FSX GUIDE
PMDG 737-800 NG

By Chuck

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TABLE OF CONTENTS

- PART 1 – INTRODUCTION
- PART 2 – COCKPIT LAYOUT
- PART 3 – FLIGHT PLAN & PRE-START
- PART 4 – START-UP PROCEDURE
- PART 5 – TAXI
- PART 6 – TAKEOFF, CLIMB & CRUISE
- PART 7 – AUTOPILOT
- PART 8 – APPROACH & LANDING

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

The **Boeing 737** is a short- to medium-range twinjet narrow-body airliner developed and manufactured by Boeing Commercial Airplanes in the United States. Originally developed as a shorter, lower-cost twin-engine airliner derived from the 707 and 727, the 737 has developed into a family of ten passenger models with capacities from 85 to 215 passengers. The 737 is Boeing's only narrow-body airliner in production, with the 737 Next Generation (-700, -800, and -900ER) and the re-engined and redesigned 737 MAX variants currently being built.

The 737 was originally envisioned in 1964. The initial 737-100 made its first flight in April 1967, and entered airline service in February 1968 at Lufthansa. Next, the lengthened 737-200 entered service in April 1968. In the 1980s, Boeing launched the longer −300, −400, and −500 models, subsequently referred to as the Boeing 737 Classic series and featuring CFM56 turbofan engines along with wing improvements.

The 737 Next Generation (also known as “NG” or “Next Gen”) was introduced in the 1990s in response to the A320, with a redesigned, increased span laminar flow wing, upgraded "glass" cockpit, and new interior. The 737 Next Generation comprises the four −600, −700, −800, and −900 models, with lengths ranging from 102 to 138 ft (31.09 to 42.06 m). Boeing Business Jet versions of the 737 Next Generation are also produced. The 737 was revised again in the 2010s for greater efficiency, with the 737 MAX series featuring CFM International LEAP-1B engines and improved winglets. The 737 MAX entered service in 2017.

Systems wise, the 737 has a lot of parts that were certified in the 1960/70' and had no inherent reason to change over time. Hence this is why you will find a mix of technology throughout the aircraft. The aerospace industry has the saying “if it isn’t broken, don’t fix it”.

PMDG simulates the 737 NG “X” for variants -800 and -900 in the base package and the
-600 and -700 in an expansion pack.

FlyJSim Boeing 737-200 (X-Plane 11)

IXEG Boeing 737-300 Classic (X-Plane 11)

PMDG Boeing 737-800 NG (FSX)

Boeing 737 MAX 8

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
  - Begin navigation system alignment phase
  - Program the FMC (Flight Management Computer)
- Start–up the aircraft and make it ready for flight
- Taxi
- Takeoff
- Climb and cruise
- Explore autopilot capabilities
- Approach and land

BEST RESOURCES

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

Boeing B737.UK.ORG Website
http://www.b737.org.uk/

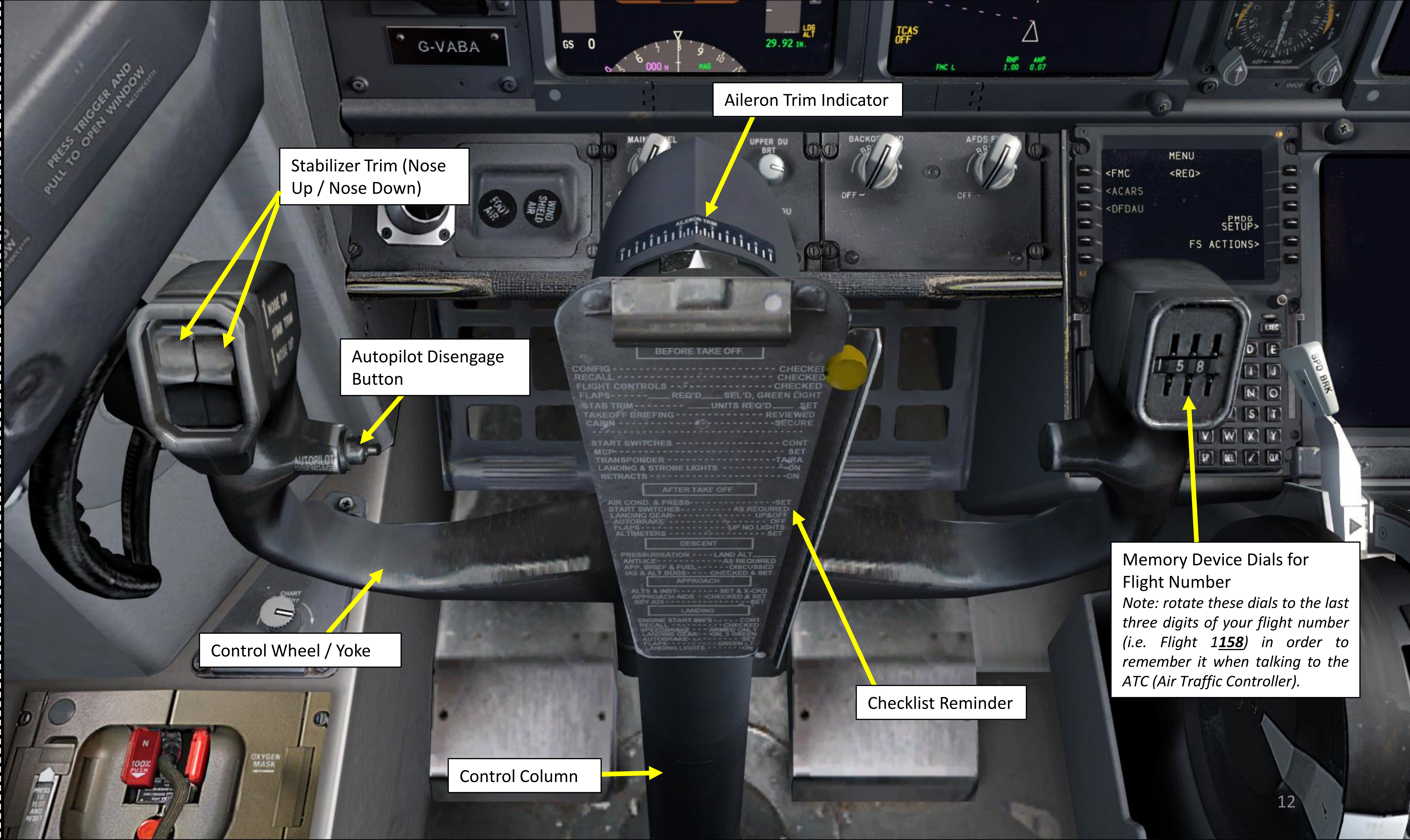
Mahmoud Abdellatief Youtube Tutorial Playlist
https://www.youtube.com/playlist?list=PLN9OFdlZ4OCVte0Puy6y3OvxEwCKazx3U

