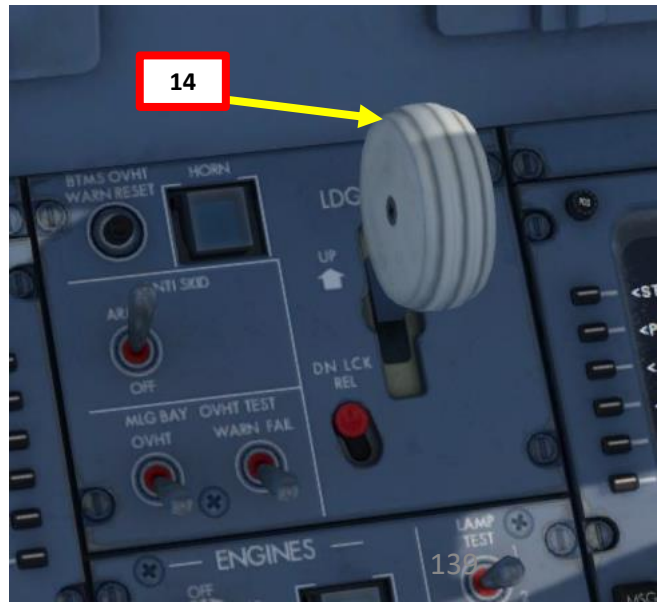
TAKEOFF

9. Unless you are doing a standing takeoff due to performance reasons, there is no need to hold brakes.
10. Throttle up until engines stabilize to 70 % N1 and wait for engine parameters to stabilize
11. Release brakes and start your takeoff roll. Use rudder pedals to stay centered on the runway.
12. Advance the throttles to the TOGA (Takeoff/Go Around) detent to set takeoff power to the FLEX rating.
13. Rotate smoothly and continuously when reaching VR (125 kts) until reaching 10 degrees of pitch angle.
14. Verify a positive rate of climb, then raise landing gear
15. As we can see on the altitude tape, our altitude changed from the airport elevation since the barometric pressure changed since we entered it. This is why we will use the radar altimeter indication as an altitude reference during takeoff; it is a more reliable reading for low altitudes.









TAKEOFF

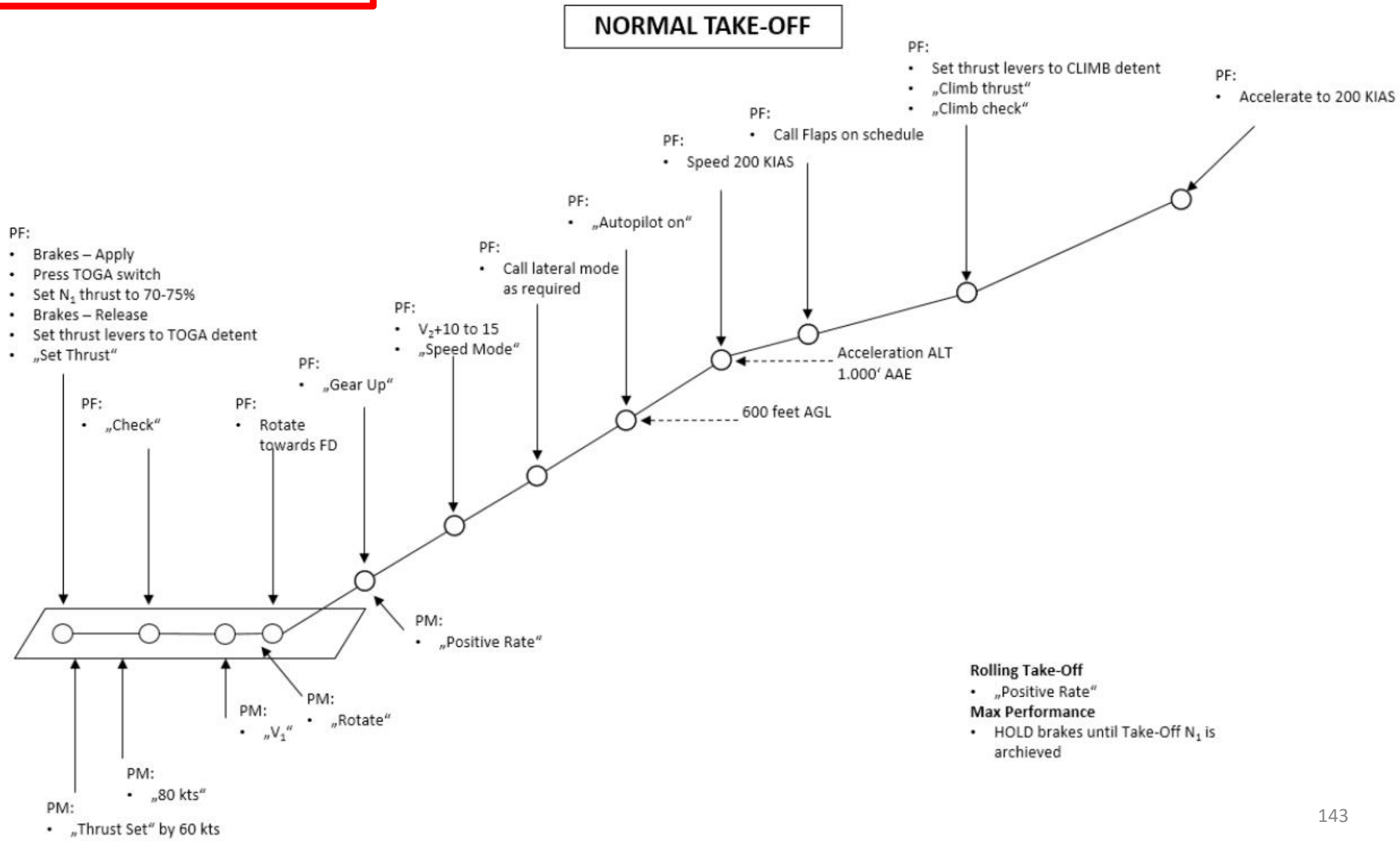
TAKEOFF

TAKEOFF

16. Quickly arm the SPEED and HDG autopilot modes. The speed mode should be set to an initial climb speed of 148 kts, which is V2 + 10 kts.
17. Maintain 10 deg of pitch until 1000 ft AGL and follow the Flight Director (pink lines)
18. When reaching 600 ft AGL, press the AP ENG switch to engage the autopilot with the SPEED and HDG modes.
19. When you are lined up with the Flight Director command bars and above 600 ft AGL, engage the NAV autopilot mode.
20. The Lateral Autopilot Mode on the Flight Mode Annunciator will switch from HDG to FMS1; the autopilot will track the flight trajectory of the Flight Plan entered in the Flight Management System instead of a set heading.

TAKEOFF

NORMAL TAKE-OFF



Rolling Take-Off
- „Positive Rate“

Max Performance
- HOLD brakes until Take-Off N_1 is archieved

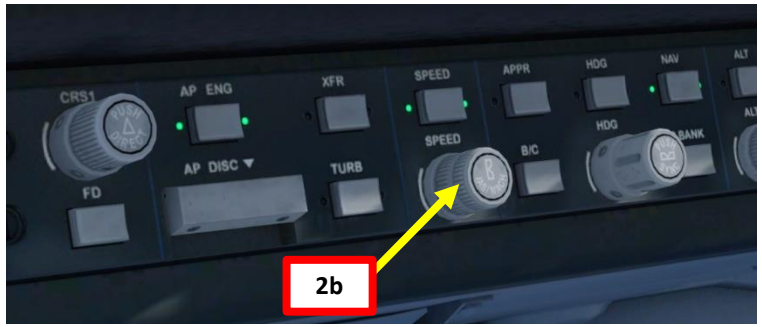
TAKEOFF

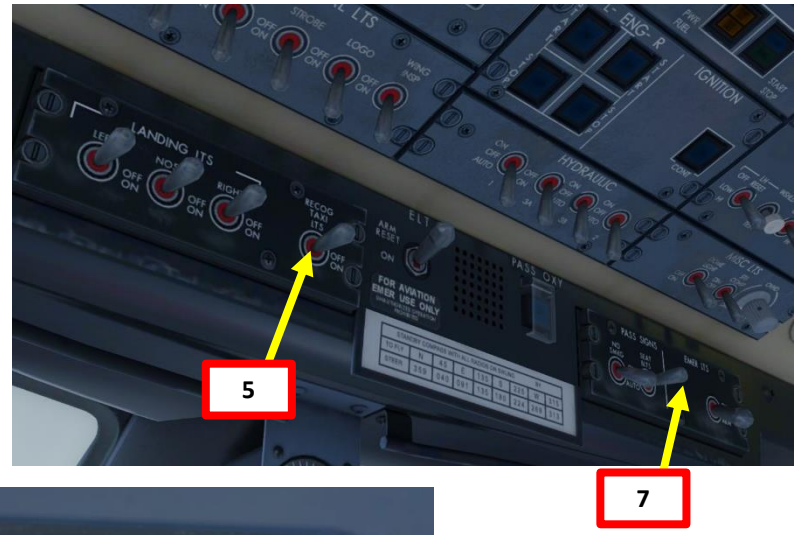
CLIMB

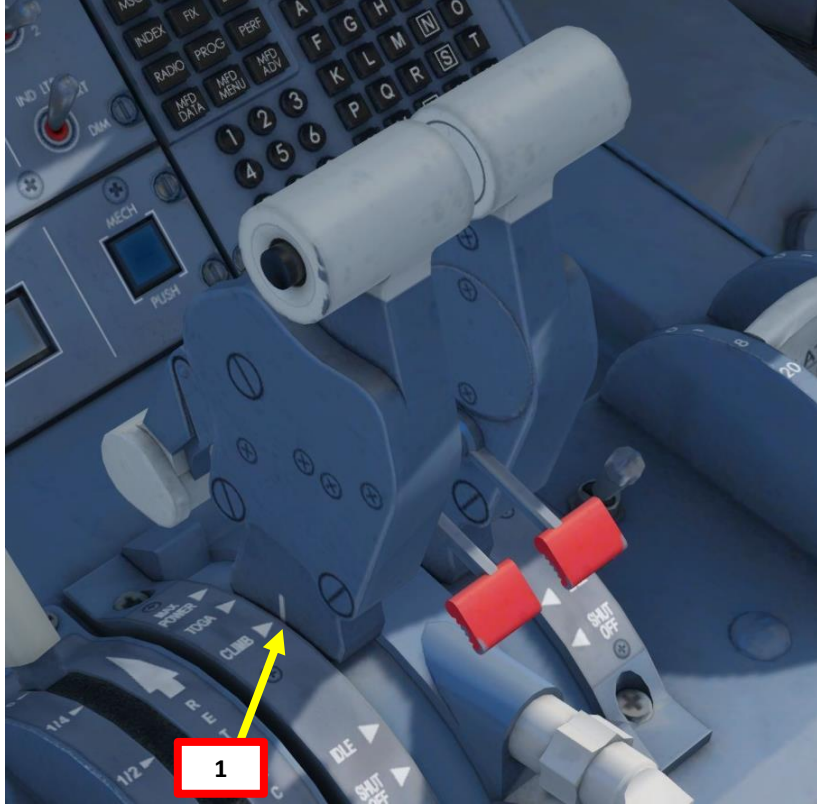
CLIMB

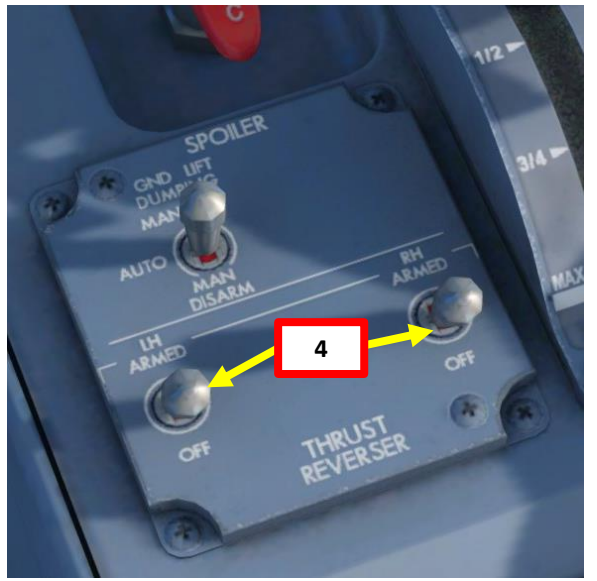
Note: Once we are 1000 ft above airport elevation, we hit our acceleration altitude.

1. Set the throttles to CLIMB detent to set CLIMB engine power rating
2. Set autopilot speed to 250 kts by turning the SPEED knob
3. Raise flaps to 0 deg before reaching 180 kts
4. Set Thrust Reverser Arming Switches – OFF (AFT)
5. Set Taxi Lights – OFF
6. Above 10000 ft, set SEAT BELTS light OFF







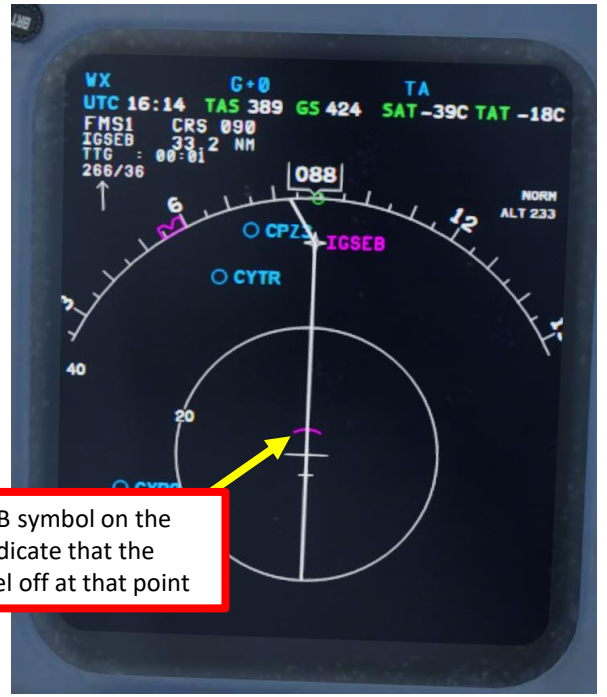


CLIMB

7. Once you have reached ALKUT at 3000 ft, begin our main climb segment. The ALTS CAP mode on the FMA will tell you that you have captured the selected target altitude. This mode will maintain the targeted altitude.
8. Scroll mousewheel on ALT setter to set 24000 ft for our cruising altitude target. This will arm the ALTS (Altitude Select) autopilot mode to 24000 ft.
9. Engage autopilot SPEED mode and set climb speed to 250 kts by turning the SPEED knob. We will keep this speed until reaching 10000 ft.

CLIMB

10. When reaching 10000 ft, set climb speed to 290 kts by turning the SPEED knob. We will keep this speed until reaching 24000 ft.
11. When you reach your cruising ceiling (24,000 ft), the autopilot will automatically set itself in the Altitude Capture mode (ALTS CAP), then in the Altitude Hold mode (ALTS). The aircraft will now try to maintain your current altitude at your current thrust setting.
12. Press the PROG button on the FMC to access the progress page. You can monitor your performance parameters from there.