Matt Davies Youtube Channel
https://www.youtube.com/watch?v=gj_0GBNUAYU&list=UU7SryNncikhgt5tp3rPn0RQ


Front Flight Deck

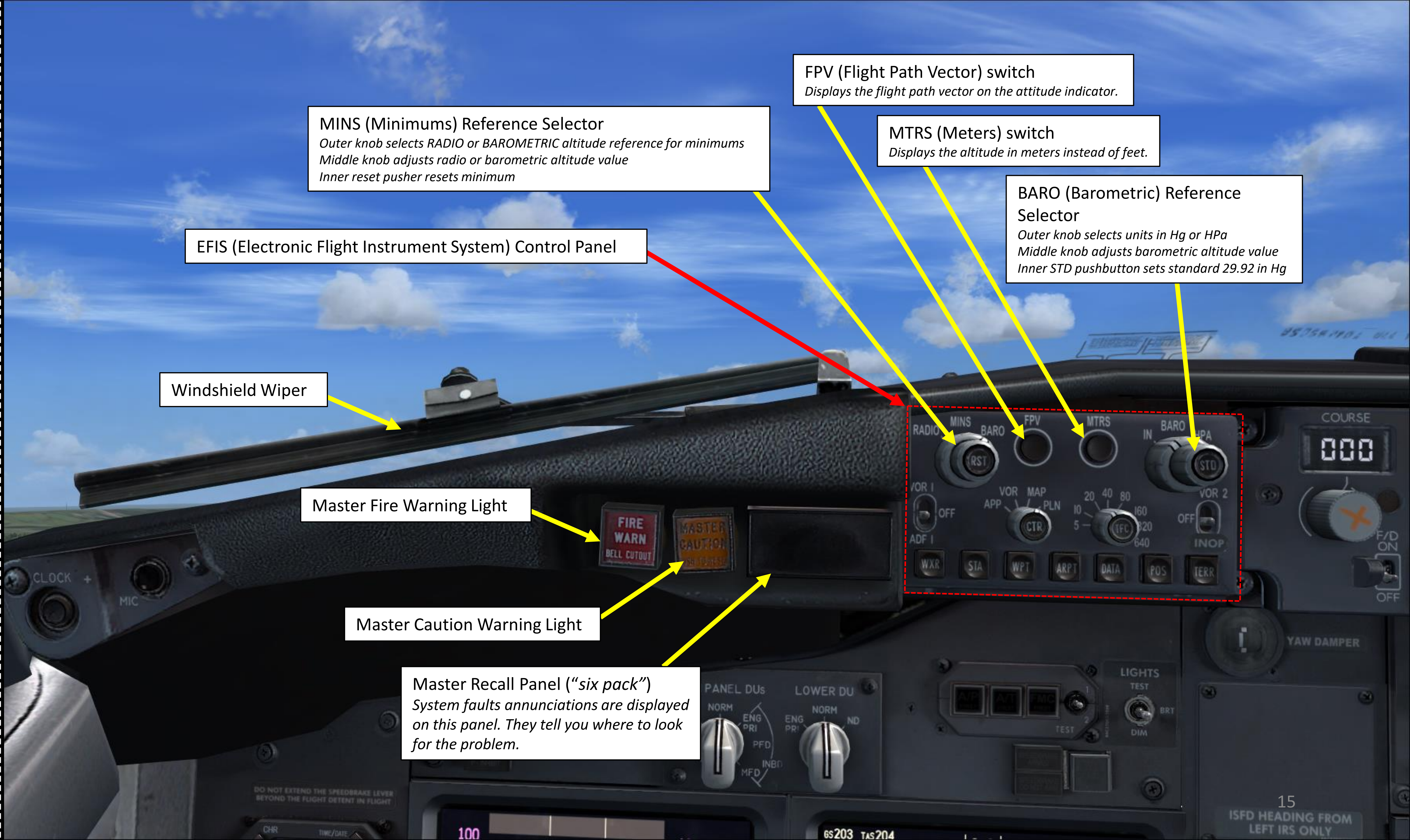

Nose Wheel Steering Tiller
(used to steer aircraft on the ground)
CENTER
RIGHT
Oxygen Mask
Test Switch
Map Light Control
Chart Light Control
Oxygen Mask
HAND MIKE