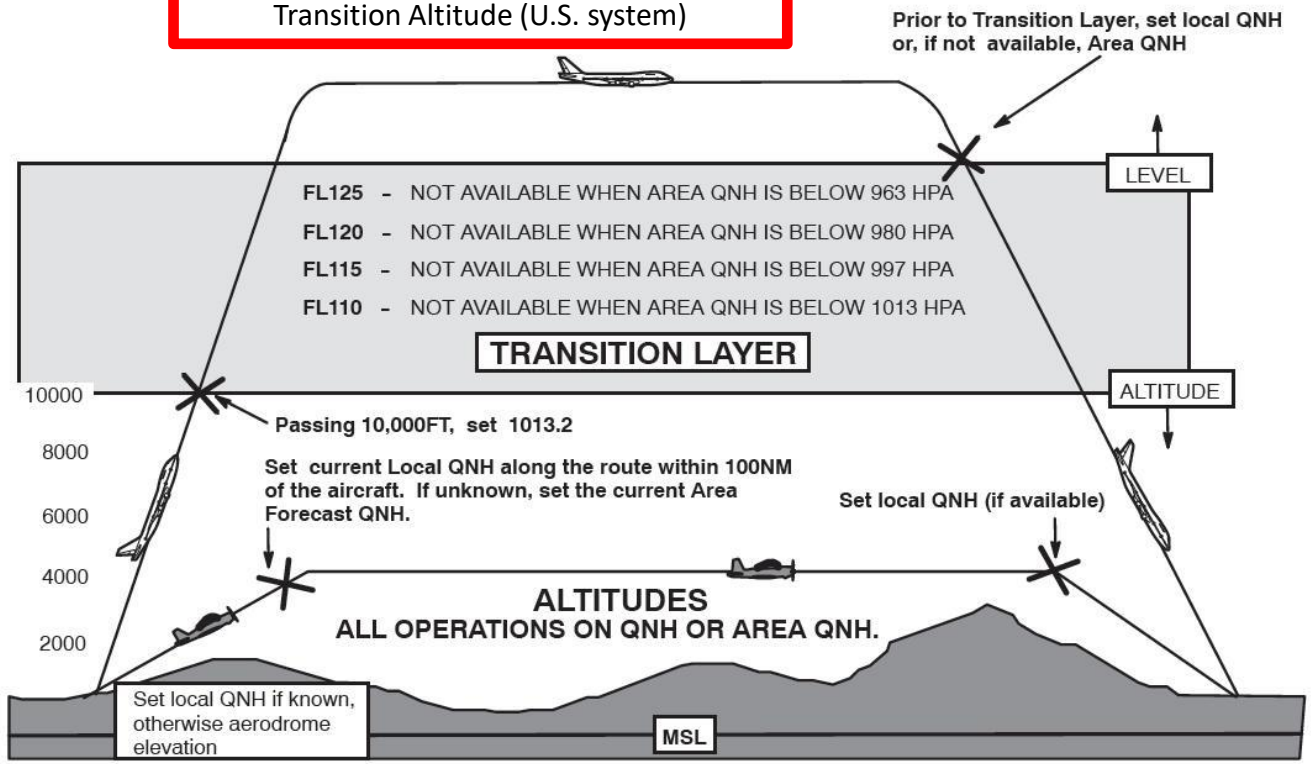
There is no TOP OF CLIMB symbol on the CRJ, but Magenta arcs indicate that the aircraft autopilot will level off at that point

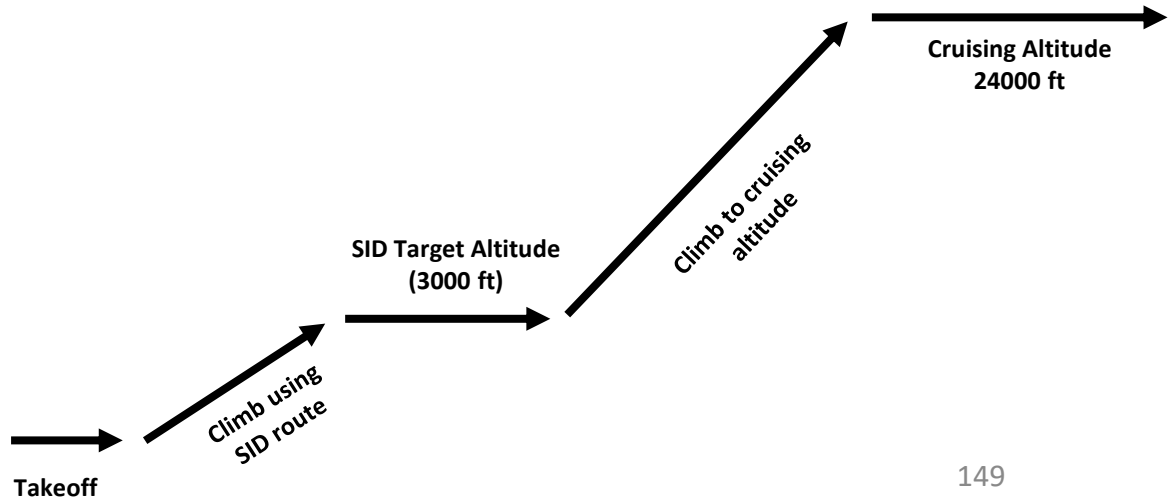
CLIMB

13. Once you pass transition altitude (3000 ft in Europe, 18000 ft in the US), adjust altimeter setting to standard barometric pressure (29.92 in Hg). You can also push the BARO STANDARD button in to set the Barometric Pressure directly to 29.92 in Hg.

If turning the Baro knob manually, do it SLOWLY or your autopilot will start freaking out since you are changing his pressure reference. Using STANDARD pressure is done in order to use flight levels as a reference. This means you will be using a standard barometric pressure of 29.92 in Hg, which is also used by other aircraft in the airspace instead of a local one given by an Air Traffic Controller. If pilots don't use a "standard" barometric pressure, different aircraft may collide in flight since they don't use the same pressure to define their current altitude. This is why higher altitudes are defined as "flight levels" (i.e. FL240 would be 24000 ft).

Transition Altitude (U.S. system)



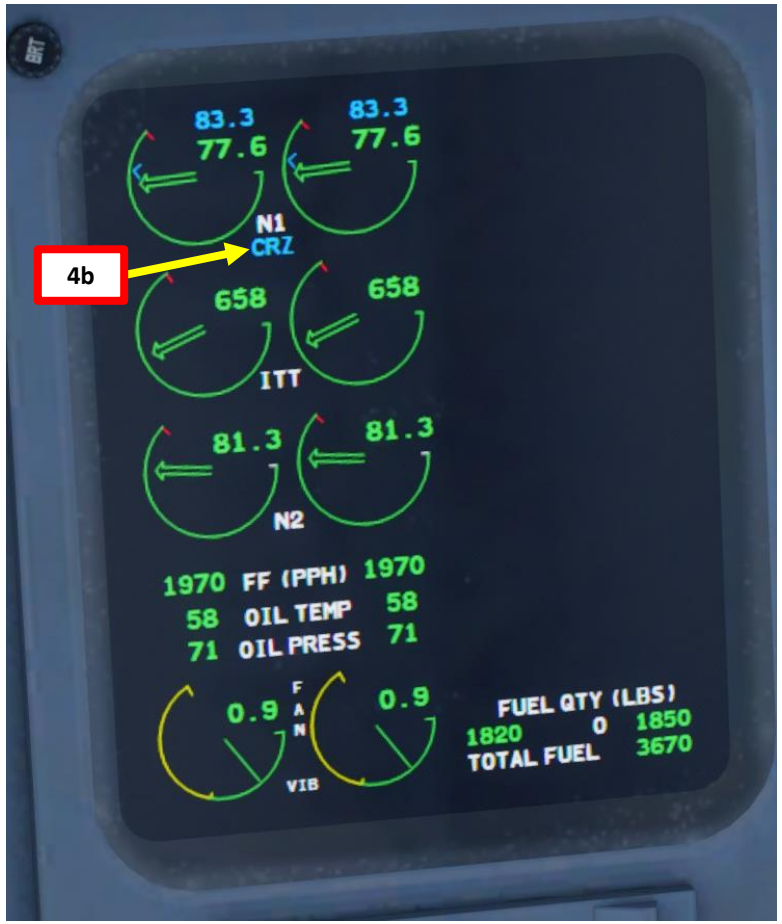


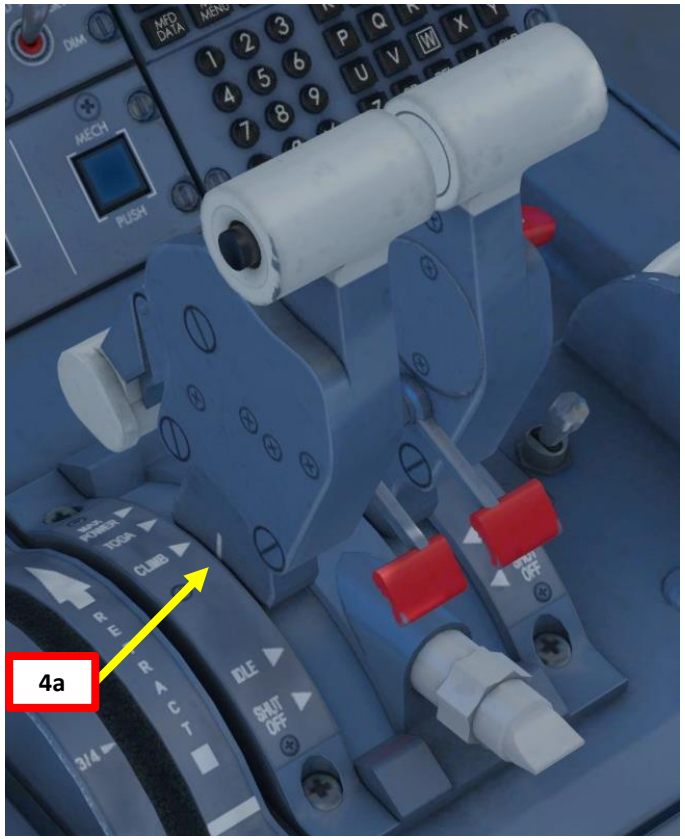
CLIMB

CRUISE

CRUISE

1. When you reach your cruising ceiling (24,000 ft), the autopilot will automatically set itself in the Altitude Capture mode (ALTS CAP), then in the Altitude Hold mode (ALTS).
2. The aircraft will now try to maintain your current altitude at your current thrust setting. There is no autothrottle system here, so your airspeed needs to be managed with the throttle.
3. Adjust throttle to maintain an airspeed of Mach 0.74.
4. Once throttle is below CLIMB detent but above IDLE detent, the FADEC (Full Authority Digital Engine Controller) will set the thrust limit mode to CRZ. There is no "CRUISE" throttle detent on the CRJ; you should see it as a throttle range instead of a fixed detent.





CRUISE

5. You can monitor the your distance to waypoints with the LEGS FMC page.

CRUISE

Introduction to Autopilot

Many newcomers in the flight simulation world have this idea that the autopilot is the answer to EVERYTHING. And I mean: e-v-e-r-y-t-h-i-n-g. Spoiler alert: it's not. The autopilot is a tool to help you fly to reduce your workload, not a tool to replace the pilot. The autopilot should be seen as a system that can make your life easier. This is why you need to be familiar with its capabilities and be able to read what the FMA (flight mode annunciator) is telling you.

It is important to take note that there is no autothrottle system on the CRJ. Why? Because autothrottle systems are expensive and a regional jet may not need it much for short flights. Instead, you will be managing your airspeed with a combination of aircraft attitude and throttle input.

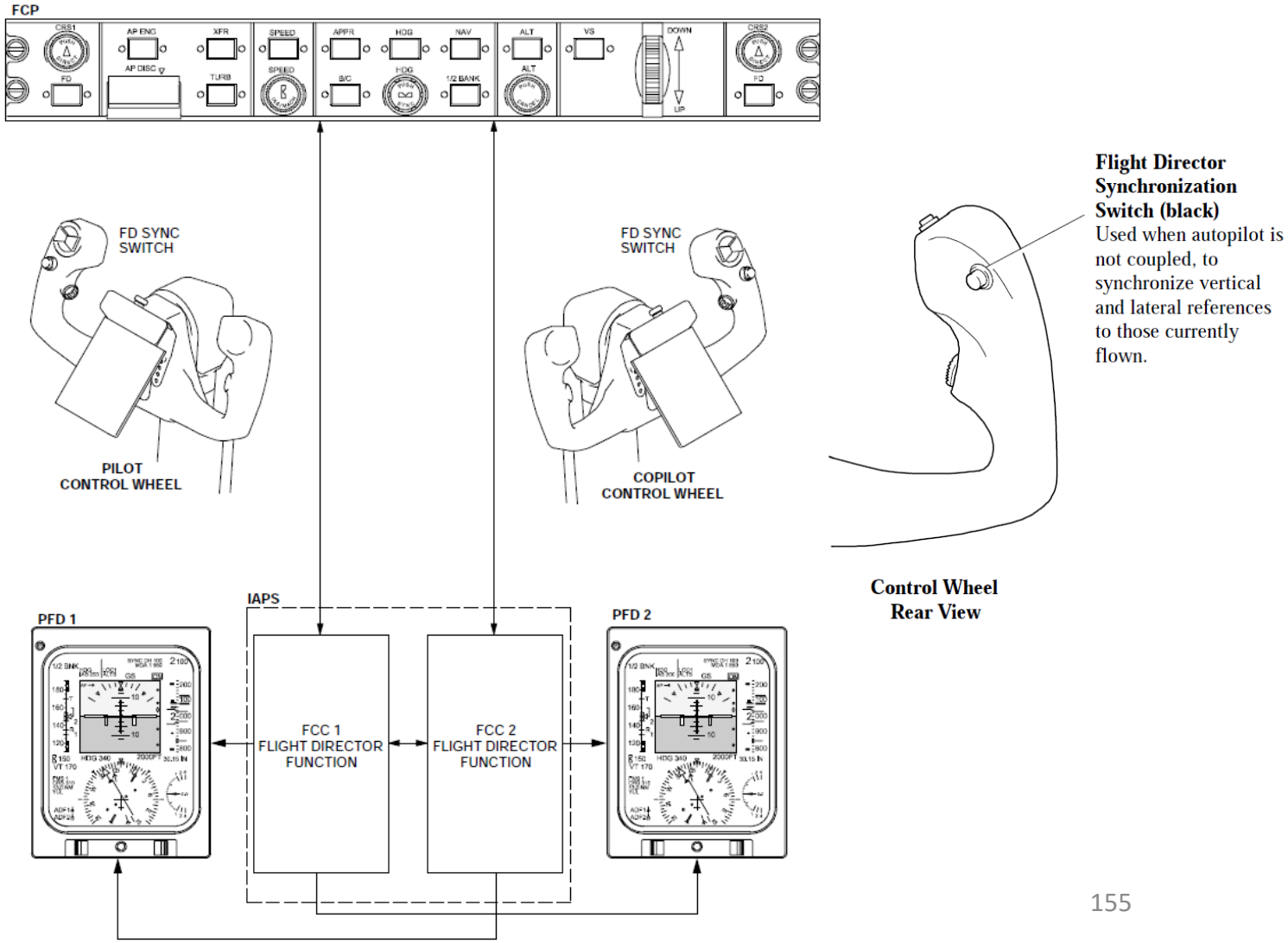
AFCS: Automatic Flight Control System

The AFCS provides several major functions: the flight director (FD) provides lateral and vertical guidance to fly the aircraft, either manually or automatically.

While most airliners like the 737 or the A320 use an autothrottle system, the CRJ does not have one. The AFCS will move the control surfaces and trim tabs to match what command you send the autopilot. As an example, if you set a target altitude and IAS, the control surfaces will set the aircraft in an attitude that allows the aircraft to reach the target altitude at the set IAS, meaning that you will control your climb/descent rate with the throttle.

In other words, the autopilot will change your aircraft's attitude based on what you want to do, but you need to make sure that your throttle and propeller speed (condition levers) give you enough power.

The IAPS (Integrated Avionics Processing System), FCC (Flight Control Computer) and FD (Flight Director) are all integrated together. The interface the pilot uses is called the FCP (Flight Control Panel).



Button	Description
SPEED	Vertical autopilot changes aircraft attitude to hold indicated airspeed
VS	Vertical autopilot changes aircraft attitude to hold vertical speed
ALT	Vertical autopilot changes aircraft attitude to maintain current altitude
HDG	Lateral autopilot tracks selected heading
NAV	Lateral autopilot tracks navigation flight plan determined by the FMS
BC	Lateral autopilot tracks backcourse localizer displayed on active PFD
1/2 BANK	Half bank mode reduces the maximum commanded bank angle to 15 degrees.
APPR	Lateral and vertical autopilots track localizer and glide slope targets for approach
AP	Engages/Disengages Autopilot
FD	Used to select flight director off when autopilot is not coupled. When pushed, removes steering and mode information from respective PFD.
TURB	Turbulence mode reduces autopilot gain so that flight control computer response to turbulent flight conditions is slowed and aircraft motion is smoother. On approach, an on-side localizer capture automatically clears the autopilot turbulence mode.