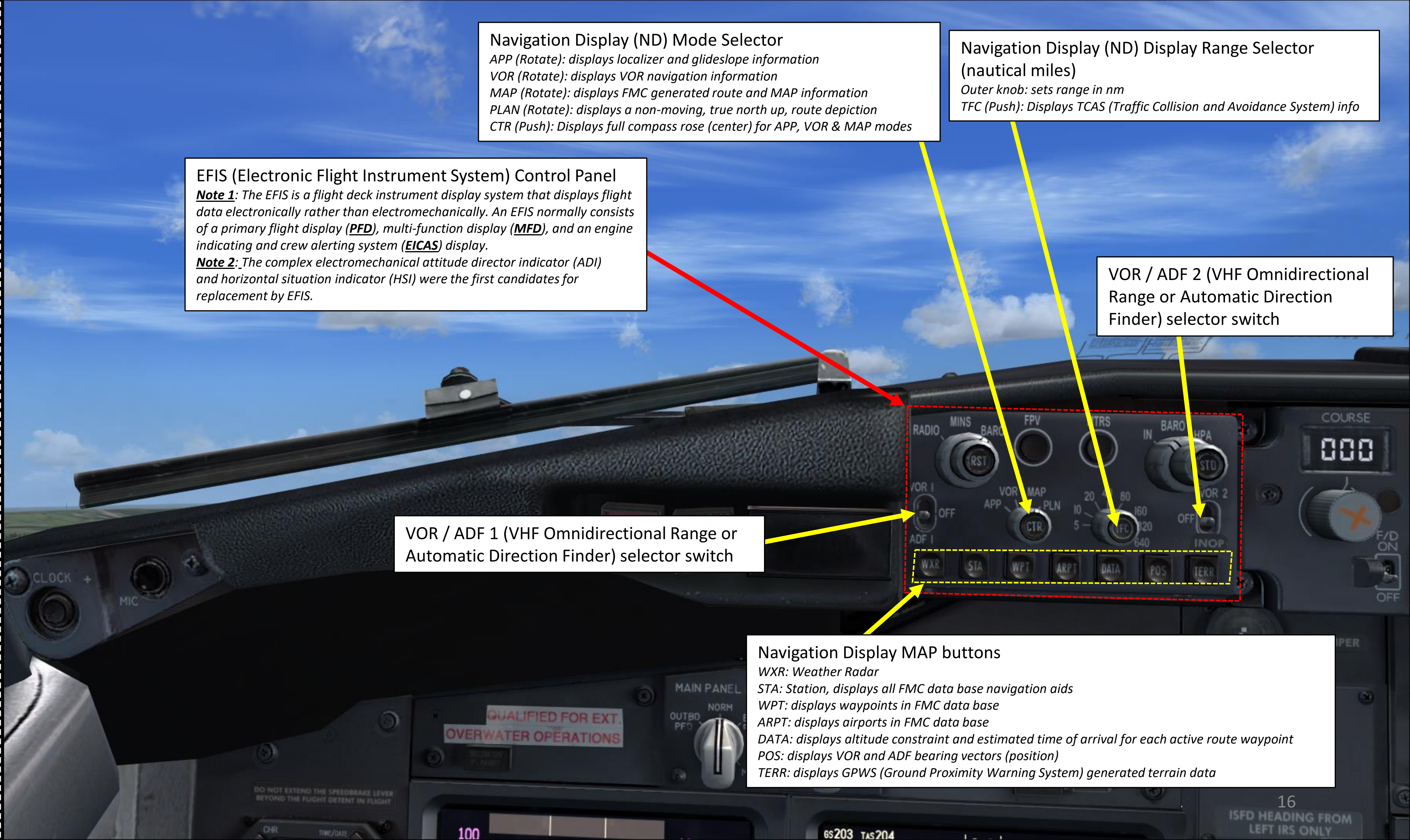

CAUTION
QUALIFIED FOR EXT OVERWATER OPERATIONS


Aileron Trim Indicator
Stabilizer Trim (Nose Up / Nose Down)
Autopilot Disengage Button
Memory Device Dials for Flight Number
Note: rotate these dials to the last three digits of your flight number (i.e. Flight 1__158__) in order to remember it when talking to the ATC (Air Traffic Controller).
Control Wheel / Yoke
Checklist Reminder
Control Column


HUD (Heads-Up Display) Brightness
HUD (Heads-Up Display) screen
(click to stow or deploy)
HUD BRT
MAN
AUTO
FUEL
PUMPS


MCP (Mode Control Panel)
Autopilot controls
EFIS (Electronic Flight Instrument System) Control Panel
Note 1: *The EFIS is a flight deck instrument display system that displays flight data electronically rather than electromechanically. An EFIS normally consists of a primary flight display (**PFD**), multi-function display (**MFD**), and an engine indicating and crew alerting system (**EICAS**) display.*
Note 2: *The complex electromechanical attitude director indicator (ADI) and horizontal situation indicator (HSI) were the first candidates for replacement by EFIS.*
Glareshield Panel


FPV (Flight Path Vector) switch
Displays the flight path vector on the attitude indicator.
MINS (Minimums) Reference Selector
Outer knob selects RADIO or BAROMETRIC altitude reference for minimums
Middle knob adjusts radio or barometric altitude value
Inner reset pusher resets minimum
MTRS (Meters) switch
Displays the altitude in meters instead of feet.
BARO (Barometric) Reference Selector
Outer knob selects units in Hg or HPa
Middle knob adjusts barometric altitude value
Inner STD pushbutton sets standard 29.92 in Hg
EFIS (Electronic Flight Instrument System) Control Panel
Windshield Wiper
Master Fire Warning Light
Master Caution Warning Light
Master Recall Panel ("*six pack*")
System faults annunciations are displayed on this panel. They tell you where to look for the problem.