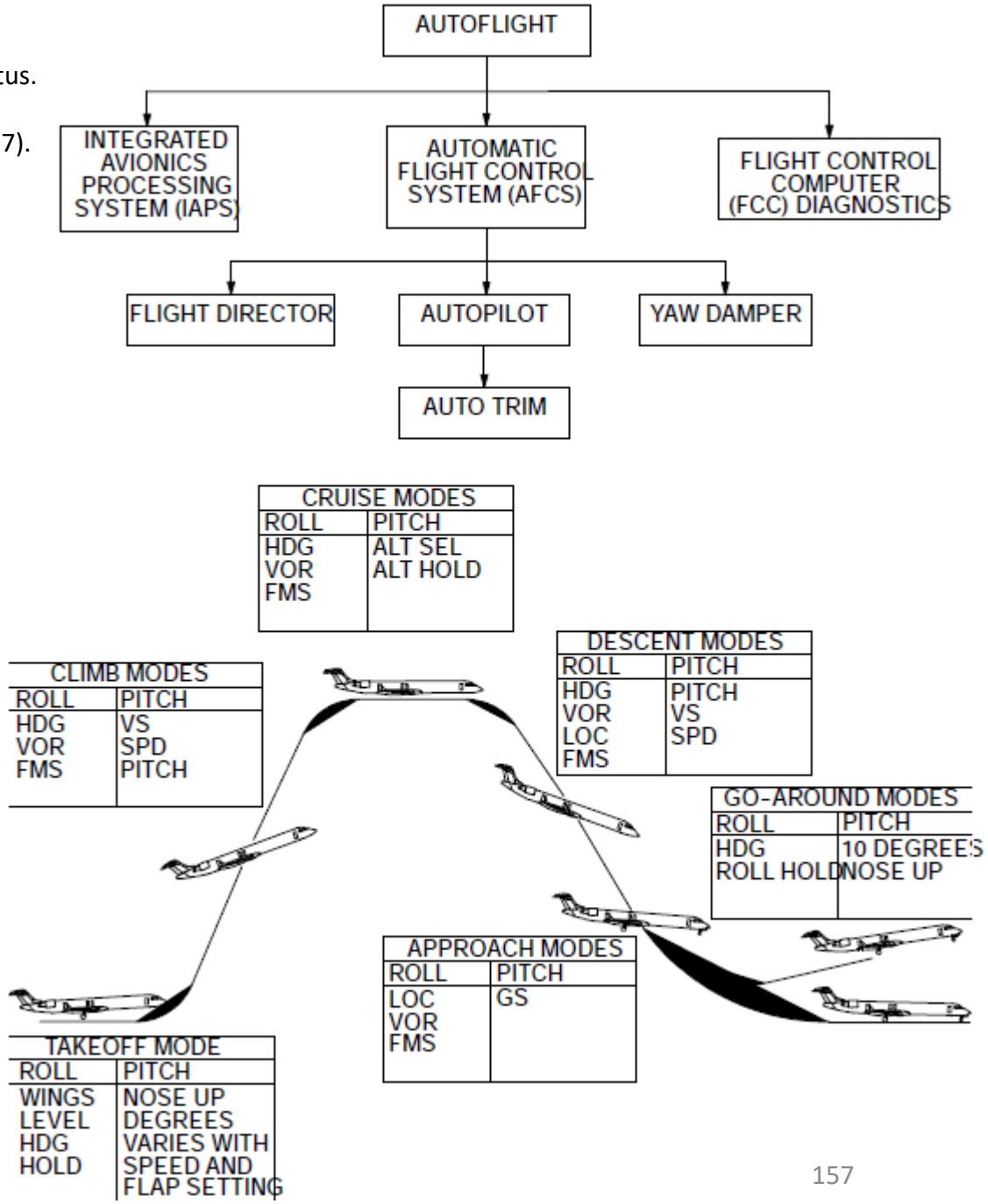
Knobs	Description
COURSE	Sets ILS course
HDG	Sets autopilot heading for HDG mode
SPEED	Sets aircraft speed command to the automatic flight control system
ALT	Sets target altitude
AUTOPILOT PITCH THUMBWHEEL (NOSE DN/ NOSE UP)	Sets autopilot pitch attitude (which can be used by flight guidance modes VS, PITCH HOLD and IAS/CLB/DES.)

FMA (Flight Mode Annunciator)

The FMA displays the status of the autopilot vertical mode, lateral mode, and autopilot status.

First row is for LATERAL systems (i.e. FMS1), second row if for VERTICAL systems (i.e. CLB317).

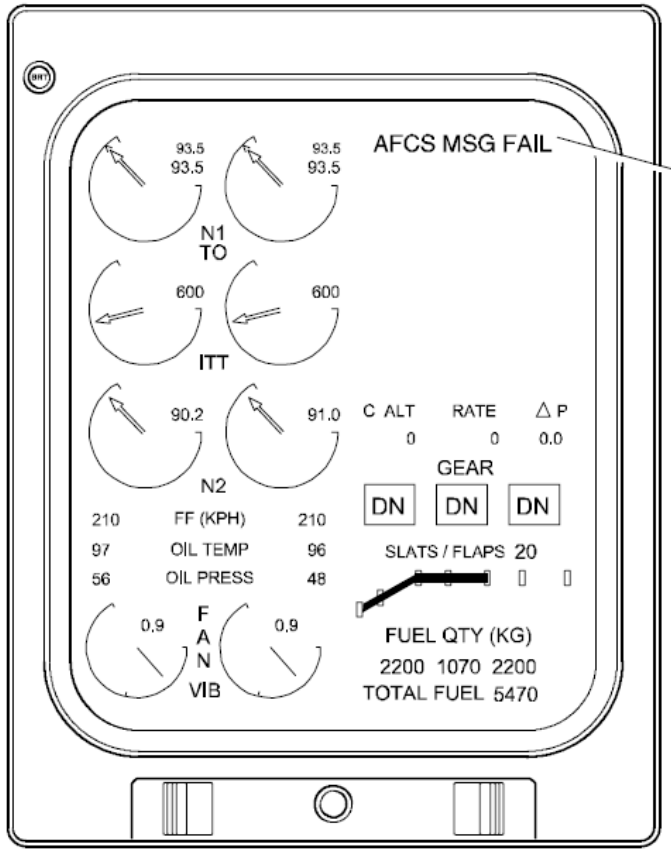
First column is for the ACTIVE (green) autopilot modes, and right column is for the ARMED (white) but not engaged modes.



FMA (Flight Mode Annunciator)

1: Lateral		2: Vertical	
TO: Lateral Takeoff Mode generates a wings level command while on the ground. After take-off, it generates a heading hold command with a 5-deg bank limit, using the heading which existed at takeoff.	**GA**: Lateral go-around mode generates a heading hold command with a 5 deg bank limit.	**TO**: Vertical takeoff mode generates a variable fixed pitch-up command dependant on flap setting for takeoff and the spread between V2 and VR.	**CLB/DES/IAS**: Speed mode holds a selected airspeed. CLB is activated when pressing the SPEED button on the FCP once with a pre-selected altitude set above current altitude. DES is activated when pressing the SPEED button on the FCP once with a pre-selected altitude set below current altitude. IAS is basically the same as CLB or DES and is activated when pressing on the SPEED button twice. Upon altitude capture (selected altitude), speed mode is automatically disabled and altitude hold is selected.
FMS1/2: Navigation mode engaged (source identifier is the Flight Management System)	**B/C 1/2**: Back Course Mode captures and tracks selected back course displayed on the PFD.	**PTCH**: pitch command on the PFD is set to the current pitch angle.	**VS**: Vertical Speed Mode commands a climb or descent rate.
VOR1/2: Navigation mode engaged (source identifier is a VOR)	**ROLL**: Roll mode holds generates commands to hold the heading that exists when the mode is initiated, unless the roll angle upon initiation is over 5 degrees (commands are then generated to hold the roll angle). Roll is automatically selected when no other lateral mode is active and the flight director is on.	**ALT**: Altitude hold mode	**GS**: Glide Slope capture mode.
LOC1/2: Navigation mode engaged (source identified is a localizer)	**GA**: Lateral go-around mode generates a heading hold command with a 5 deg bank limit.	**ALTS**: Altitude preselect mode. After capturing preselected altitude, if preselected altitude is changed, altitude hold is automatically selected and altitude preselect is re-armed.	**GA**: Vertical Go-Around mode generates a fixed pitch-up command, the value depending on whether both engines are operating or if one engine is inoperative (OEI).
HDG: Heading select mode	**1/2 BNK**: Half bank mode reduces the maximum commanded bank angle to 15 deg.	**ALTS CAP**: Altitude Preselect Capture mode (when within 200 ft of the preselected altitude)	

FMA (Flight Mode Annunciator)



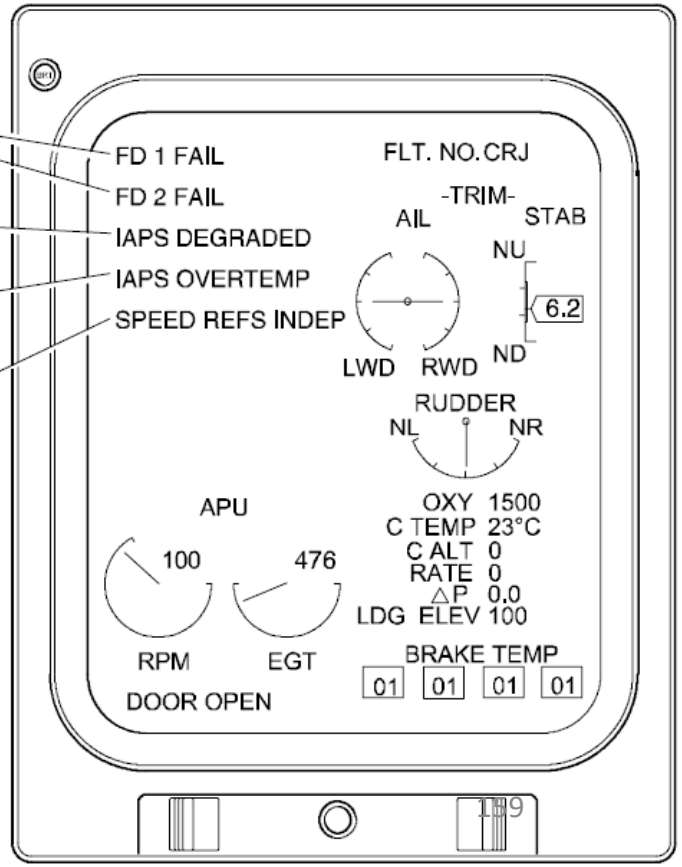
AFCS MSG FAIL warning (red)
Indicates all AFCS (IAPS) data busses are invalid.

FD 1 or 2 FAIL status (white)
Indicates that the respective flight director has failed.

IAPS DEGRADED status (white)
Indicates that an IAPS bus has failed.

IAPS OVERTEMP status (white)
Indicates that an IAPS overtemperature condition has been detected.

SPEED REFS INDEP status (white)
Indicates that pilot and copilot vertical-speed selection is not synchronized or air data computer cross-talk has failed.



3: Autopilot
AP ←: Autopilot is engaged

APPROACH & LANDING

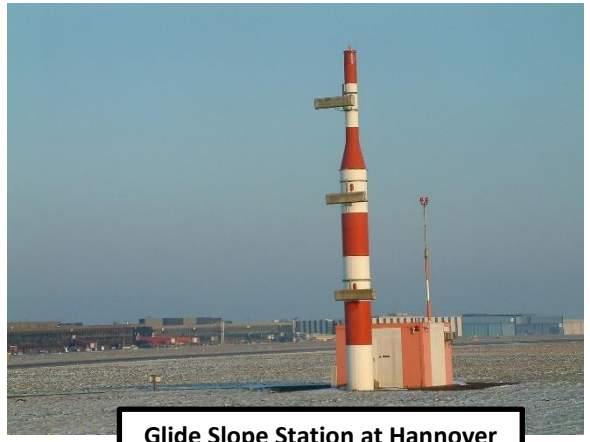
PLANNING DESCENT

So, you've finally made it all the way up to your cruising altitude? Congrats! Now, we have a bit of planning to do.

First, let's introduce you to the ILS (Instrument Landing System). This system exists to guide you during your approach.

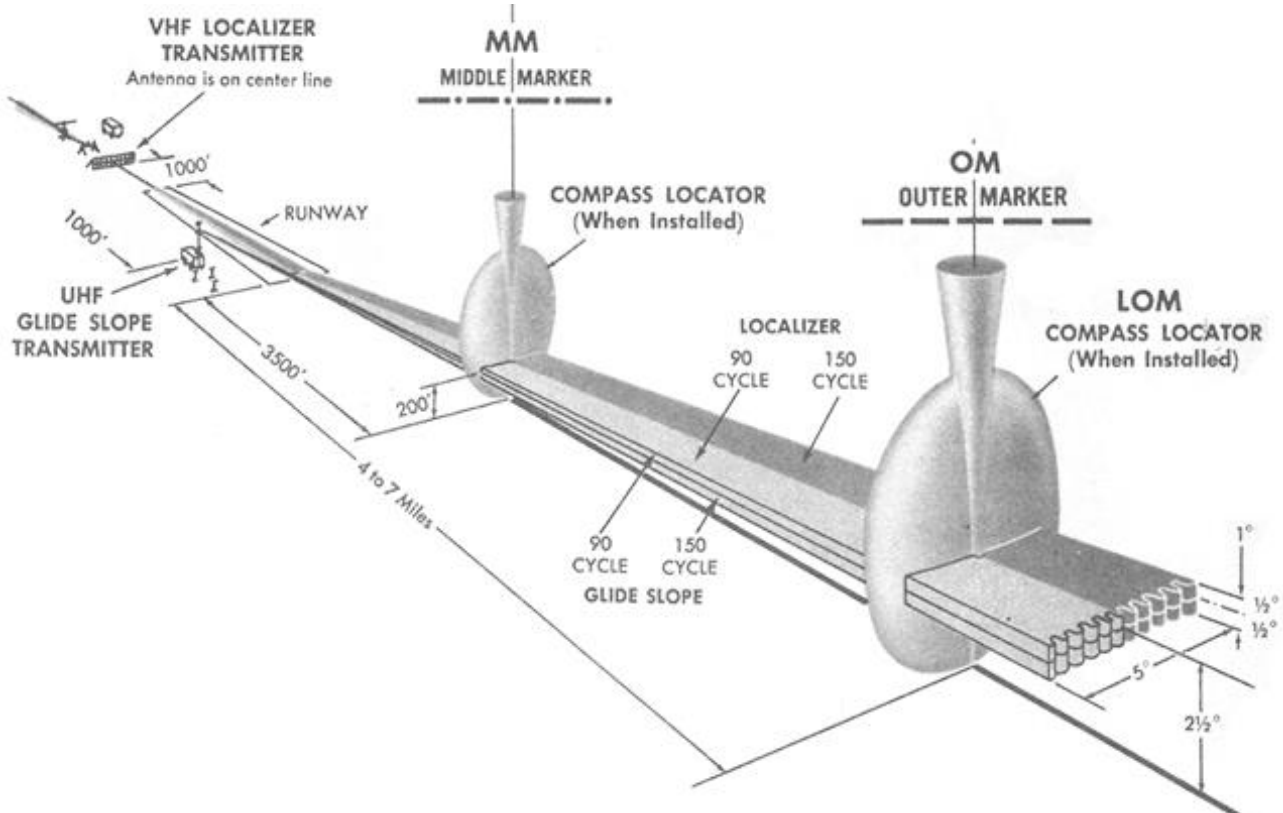
- The Localizer is generally an array of antennas that will give you a lateral reference to the center of the runway.
- The Glide Slope station will help you determine the descent speed you need in order to not smack the runway in a smoldering ball of fire.

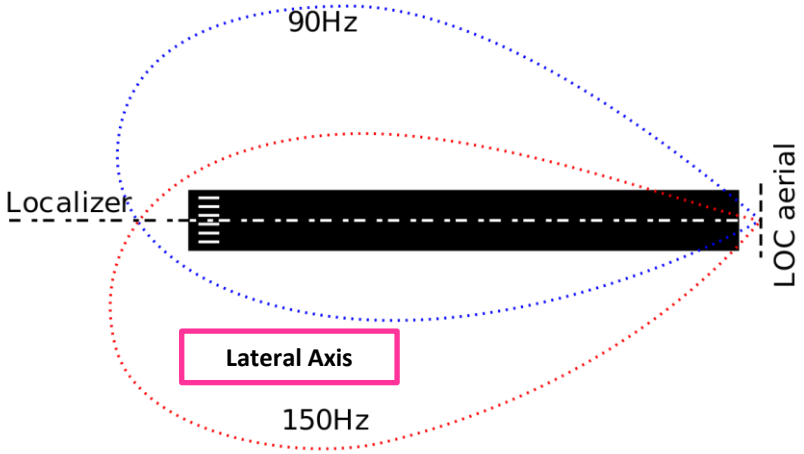
Localizer Array Station at Hannover

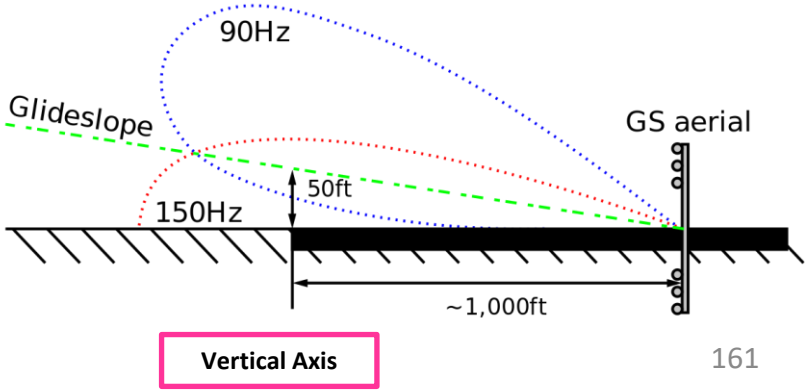


Glide Slope Station at Hannover

Great video explanation of ILS
https://www.youtube.com/watch?v=KVtEfDcNMO8



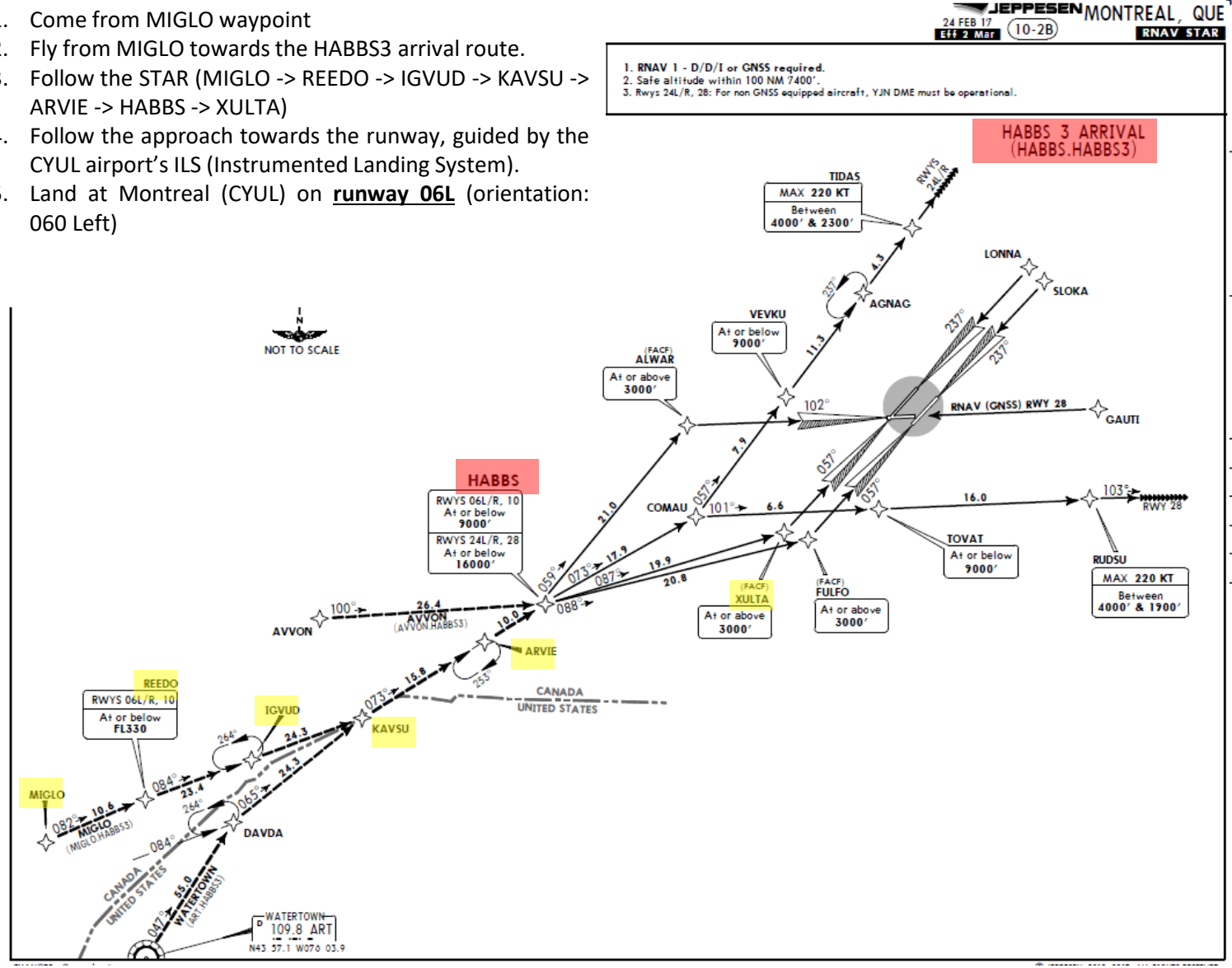


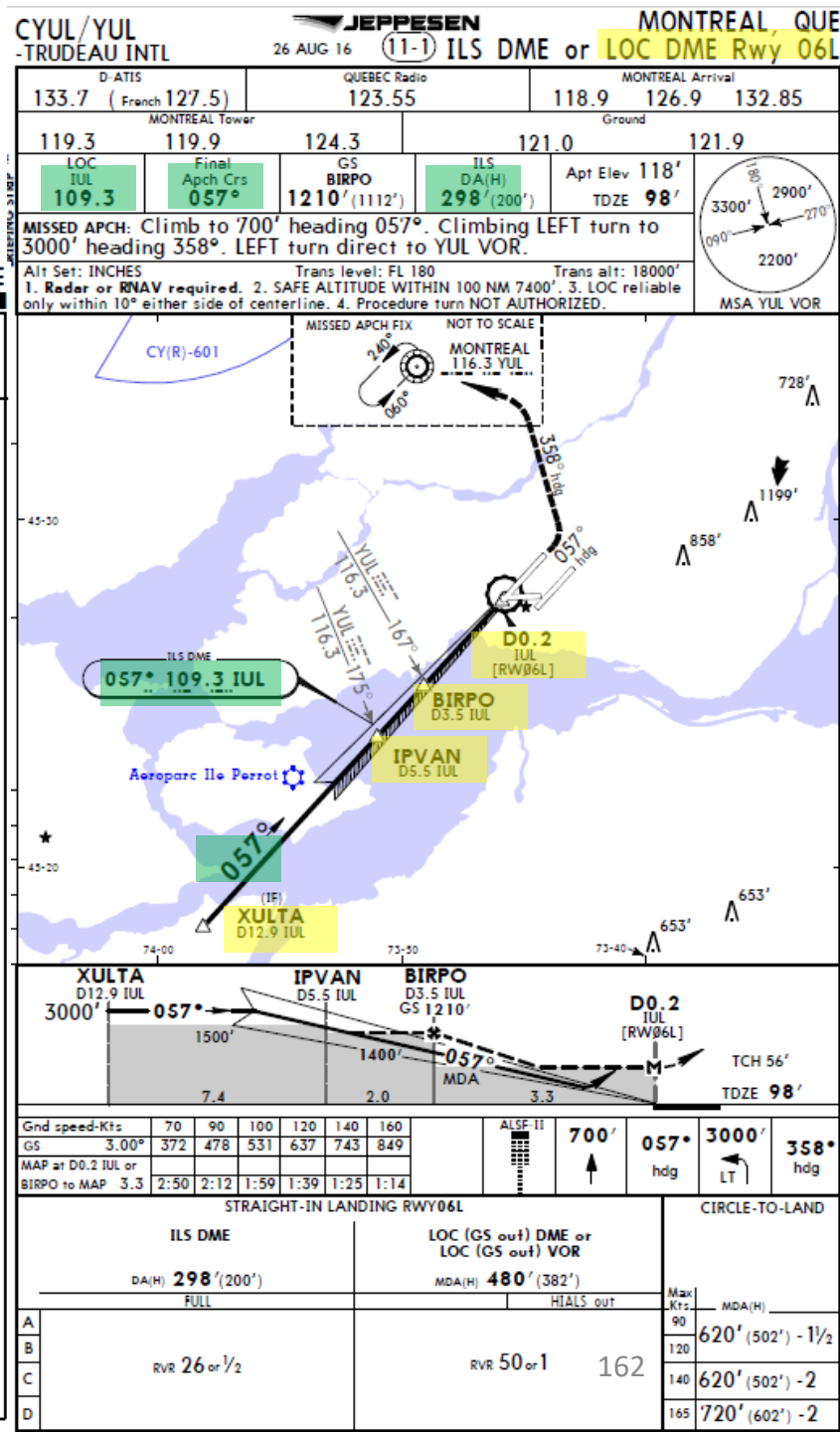


PLANNING DESCENT

These charts are for the STAR (Standard Terminal Arrival Route) from MIGLO to Montreal Pierre-Elliott Trudeau (CYUL). We intend to:

1. Come from MIGLO waypoint
2. Fly from MIGLO towards the HABBS3 arrival route.
3. Follow the STAR (MIGLO -> REEDO -> IGVUD -> KAVSU -> ARVIE -> HABBS -> XULTA)
4. Follow the approach towards the runway, guided by the CYUL airport's ILS (Instrumented Landing System).
5. Land at Montreal (CYUL) on **<u>runway 06L</u>** (orientation: 060 Left)





PLANNING DESCENT

Final Approach Course: 057
This is the heading you will take when approaching for final landing.

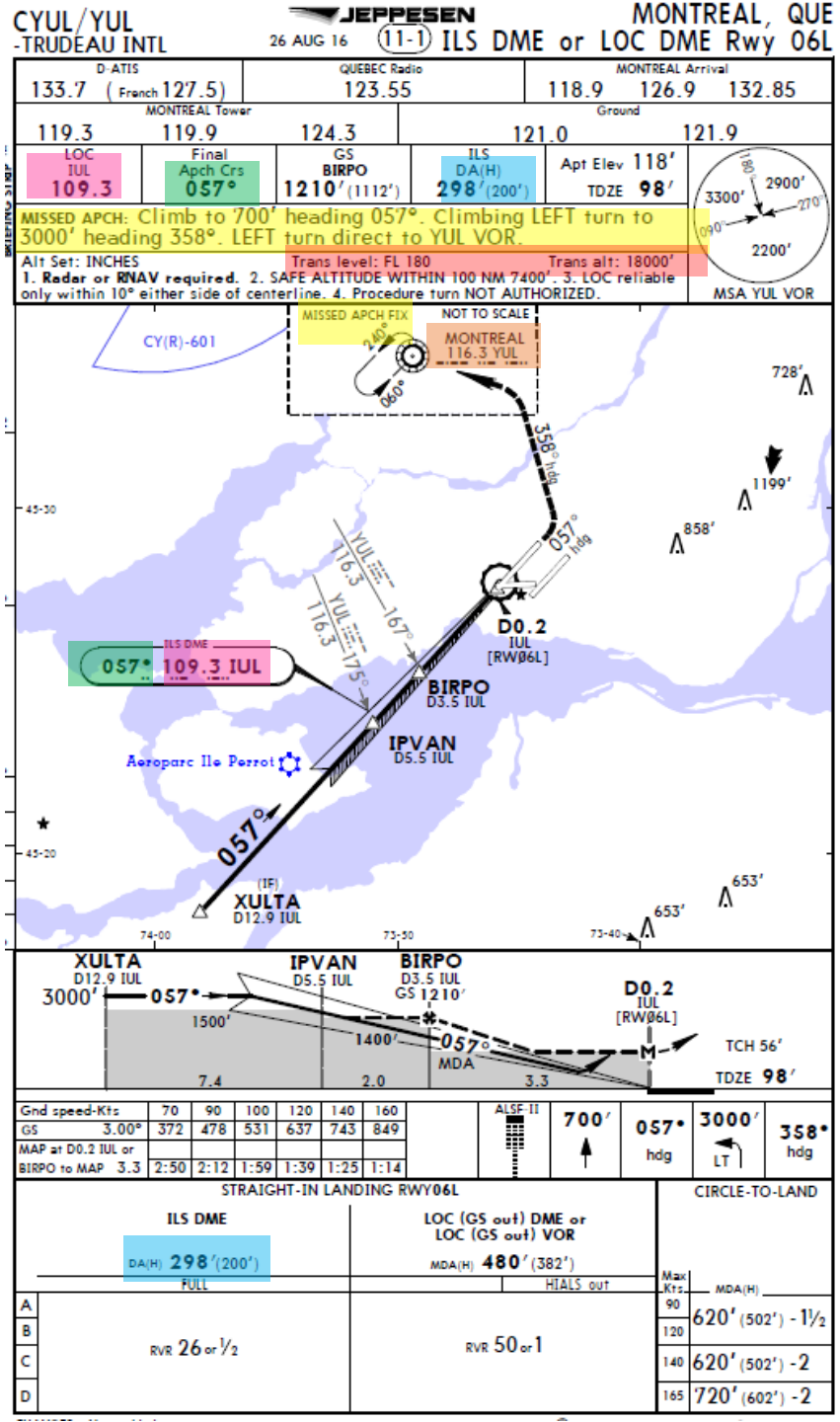
Minimums Decision Height: 200 ft (or 298 ft Decision Altitude)
This is the minimum "decision altitude" (DA) during landing. If you go lower than 298 ft, you are committed to land no matter what happens. Above 298 ft, you can still miss your approach and go around. You can also use the Decision Height (DH) of 200 ft, which is what we will use.

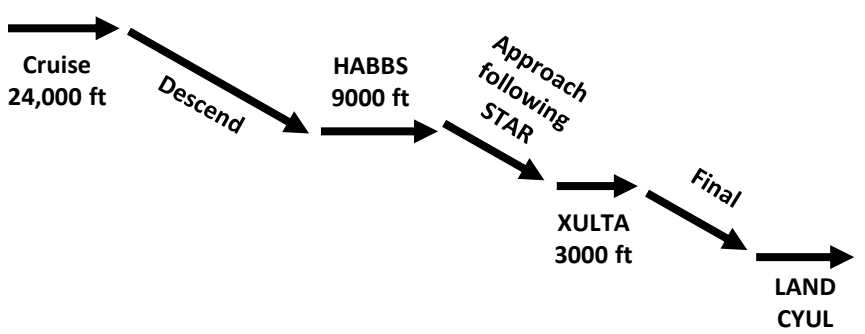
ILS Frequency: 109.30 MHz
This is the ILS system frequency you will track to guide your aircraft for landing.