Navigation Display (ND) Mode Selector
APP (Rotate): displays localizer and glideslope information
VOR (Rotate): displays VOR navigation information
MAP (Rotate): displays FMC generated route and MAP information
PLAN (Rotate): displays a non-moving, true north up, route depiction
CTR (Push): Displays full compass rose (center) for APP, VOR & MAP modes

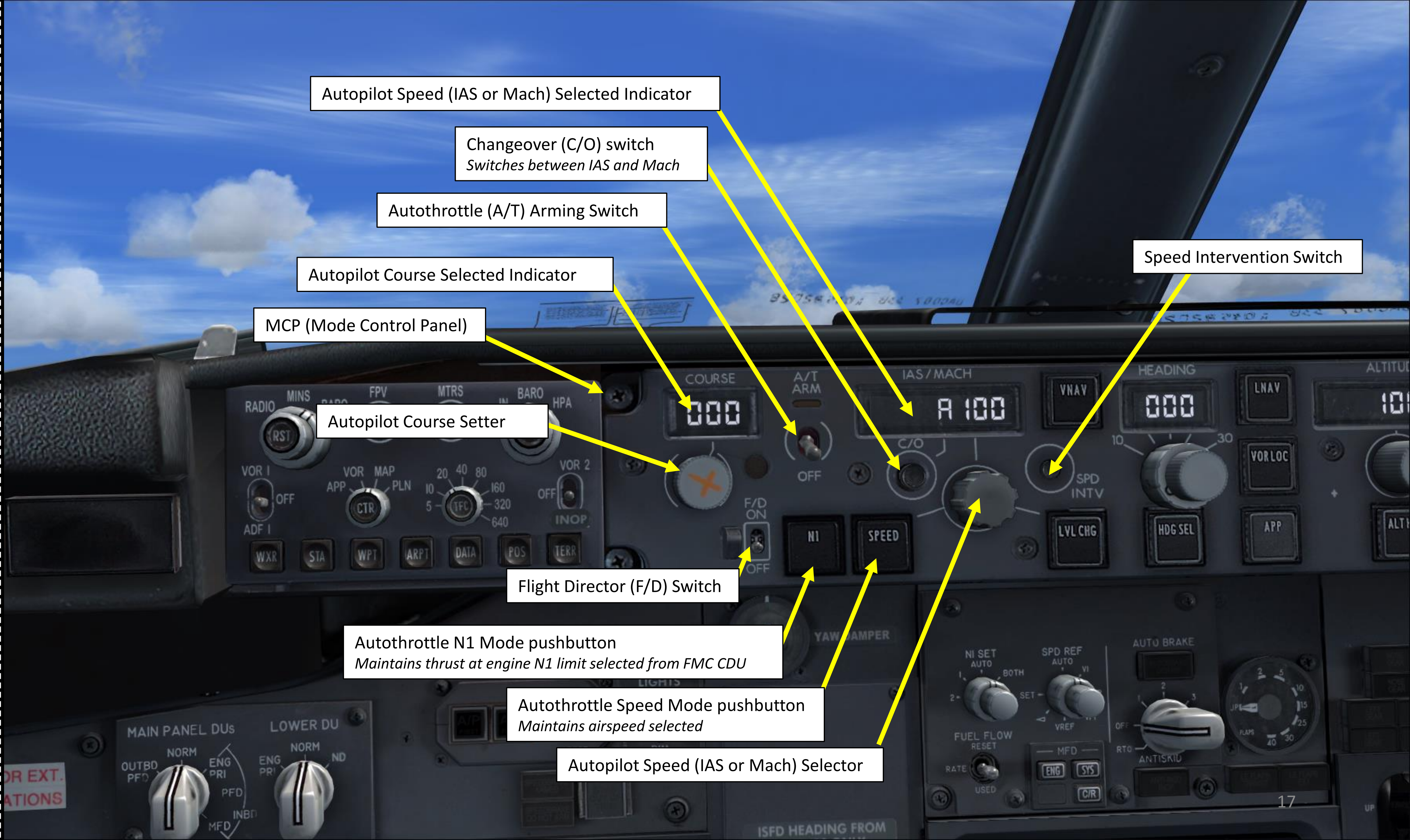
Navigation Display (ND) Display Range Selector (nautical miles)
Outer knob: sets range in nm
TFC (Push): Displays TCAS (Traffic Collision and Avoidance System) info