Missed Approach Standby Frequency: 116.30 MHz
VOR "MONTREAL" (YUL) will be the beacon we will track in case we miss our approach and have to go around.

Missed Approach Procedure
In case we miss our approach, the procedure is to climb straight ahead. When passing 700 ft, we climb LEFT on heading 358 to 3000 ft. We then turn left directly towards YUL VOR.

Transition Level & Transition Altitude
The transition altitude is the altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes (18000 ft on chart). The transition level is the lowest flight level available for use above the transition altitude. According to the chart, the transition altitude gives us FL180 as well, or 18000 ft.





Here is a great link to know how to read these charts properly:
https://community.infinite-flight.com/t/how-to-read-an-approach-chart/8952

PLANNING DESCENT

To make sure you can start your descent early enough, there are usually three methods.

METHOD 1:

- Check the TOD (Top of Descent) marker on the Navigation Display to evaluate when you should start your descent. The CRJ's FMS offers an advisory VNAV. After reaching your cruise altitude the FMS computes the Top-Of-Descent based on the data entered in the PERF section. The TOD is drawn along the flight route as a green circle and the DIR/INT page shows information on the required descent rates based on the programmed speeds. The standard profile for descents is: M0.74 / 290 kts / 250 kts. Start your descent with Mach 0.74 until you pass 290 kts, then switch to 290 kts and after passing 10,000ft continue to descend with 250 kts.

METHOD 2:

- Estimate the distance required for descent using a rule of thumb. The general rule is for each thousand feet of altitude, you add three nautical miles of horizontal distance. As an example, Distance for 24000 ft = 24 x 3 = 72 nm

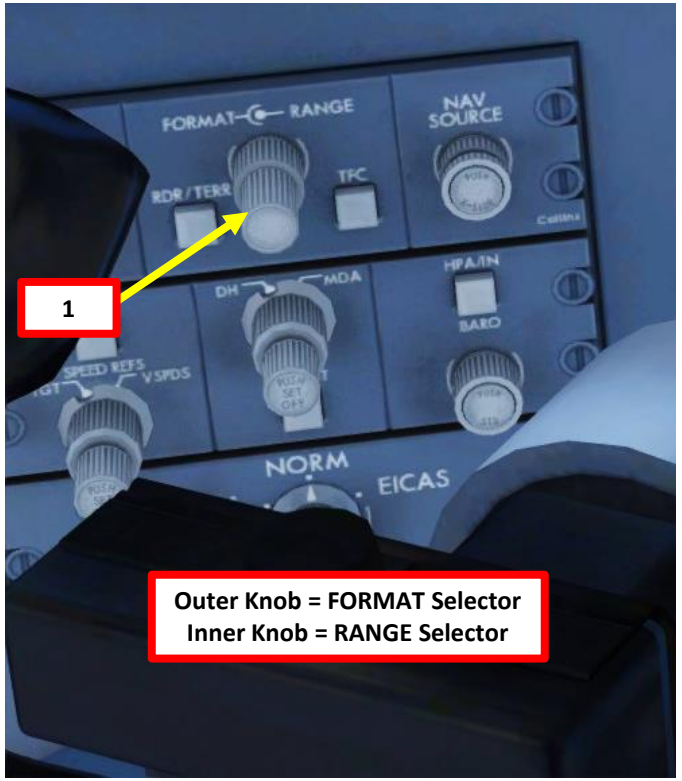
METHOD 3:

- In real life, pilots can check the CRJ QRH (Quick Reference Handbook) for the required distance the descent.

CHECK VNAV PROFILE

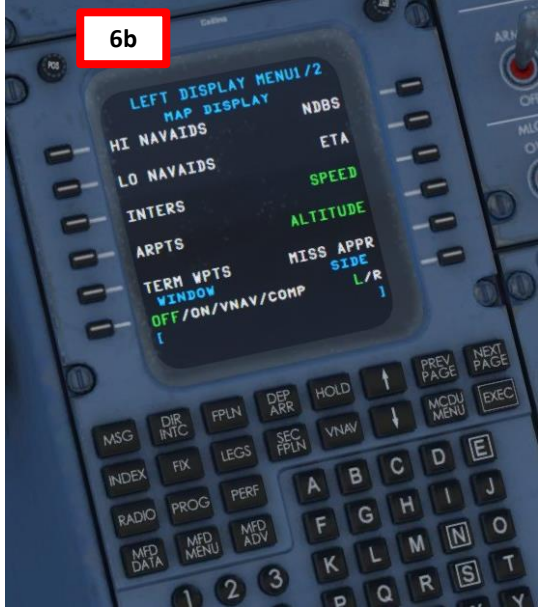
While we are cruising, we can plan our VNAV (Vertical Navigation) planning for the descent and approach to Montreal.

1. Adjust your navigation display scale to get a good view of the waypoints ahead of you.
2. We intend to descend to HABBS waypoints to the restriction of 9000 ft. We have to first set the autopilot to its target altitude.
3. Scroll mousewheel on ALT knob to set 9000 ft as the autopilot's target altitude. Keep in mind that we will not start descending yet.



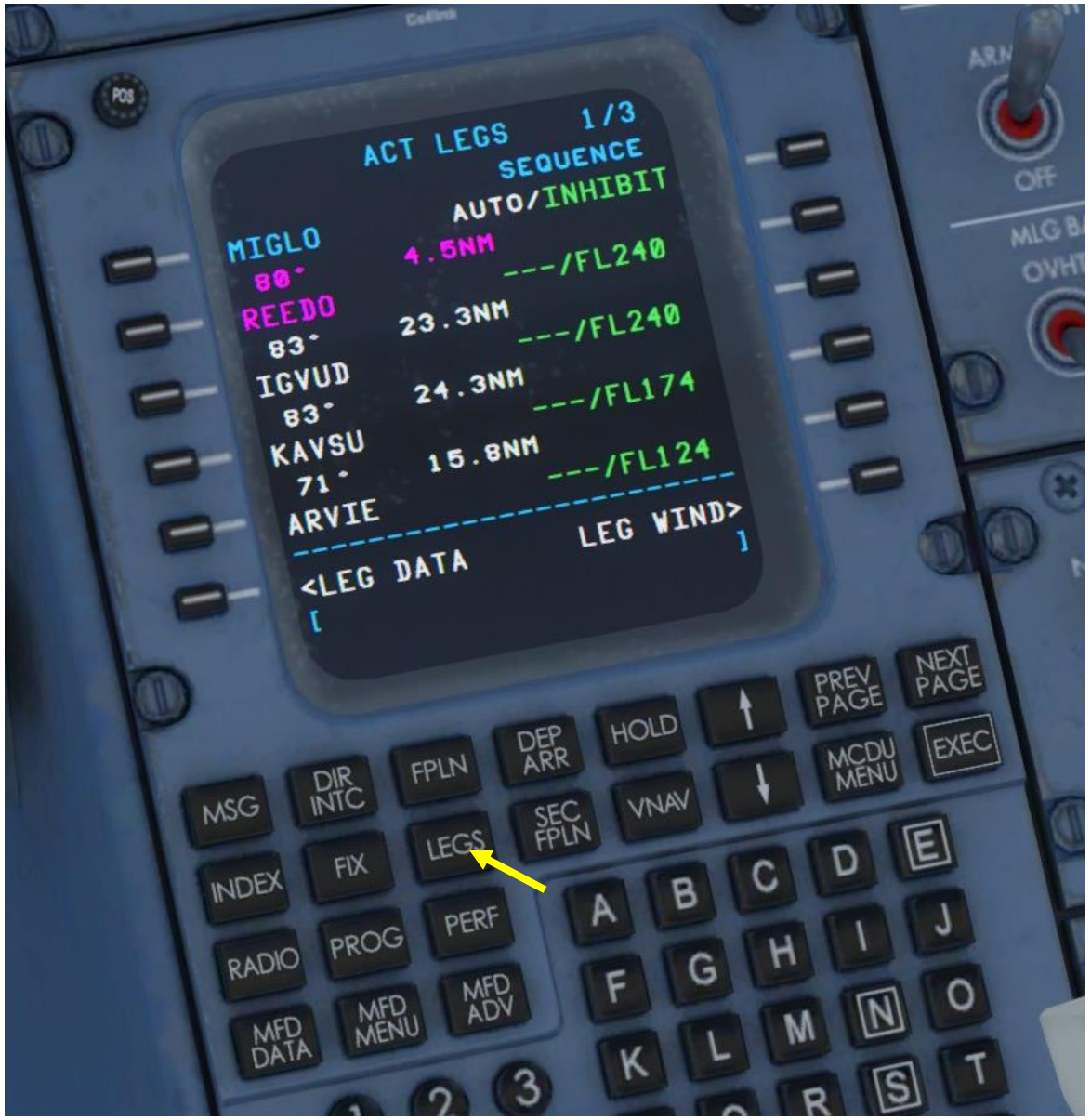
CHECK VNAV PROFILE

4. We can set Vertical Navigation information on our MFD (Multifunction Display) if we want.
5. Press the MFD MENU button on the FMC (Flight Management Computer) CDU (Control Display Unit).
6. If the TEXT DISPLAY sub-menu appears, press the MFD DATA button on the FMC CDU to show the MAP DISPLAY sub-page. If the MAP DISPLAY sub-page appears, you're at the right place.
7. Press the the LSK next to WINDOW successive times until the VNAV WINDOW option is selected. In practice, the PF (Pilot Flying) will have VNAV while the PM (Pilot Monitoring) will have ON.
8. And that's it! You can now monitor the required altitude restrictions in your FMC directly on the multifunction display.



CHECK VNAV PROFILE

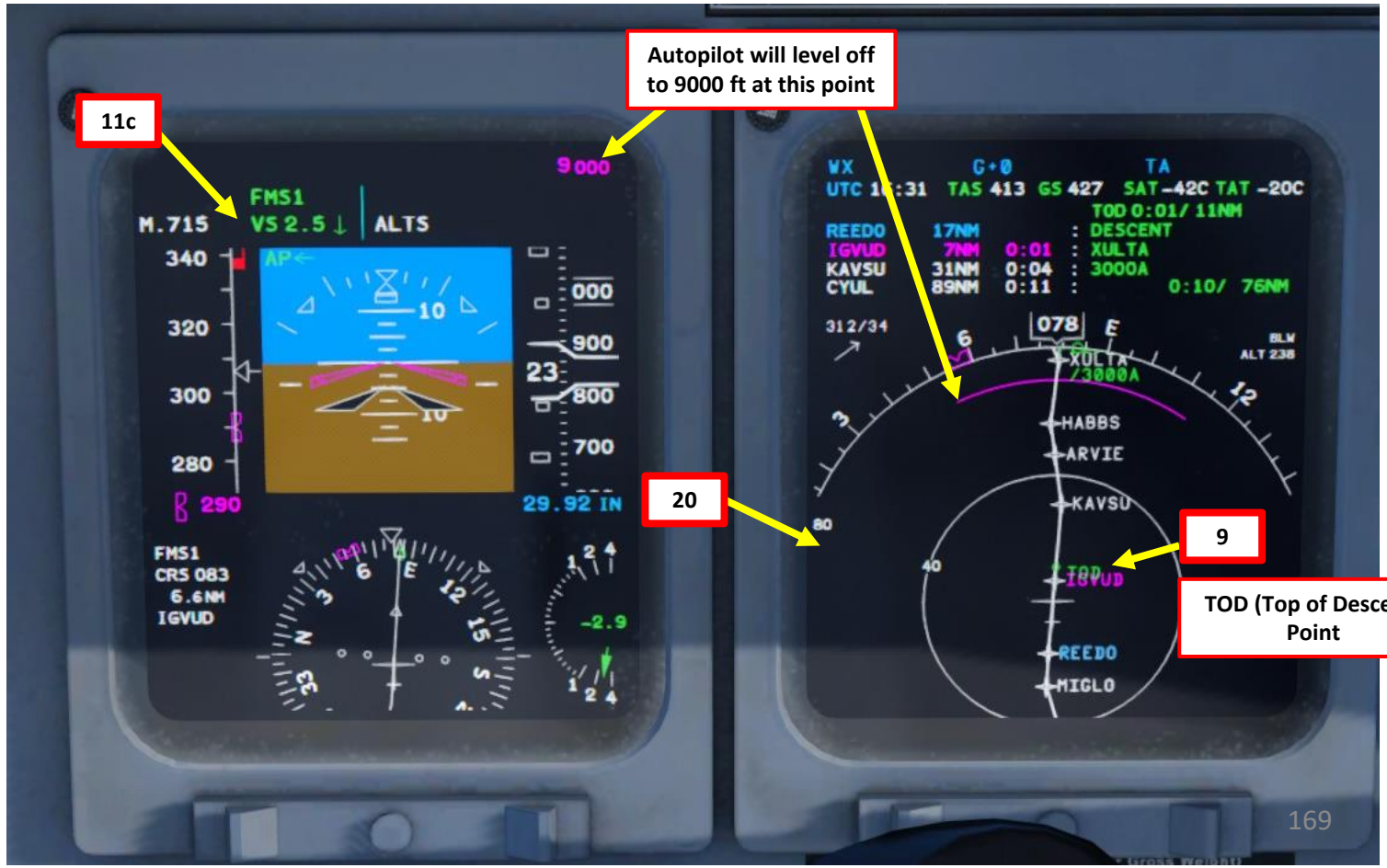
Note: you can also monitor altitude restrictions from the FMC LEGS or DIR INTC pages.



START DESCENT

START DESCENT

9. Your TOD (Top of Descent) point will be identified by a circle marker with « TOD » on your navigation display.
10. You can either perform your descent by using the Vertical Speed autopilot mode and control your airspeed with your throttle… or you can set the Speed autopilot mode to Mach 0.74 / 290 kts and control your descent rate with your throttle. We'll use the Vertical Speed method.
11. When you are near the TOD point, press the VS button on the FCP (Flight Control Panel) to engage Vertical Speed mode, then set a vertical descent speed of 2500 ft/min with the thumbwheel.
12. Control your airspeed by throttling back but keep enough power to maintain 290 kts / Mach 0.74 when above 10000 ft. When below 10000 ft, throttle back to maintain 250 kts. From 24000 to 20000 ft, a throttle setting of about 50 % N1 is recommended.

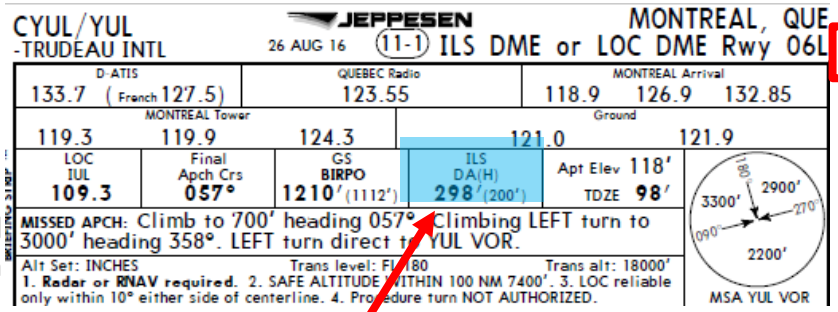


SET UP APPROACH

13. Verify on the FMC RADIO page that the NAV1 and NAV2 frequencies are both set to MAN (Manual) 109.30, CYUL's Runway 06L ILS frequency.
14. Set TCAS (Traffic & Collision Avoidance System) to BELOW by going on the Radio panel, pressing the LSK next to TCAS AUTO ABS, then press the LSK next to BELOW in the TCAS sub-menu. Then, press the LSK next to RETURN.

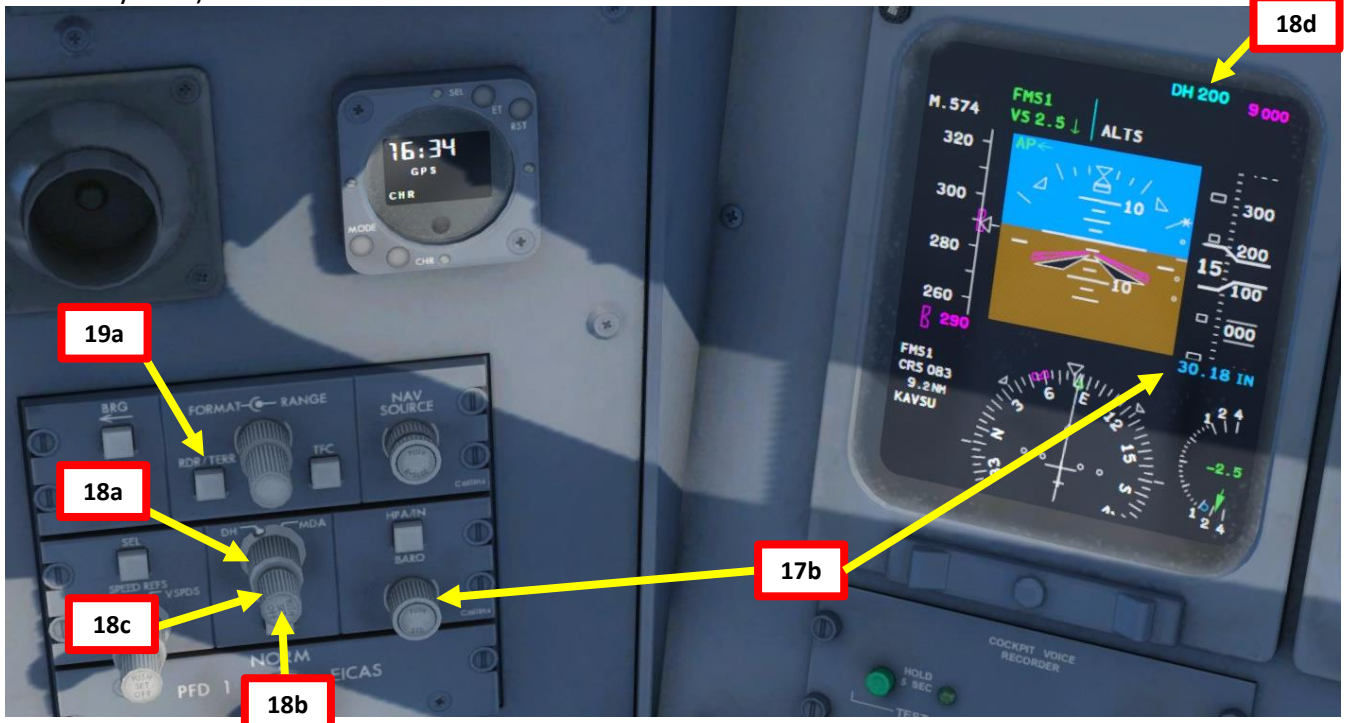
SET UP APPROACH

15. Continue your descent to HABBS.
16. Set your radio frequency to CYUL (Montreal) ATIS (133.700).
17. Listen to ATIS broadcast and adjust your altimeter setting to the Dorval setting (30.18 in Hg in our case) when reaching below the transition altitude (18000 ft).
18. Set Decision Height to 200 ft (DH) by setting DH/MDA outer knob to DH. Then, push the inner knob IN to display the cyan DH setting reading on the PFD. Then, rotate the inner knob to adjust the decision height to 200 ft. *(Note: You could alternatively set MDA to 298 ft as per CYUL chart.)*
19. Select whether you want the Weather Radar or the Terrain Overlay by pressing the RDR/TERR button. Terrain display is not an active radar but terrain information extracted from the GPWS (Ground Proximity Warning System) database.



18

19b
WX: Weather Radar
TERRAIN: GPWS terrain data



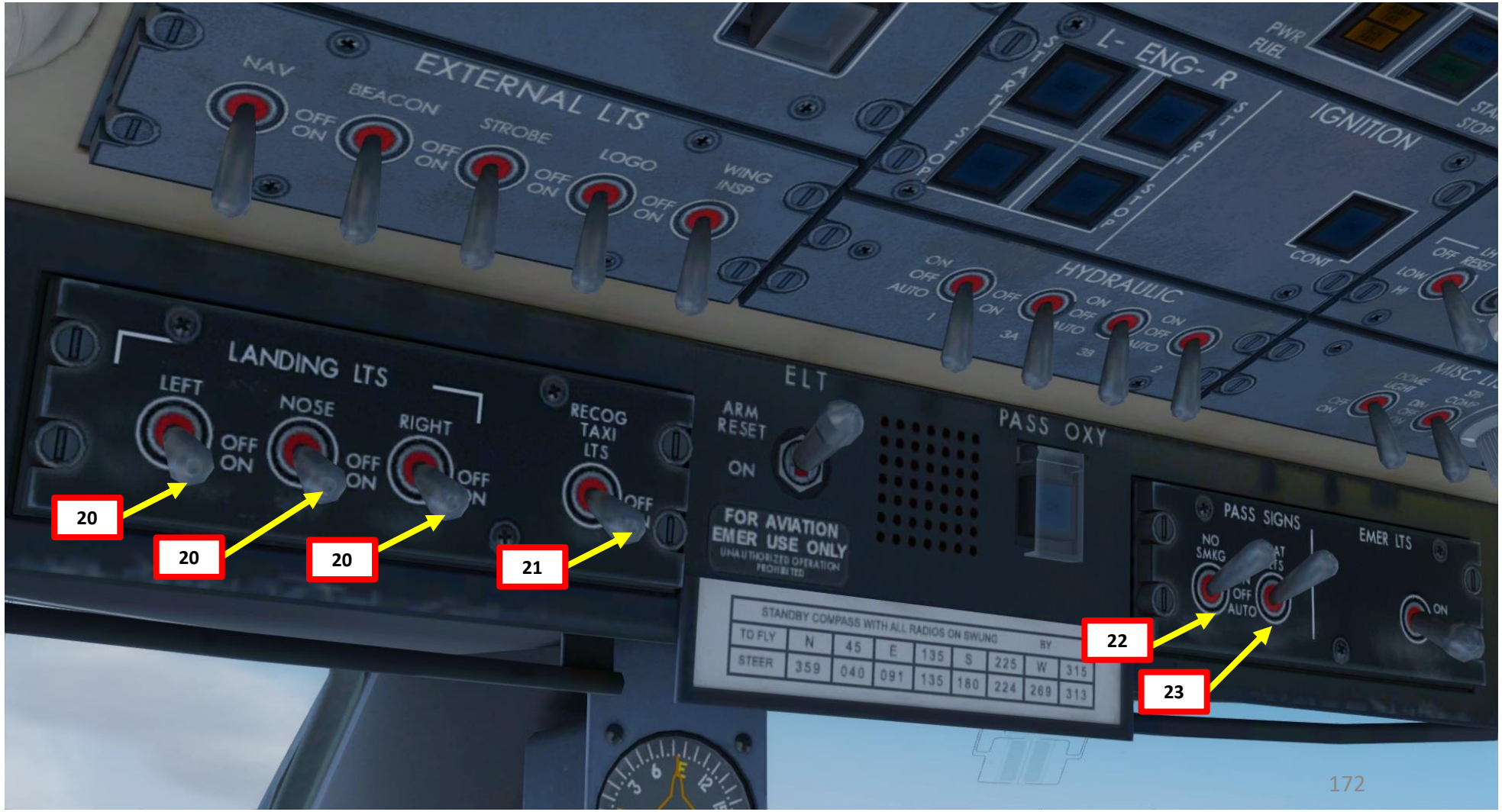
19a
18a
18c
18b
17b
18d

17a

Dorval airport information Sierra, 1635 zulu. Wind 314 at 4 . Visibility: 15. Sky condition: ceiling 2,200 broken. Temperature: -10. Dewpoint: -13. Altimeter 3018. Visual runway 28, Visual runway 27, Visual runway 26, Visual run

SET UP APPROACH

20. Set Left, Nose and Right Landing Lights – ON
21. Set Recognition/Taxi Light – ON
22. Set NO SMOKING switch – ON
23. Set SEAT BELTS switch – ON

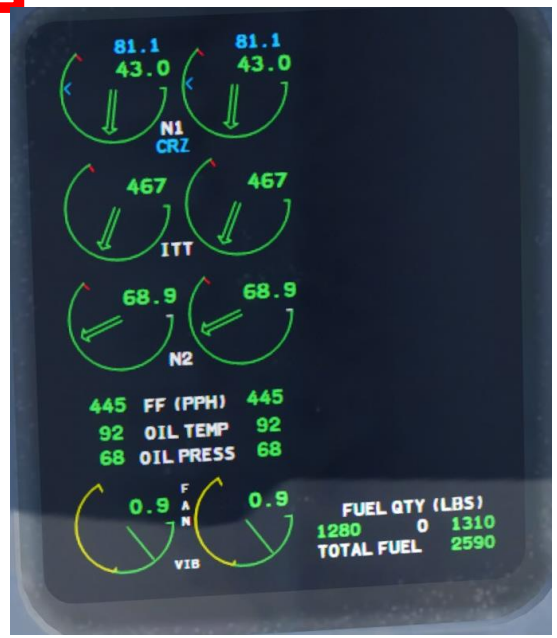


SET UP APPROACH (V-SPEEDS)

Even if the DAVE EFB can calculate your V-Speeds for you, you can also calculate them yourself with performance charts available in the aircraft QRH (Quick Reference Handbook).

a) You can obtain your Gross Weight by using your ZFW (Zero Fuel Weight) in the PERF INIT FMC page and adding the Fuel Weight (approx. 62000 lbs, also available in the DAVE EFB)

b) For a Gross Weight of 62000 lbs, an airport altitude of about 120 ft (we can round it down to 0 ft), and a landing flaps setting of 45 deg, we can obtain VREF (Reference Speed) and VFTO (Final Takeoff Speed used for a go-around).



Note: QRH by Digital Aviation is available in:
C:/Program files/Lockheed Martin/P3D V4/Ecosystem/Aerosoft/Digital Aviation CRJ/Documentation
Document: Vol2_Quick Reference Guide.pdf

Gross Weight → 62'000lbs / 28'123 kgs

Flaps Setting → 45°

Landing

Flaps	0°	1°	8°	20°	30°	45°
Min Maneuvering	179	163	157	151	147	139
V_{REF}	169	153	147	14	137	129

Takeoff

Add 1 kt to V_1 & V_R for Wing & Cowl A/I ON

Flaps		8°					20°				
Press. Alt.		0	2'000	4'000	6'000	8'000	0	2'000	4'000	6'000	8'000
V_1	≤ 10°C	120	121	122	123	124	114	115	116	117	118
	20°C	120	121	122	123	124	114	115	116	117	118
	30°C	120	121	123	124	125	114	116	117	118	119
	40°C	122	123	124	38° / 125	34° / 125	116	117	118	38° / 119	34° / 119
	MAX TEMP	50° / 123	46° / 125	42° / 124			50° / 117	46° / 118	42° / 118		
V_R	≤ 10°C	120	121	122	123	124	114	115	116	117	118
	20°C	121	121	122	123	124	115	115	116	117	118
	30°C	121	122	123	124	125	115	116	117	118	119
	40°C	121	123	124	38° / 125	34° / 125	116	117	118	38° / 119	34° / 119
	MAX TEMP	50° / 123	46° / 125	42° / 124			50° / 117	46° / 118	42° / 118		
V_2 / V_{2GA}		133 / 137					126				
Flap Retraction		145 (Flaps 1)			166 (Flaps 0)		138 (Flaps 8)		146 (Flaps 1)		166 (Flaps 0)

Additional speeds

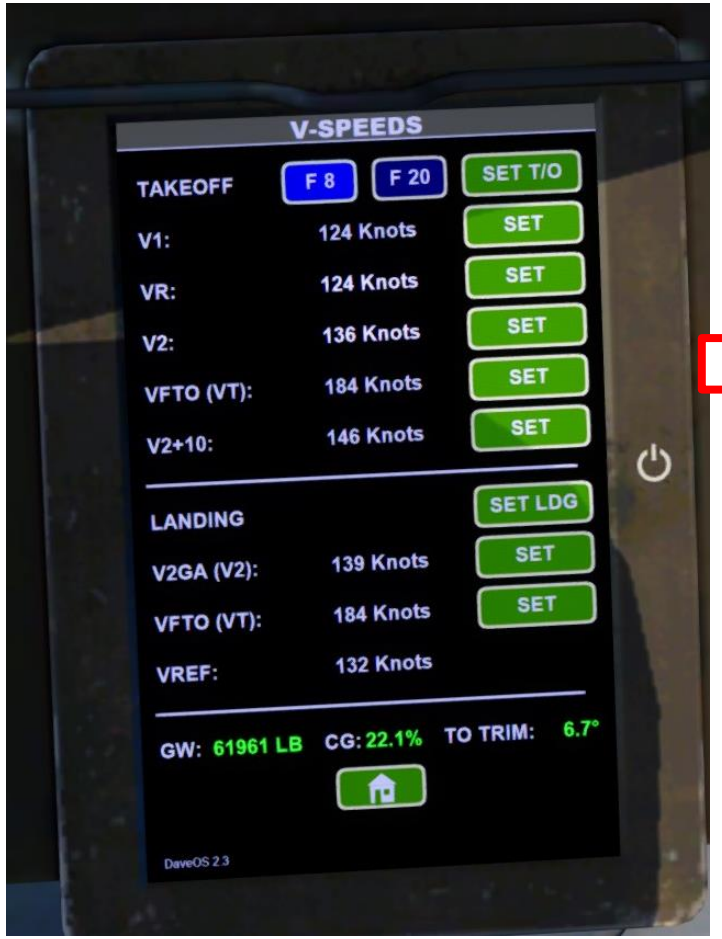
Approximate Single Engine Drift down Altitude - FL310

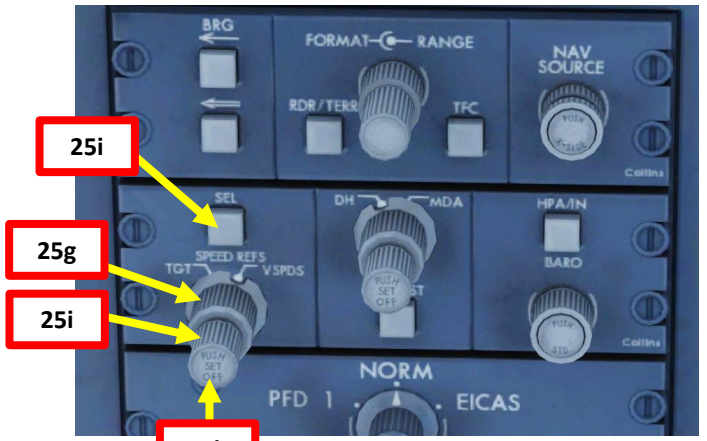
Altitude (FL)	<10'000	210	230	250	270	290	310	330	350	370	390
V_{FTO} V_{ENR}	181	184	188	192	194	196	199	202	205	208	211
V_{MD}/Min Hold	199	210	212	215	218	220	223	225	227	224	219

SET UP APPROACH (V-SPEEDS)

24. We will use flaps 45 for landing since our runway is 11000 ft and we want to have the best recovery performance.

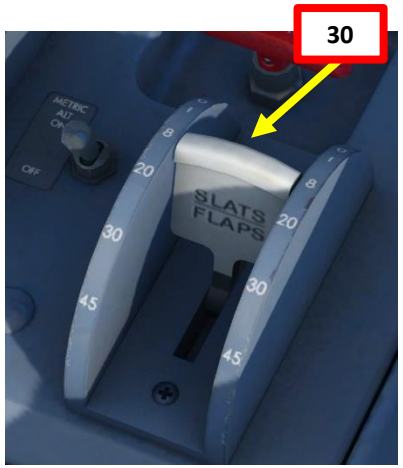
25. Find V-Speeds
    a) Go on the DAVE EFB and select V-Speeds page and selecting our desired Takeoff Flaps setting. We will use Flaps 8 deg.
    b) Find our Gross Weight: 62000 lbs
    c) We can then find the resulting V-speeds values that we want to input for the Speed Tape Bugs.
    d) V_{REF}: 132 kts
    e) $V_{2\ (V2GA)}$: 139 kts, or VREF + 5 kts
    Approach Climb Speed. Target climb speed to be attained during a go-around with one engine inoperative. This is the speed we will target for touchdown.
    f) $V_{FTO\ (VT)}$: 184 kts
    Target Speed (VT) for the Final Takeoff Speed (VFTO).
    g) Set the SPEED REFS outer knob to V-SPDS.
    h) Push the inner SPEED REFS knob IN to display currently selected V-Speed.
    i) Press the SEL button to select V2 and scroll mousewheel on SPEED REFS inner knob to set its value to 139 kts.
    j) Set the SPEED REFS outer knob to TGT (VT Target Speed)
    k) Scroll mousewheel on SPEED REFS inner knob to set VT to VFTO (184 kts).
    l) All your V-Speeds should now be set. You can now push the inner SPEED REFS knob IN again to hide the currently selected V-Speed.