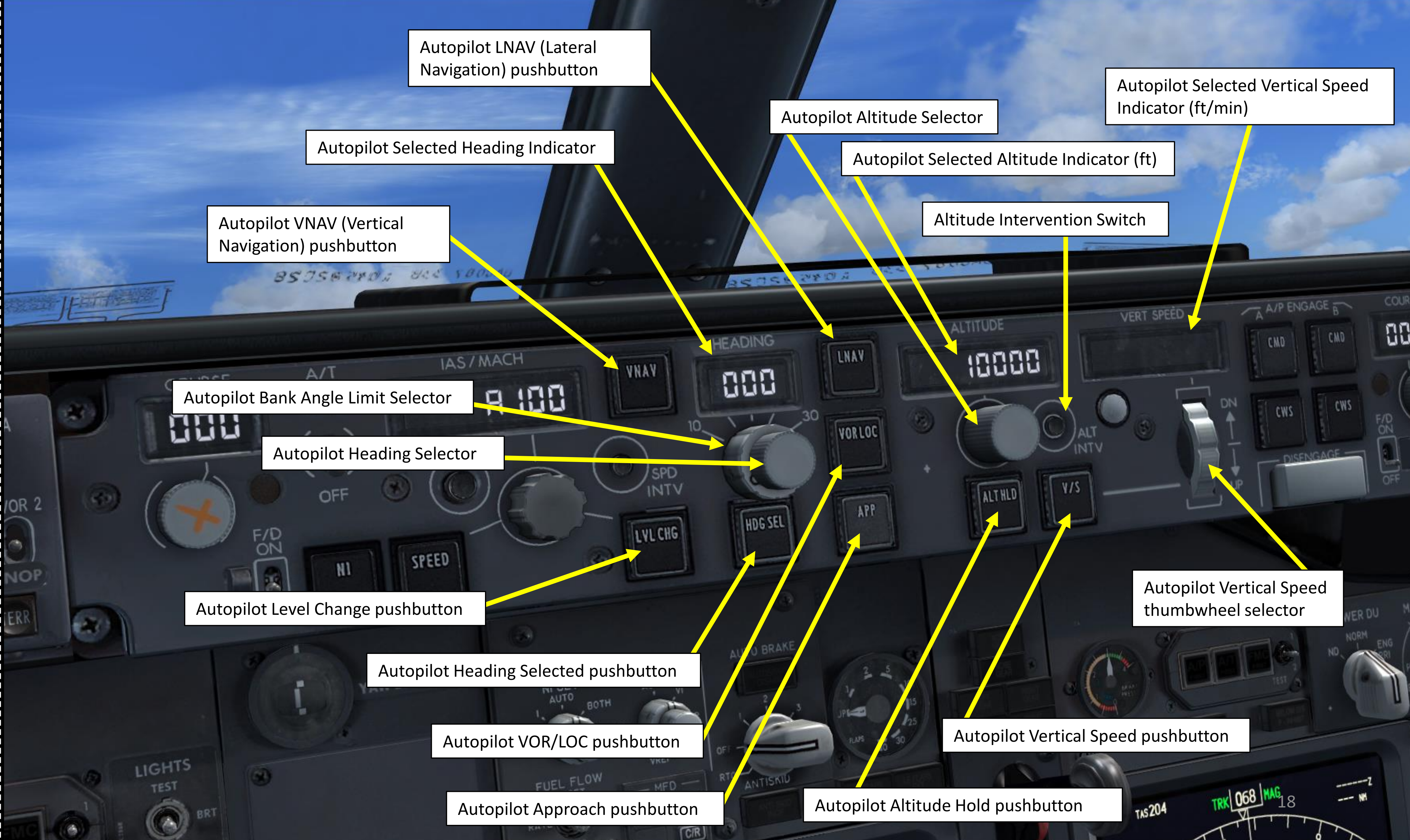
EFIS (Electronic Flight Instrument System) Control Panel
Note 1: *The EFIS is a flight deck instrument display system that displays flight data electronically rather than electromechanically. An EFIS normally consists of a primary flight display (**PFD**), multi-function display (**MFD**), and an engine indicating and crew alerting system (**EICAS**) display.*
Note 2: *The complex electromechanical attitude director indicator (ADI) and horizontal situation indicator (HSI) were the first candidates for replacement by EFIS.*

VOR / ADF 2 (VHF Omnidirectional Range or Automatic Direction Finder) selector switch

VOR / ADF 1 (VHF Omnidirectional Range or Automatic Direction Finder) selector switch