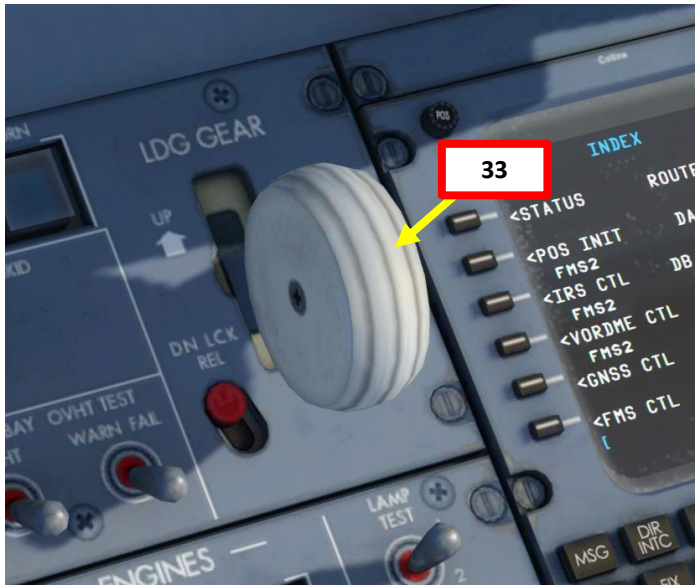
SECURING APPROACH

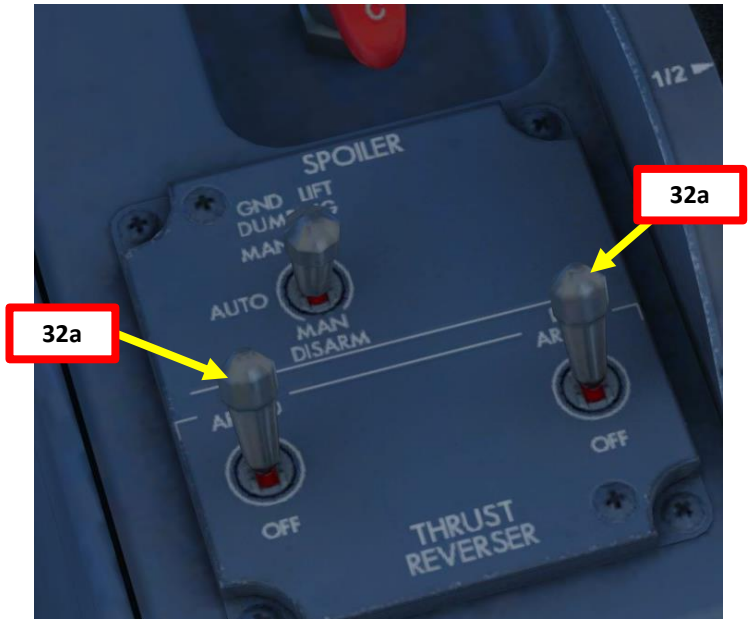
26. Once HABBS waypoint is reached, descend to XULTA waypoint aiming for a target altitude of 3000 ft.
27. Select altitude target of 3000 ft by rotating ALT knob.
28. Press the VS button on the FCP (Flight Control Panel) to engage Vertical Speed mode, then set a vertical descent speed of 1500 ft/min with the thumbwheel.
29. Control your airspeed by throttling back but keep enough power to maintain a clean airspeed (no flaps) of 200 kts.
30. 20 nm from destination, set flaps to 8 degrees and maintain an airspeed of 180 kts with your throttle.
31. 15 nm from destination, set flaps to 20 deg and maintain an airspeed of 170 kts with your throttle.



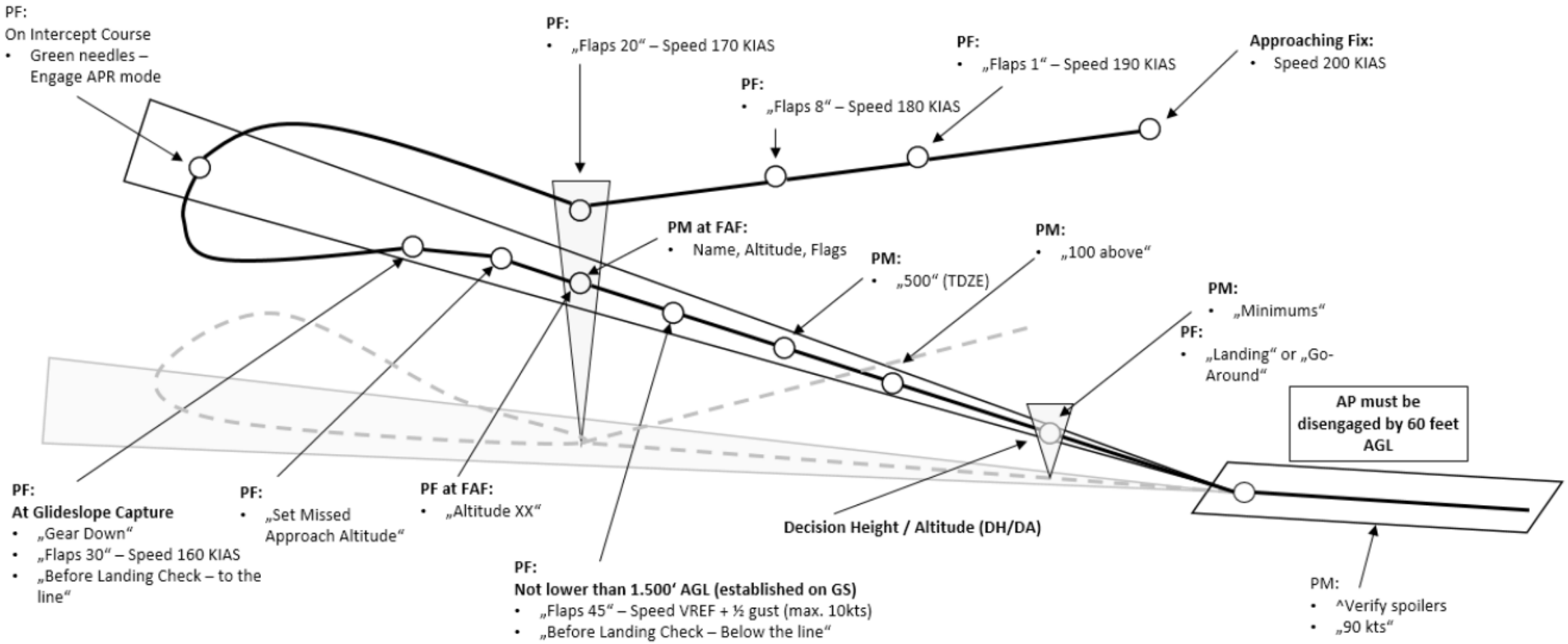
SECURING APPROACH

32. Arm Thrust Reverser Switches
33. Deploy Landing Gear



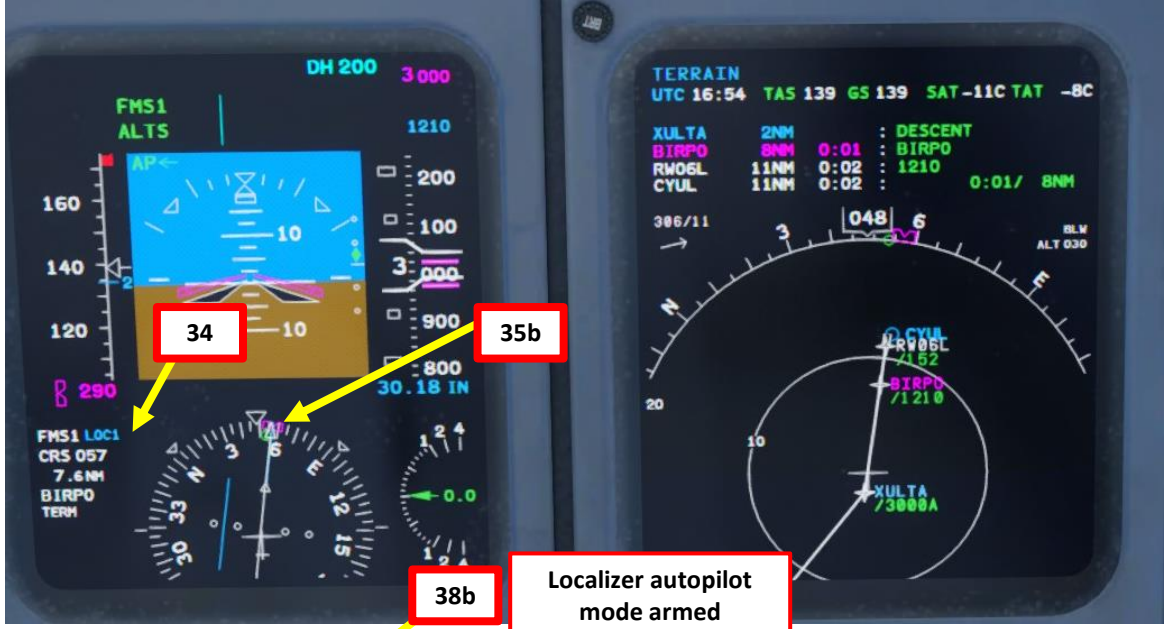


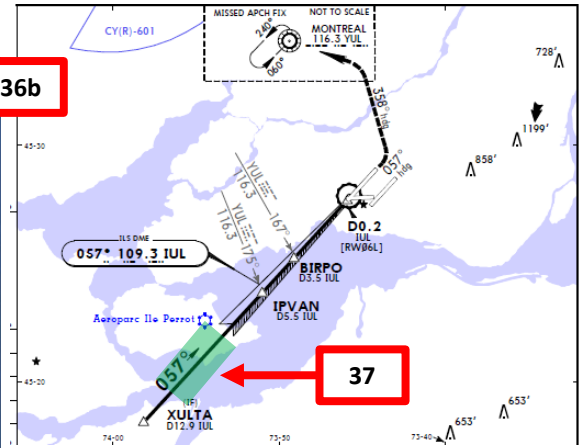
PRECISION (ILS) APPROACH



FINAL APPROACH

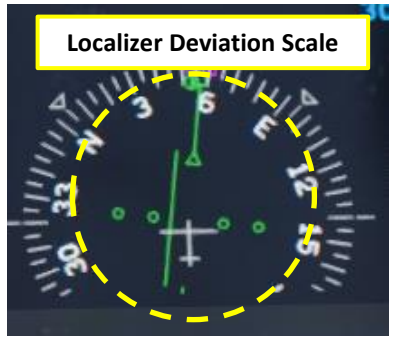
34. When you are coming in range of the localizer, a blue LOC1 indication should appear on the NAV source display.
35. Wait until you are lined up with the last approach segment (XULTA -> BIRPO segment). Set the HEADING bug to 057, which is CYUL's runway 06L Heading.
36. Keep the NAV SOURCE in FMS (Flight Management System) mode (aircraft will follow the navigation plan entered in the FMS) until you reach the last straight segment of the flight. When lined up with XULTA -> BIRPO, press the HDG button to engage HEADING mode. Then, rotate the NAV SOURCE knob and set the NAV SOURCE to LOC1 (Localizer). The NAV SOURCE indication should switch from **FMS1** to a green **LOC1**. A red **LOC1** means that you have not yet captured the localizer.
37. Set Localizer Course to 057 with the CRS1 knob on the FCP, which is the CYUL Runway 06L Heading.
38. Once you have reached XULTA, press the APPR (Approach) autopilot mode. The LOC autopilot mode will be armed (white).