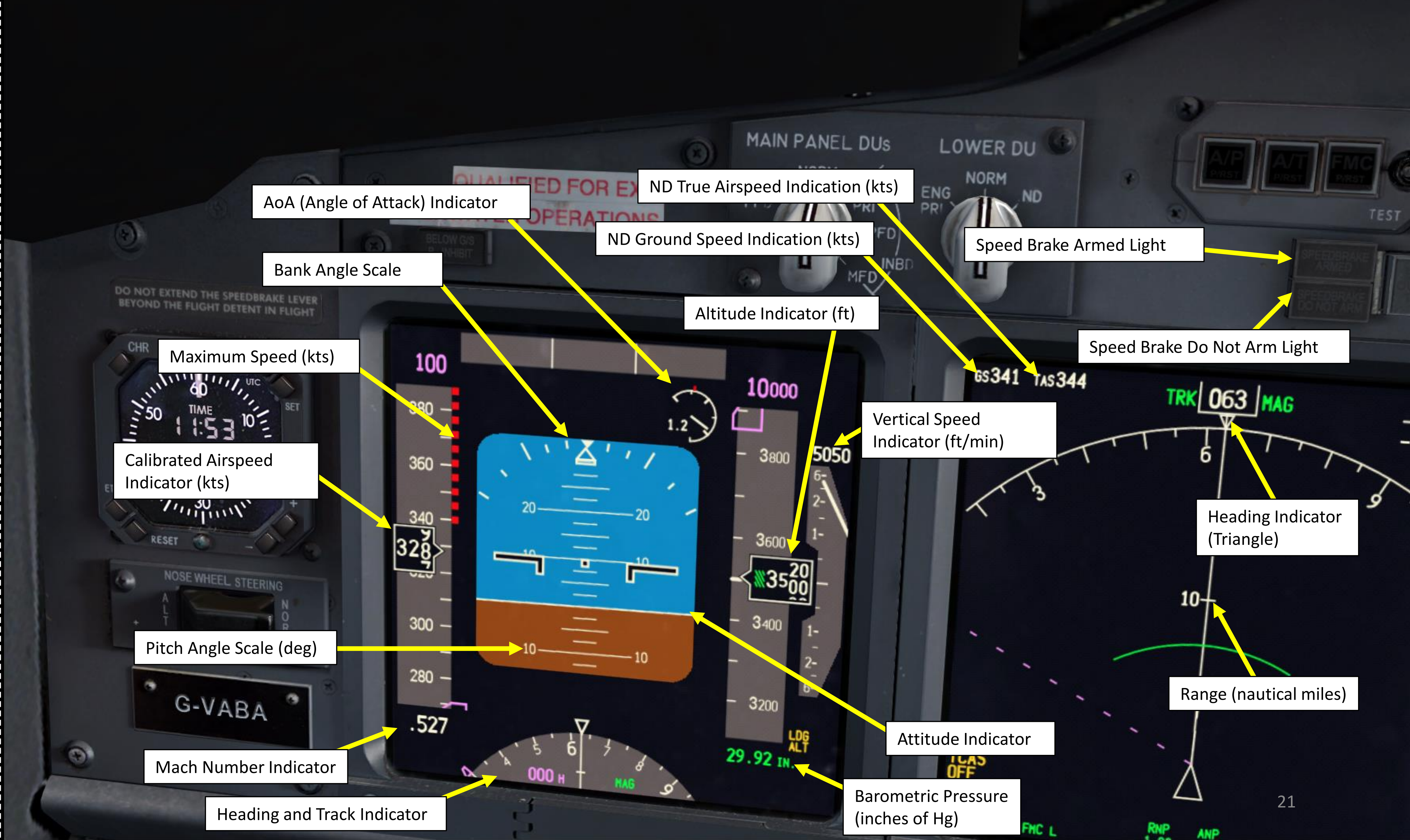
Navigation Display MAP buttons
WXR: Weather Radar
STA: Station, displays all FMC data base navigation aids
WPT: displays waypoints in FMC data base
ARPT: displays airports in FMC data base
DATA: displays altitude constraint and estimated time of arrival for each active route waypoint
POS: displays VOR and ADF bearing vectors (position)
TERR: displays GPWS (Ground Proximity Warning System) generated terrain data

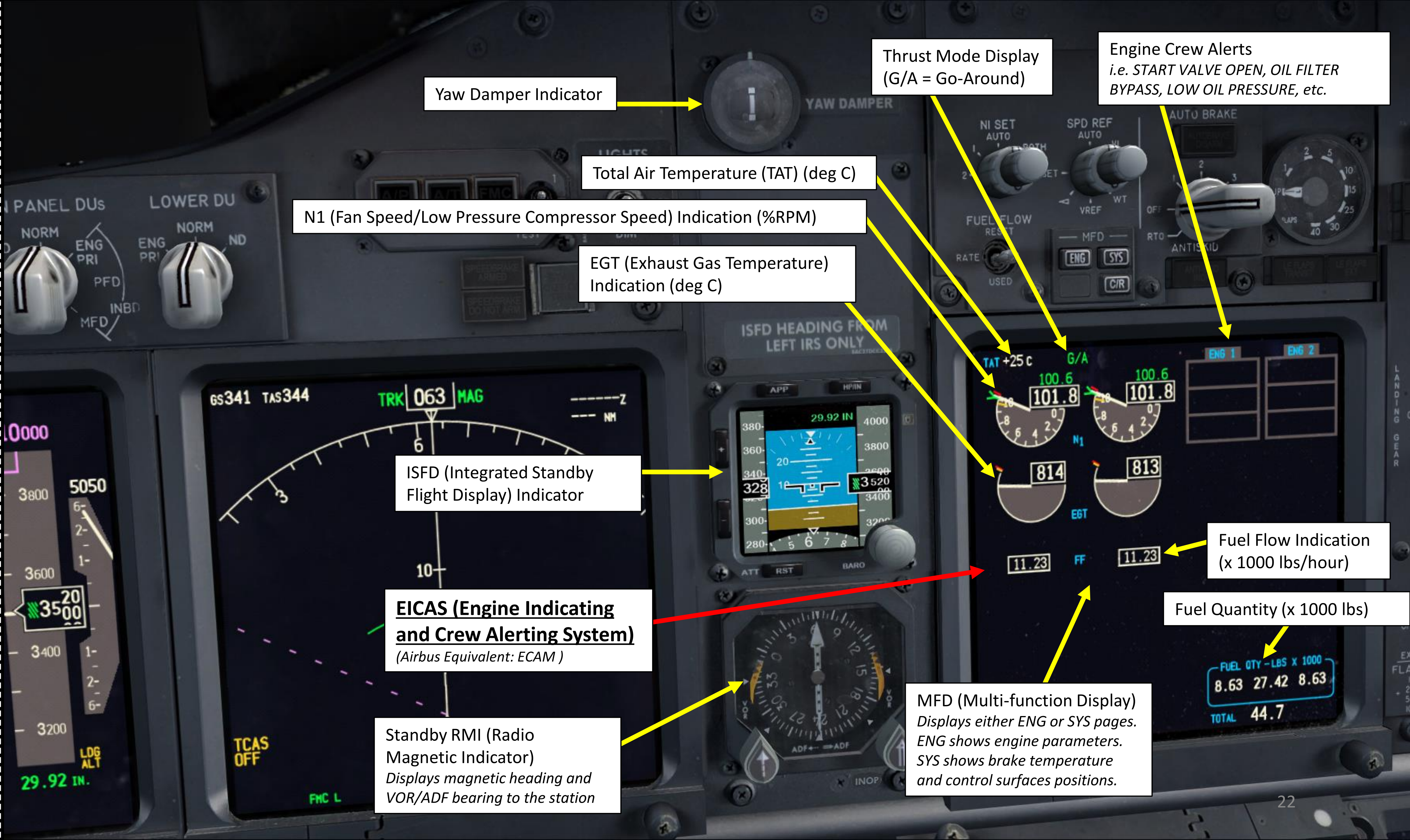

Autopilot Speed (IAS or Mach) Selected Indicator
Changeover (C/O) switch
Switches between IAS and Mach
Autothrottle (A/T) Arming Switch
Autopilot Course Selected Indicator
MCP (Mode Control Panel)
Autopilot Course Setter
Speed Intervention Switch
Flight Director (F/D) Switch
Autothrottle N1 Mode pushbutton
Maintains thrust at engine N1 limit selected from FMC CDU
Autothrottle Speed Mode pushbutton
Maintains airspeed selected
Autopilot Speed (IAS or Mach) Selector