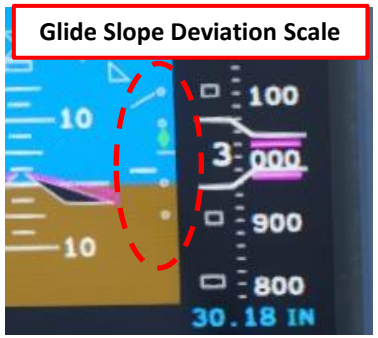


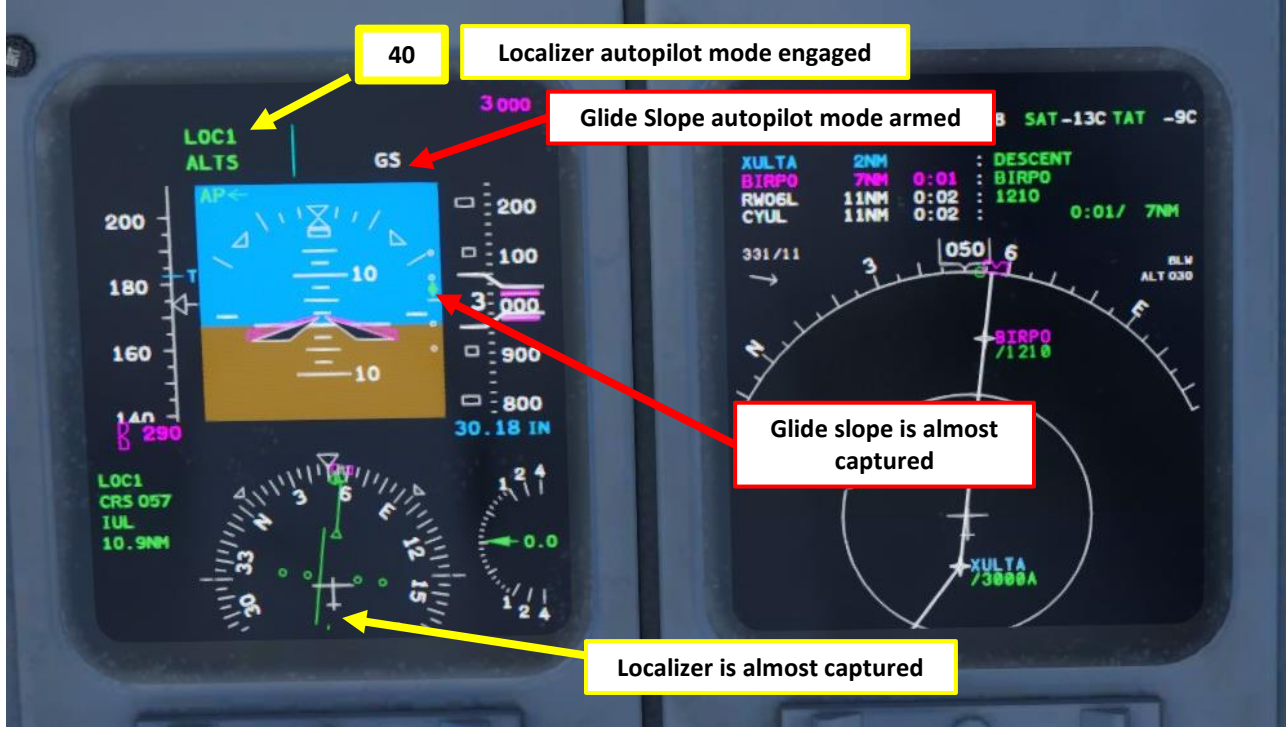


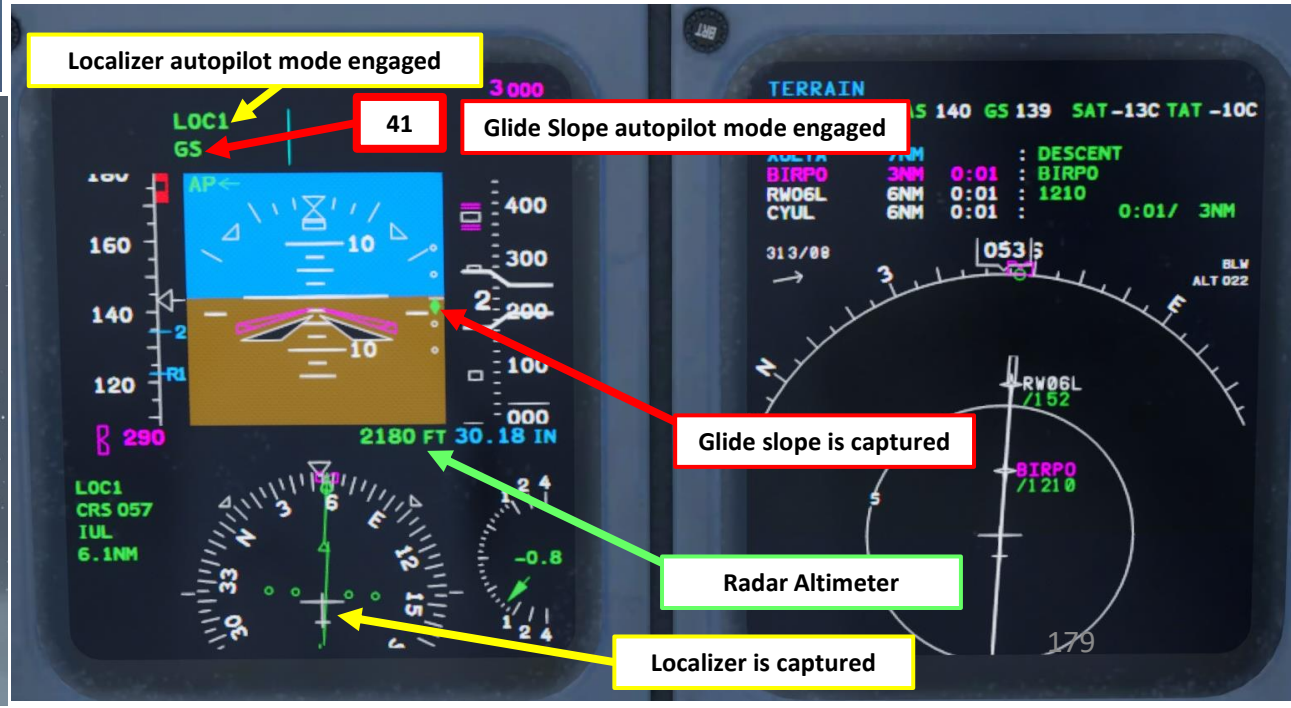
FINAL APPROACH

39. The autopilot will follow your approach until you can capture the localizer and align yourself laterally with the ILS approach. Once the localizer is captured, the autopilot in APPR mode will try to capture the glide slope.
40. When LOC (localizer) is captured, the PFD will indicate in green that the "LOC" autopilot mode is active.
41. When glide slope is captured, the PFD will indicate in green that the "GS" autopilot mode is active.
42. Once localizer (lateral guidance) and glide slope (vertical guidance) are both captured, you can now set your autopilot altitude to the Go-Around Altitude of 3000.



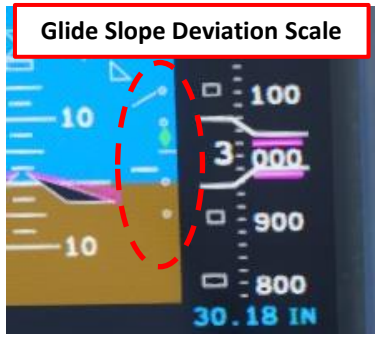


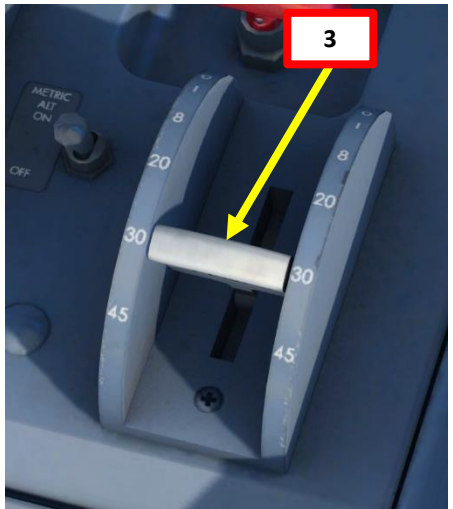


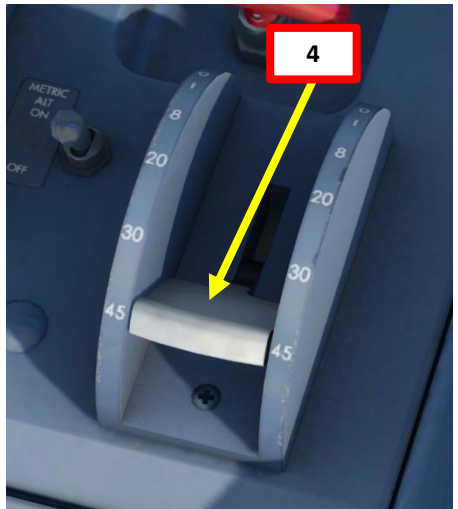


LANDING

1. The APPR autopilot mode will guide you to the runway, but keep in mind that it is not an auto-land system. You will have to land manually.
2. You can deploy your HUD (Heads-Up Display) by clicking on it.
3. When you are 1 – 1.5 degrees off glide slope, set flaps to 30 deg and maintain an airspeed of 160 kts with your throttle.
4. When you are about 1-2 nm before the final approach fix, set flaps to 45 deg and maintain an airspeed of VREF+5 (139 kt)s with your throttle until touchdown.
5. When you hear an audio cue “MINIMUMS”, this means you have reached your minimal decision altitude. You are now committed to land.

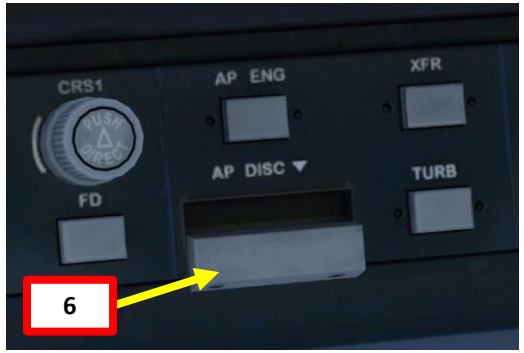






LANDING

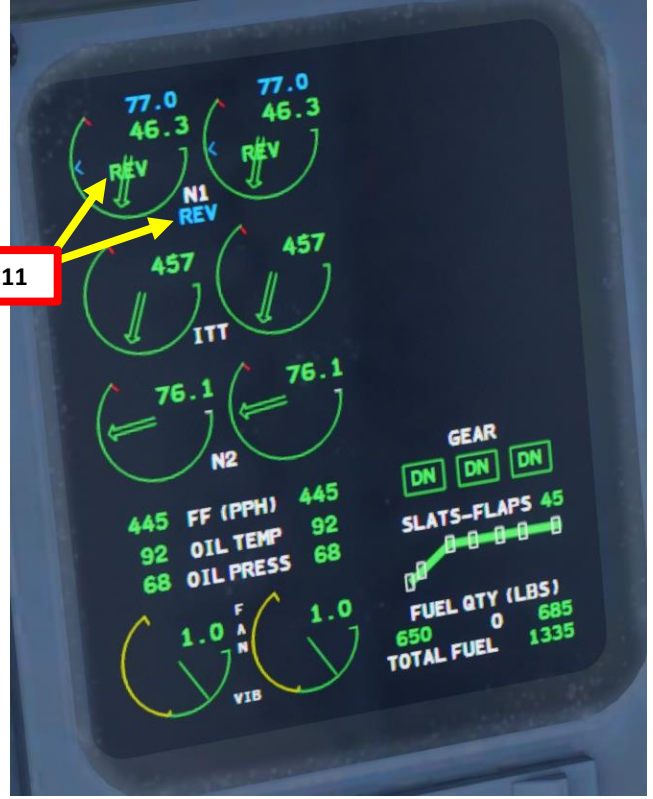
6. Set Autopilot OFF when reaching 200 ft
7. When the 50 ft-call of the GPWS (Ground Proximity Warning System) is audible, prepare to pull back the yoke a bit. At 20 ft above the runway, perform the “break” and pull back the yoke to increase pitch and ensure landing on the main wheels.
8. At 10 ft, throttle back to IDLE.
9. The CRJ normally has a slightly positive or even occasionally neutral pitch attitude during landing. Increase pitch during flare to prevent landing on the nose wheel.

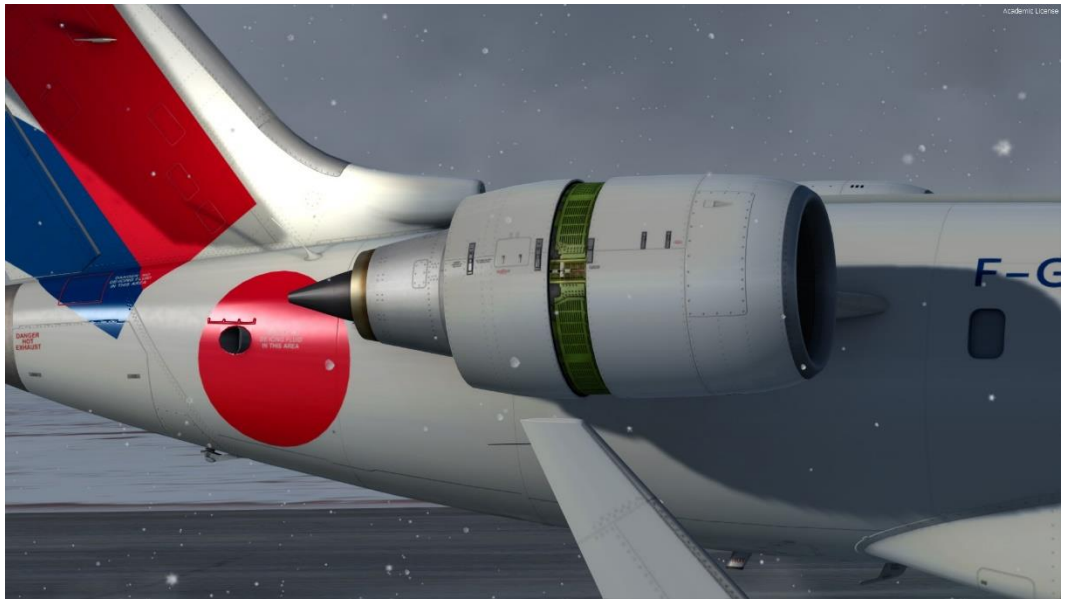


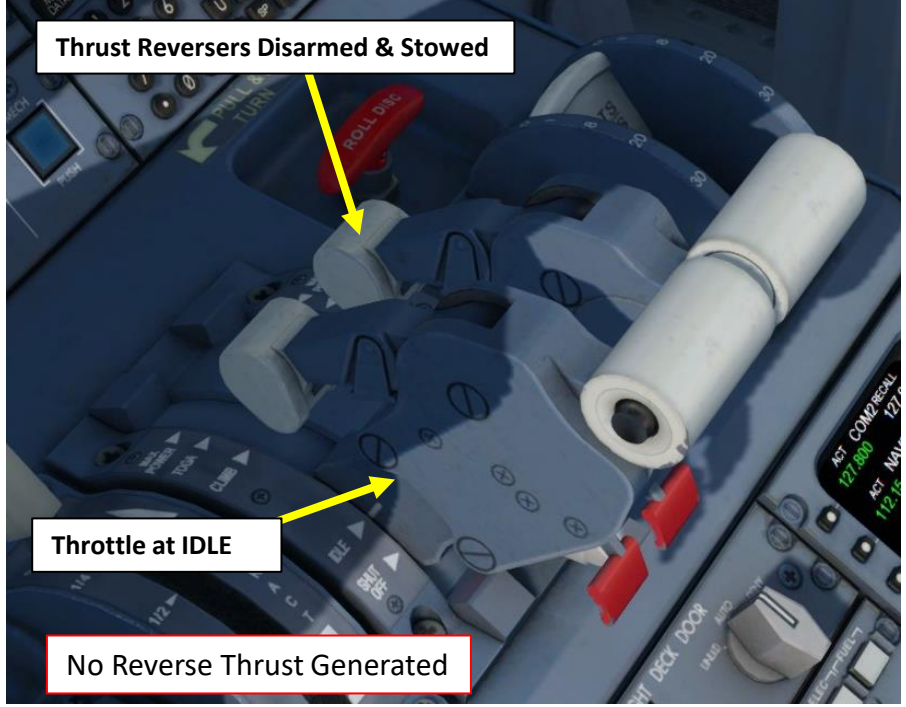

For AIRFRANCE
HOP!

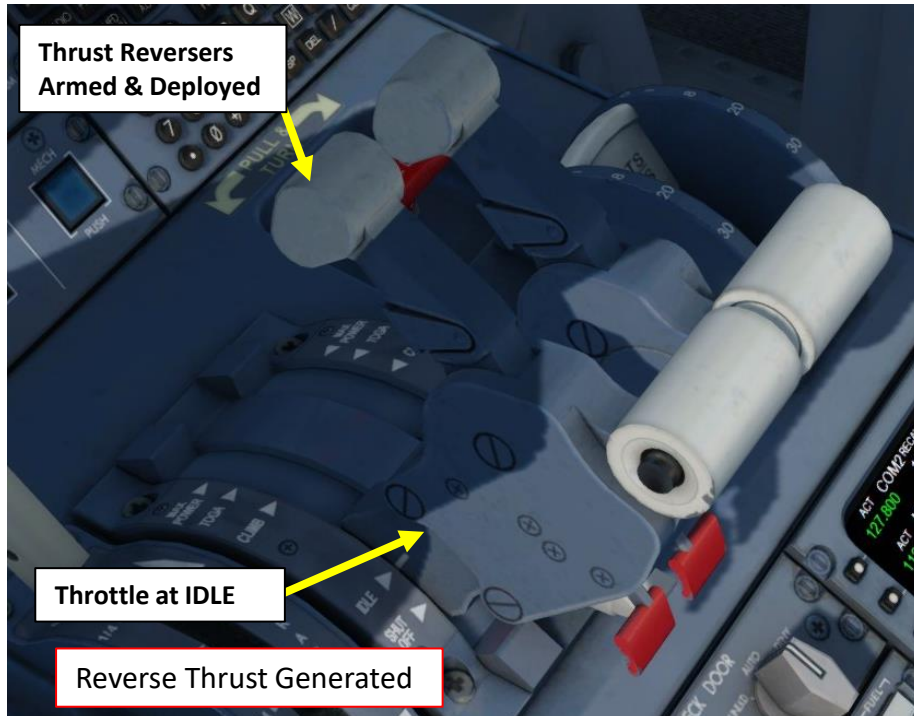
LANDING

10. During landing you will see a green GND SPLR DEPLOY advisory message telling you the ground spoilers are working. If they fail or are not armed, you won't see this message; it's an indicator you are relying only on brakes to stop.
11. Press and hold “F2” (“Throttle decrease quickly” binding) to deploy thrust reversers. You should have the reversers at idle when the main wheels touch, then again at idle by 60 kts (unless you really need them of course).
12. Once landed safely, retract slats and flaps, disengage Thrust Reverser ARMING switches, stow thrust reversers and set throttle to IDLE to taxi towards parking spot.
13. You will probably want to start the APU in order to have power when you shut the engines down at the gate.










For AIRFRANCE
HOP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