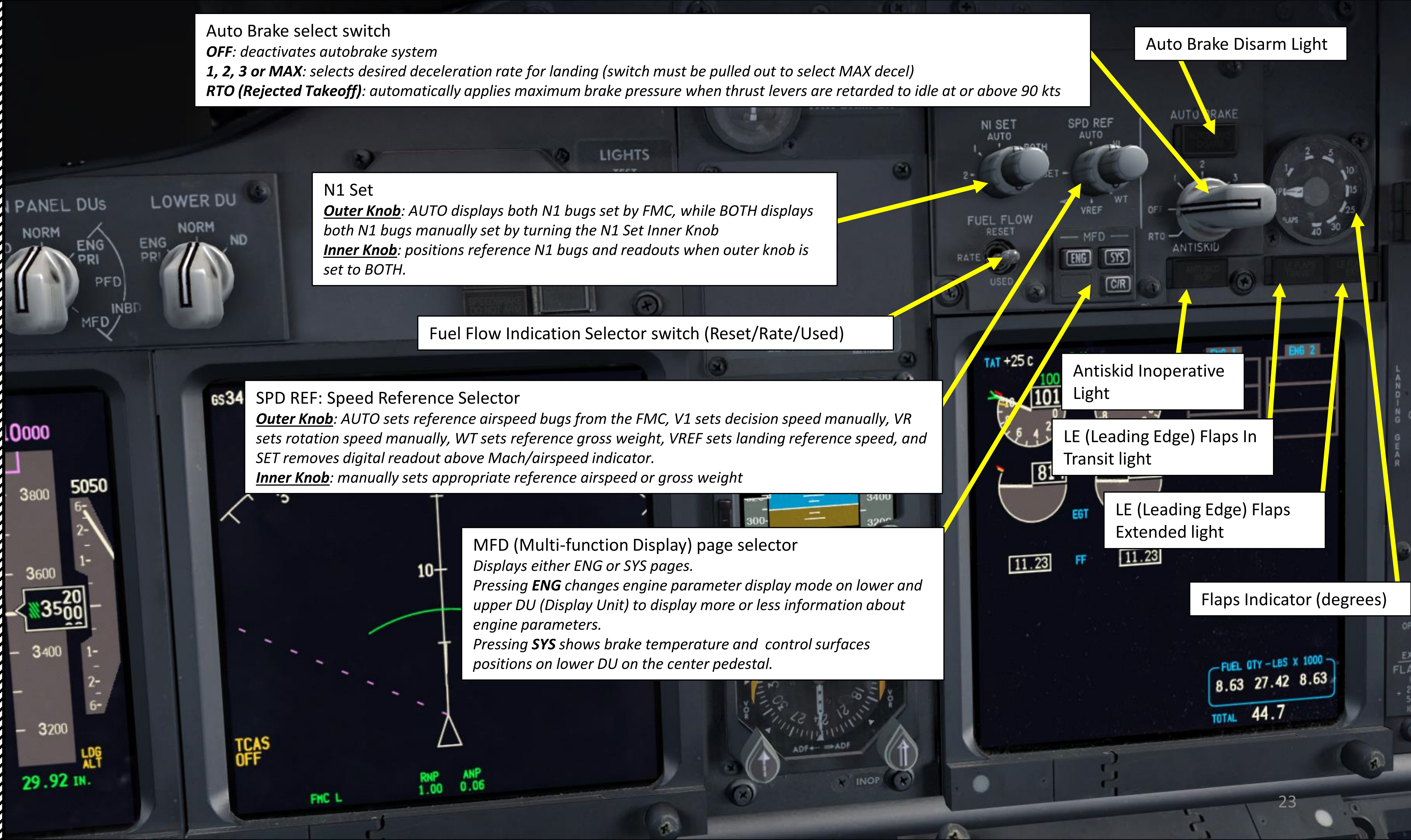

Autopilot LNAV (Lateral Navigation) pushbutton
Autopilot Altitude Selector
Autopilot Selected Vertical Speed Indicator (ft/min)
Autopilot Selected Heading Indicator
Autopilot Selected Altitude Indicator (ft)
Autopilot VNAV (Vertical Navigation) pushbutton
Altitude Intervention Switch
Autopilot Bank Angle Limit Selector
Autopilot Heading Selector
Autopilot Level Change pushbutton
Autopilot Vertical Speed thumbwheel selector
Autopilot Heading Selected pushbutton
Autopilot VOR/LOC pushbutton
Autopilot Vertical Speed pushbutton
Autopilot Approach pushbutton
Autopilot Altitude Hold pushbutton
HEADING
IAS / MACH
A/T
ALTITUDE
VERT SPEED
A/P ENGAGE
VNAV
LNAV
VOR LOC
APP
ALT HLD
V/S
HDG SEL
LVL CHG
SPEED
N1
CMD
CWS
DISENGAGE
ALT INTV
SPD INTV
F/D ON
OFF
10000
000


Autopilot Engage Command Button (A/P B)
Autopilot Engage Command Button (A/P A)
Autopilot Control Wheel Steering Engage Button (A/P B)
Autopilot Control Wheel Steering Engage Button (A/P A)
Autopilot Disengage Switch
Flip bar UP to disengage A/P
VERT SPEED
A/P ENGAGE
A
B
CMD
CMD
CWS
CWS
COURSE
000
F/D
ON
OFF
DISENGAGE
DN
UP
RADIO
MINS
BARO
FPV
MTRS
BARO
IN
HPA
RST
STD
VOR I
ADF I
OFF
APP
VOR
MAP
CTR
TFC
INOP
WXR
STA
WPT
ARPT
DATA
POS
TERR


Main Panel DUs (Display Units) selector
Outboard PFD (Primary Flight Display)
Normal – PFD on OUTBD, ND on INBD
Inboard PFD (Primary Flight Display)
Inboard MFD (Multifunction Display)
Lower Panel DU (Display Unit) selector
ENG PRI: Engine Primary
Normal
ND: Navigation Display
Autopilot (A/P) Disengage Light
Autothrottle (A/T) Disengage Light
FMC P/RST (Flight Management Computer, Push-to-Reset) Alert Light
A/T & FMC Disengage Test Switch
Master Lights Test and Dim switch
Test / Bright / Dim
BELOW G/S PUSH-INHIBIT light
Illuminates when flying below a safe glide slope except when flying under 1000 ft
Clock
Nosewheel Steering Switch
NORM: uses hydraulic System A
ALT: uses alternate hydraulic System B
PFD (Primary Flight Display) screen
ND (Navigation Display) screen


AoA (Angle of Attack) Indicator
ND True Airspeed Indication (kts)
ND Ground Speed Indication (kts)
Speed Brake Armed Light
Bank Angle Scale
Altitude Indicator (ft)
Speed Brake Do Not Arm Light
Maximum Speed (kts)
Vertical Speed Indicator (ft/min)
Calibrated Airspeed Indicator (kts)
Heading Indicator (Triangle)
Pitch Angle Scale (deg)
Range (nautical miles)
Attitude Indicator
Mach Number Indicator
Barometric Pressure (inches of Hg)
Heading and Track Indicator
MAIN PANEL DUs
LOWER DU
NOSE WHEEL STEERING
G-VABA


Yaw Damper Indicator
Thrust Mode Display
(G/A = Go-Around)
Engine Crew Alerts
i.e. START VALVE OPEN, OIL FILTER BYPASS, LOW OIL PRESSURE, etc.
Total Air Temperature (TAT) (deg C)
N1 (Fan Speed/Low Pressure Compressor Speed) Indication (%RPM)
EGT (Exhaust Gas Temperature) Indication (deg C)
ISFD (Integrated Standby Flight Display) Indicator
Fuel Flow Indication (x 1000 lbs/hour)
Fuel Quantity (x 1000 lbs)
EICAS (Engine Indicating and Crew Alerting System)
(Airbus Equivalent: ECAM)
Standby RMI (Radio Magnetic Indicator)
Displays magnetic heading and VOR/ADF bearing to the station
MFD (Multi-function Display)
Displays either ENG or SYS pages.
ENG shows engine parameters.
SYS shows brake temperature and control surfaces positions.



Auto Brake select switch

OFF: *deactivates autobrake system*

1, 2, 3 or MAX: *selects desired deceleration rate for landing (switch must be pulled out to select MAX decel)*

RTO (Rejected Takeoff): *automatically applies maximum brake pressure when thrust levers are retarded to idle at or above 90 kts*

Auto Brake Disarm Light

N1 Set

Outer Knob: *AUTO displays both N1 bugs set by FMC, while BOTH displays both N1 bugs manually set by turning the N1 Set Inner Knob*

Inner Knob: *positions reference N1 bugs and readouts when outer knob is set to BOTH.*

Fuel Flow Indication Selector switch (Reset/Rate/Used)

SPD REF: Speed Reference Selector

Outer Knob: *AUTO sets reference airspeed bugs from the FMC, V1 sets decision speed manually, VR sets rotation speed manually, WT sets reference gross weight, VREF sets landing reference speed, and SET removes digital readout above Mach/airspeed indicator.*

Inner Knob: *manually sets appropriate reference airspeed or gross weight*

MFD (Multi-function Display) page selector

Displays either ENG or SYS pages.

Pressing ***ENG*** *changes engine parameter display mode on lower and upper DU (Display Unit) to display more or less information about engine parameters.*

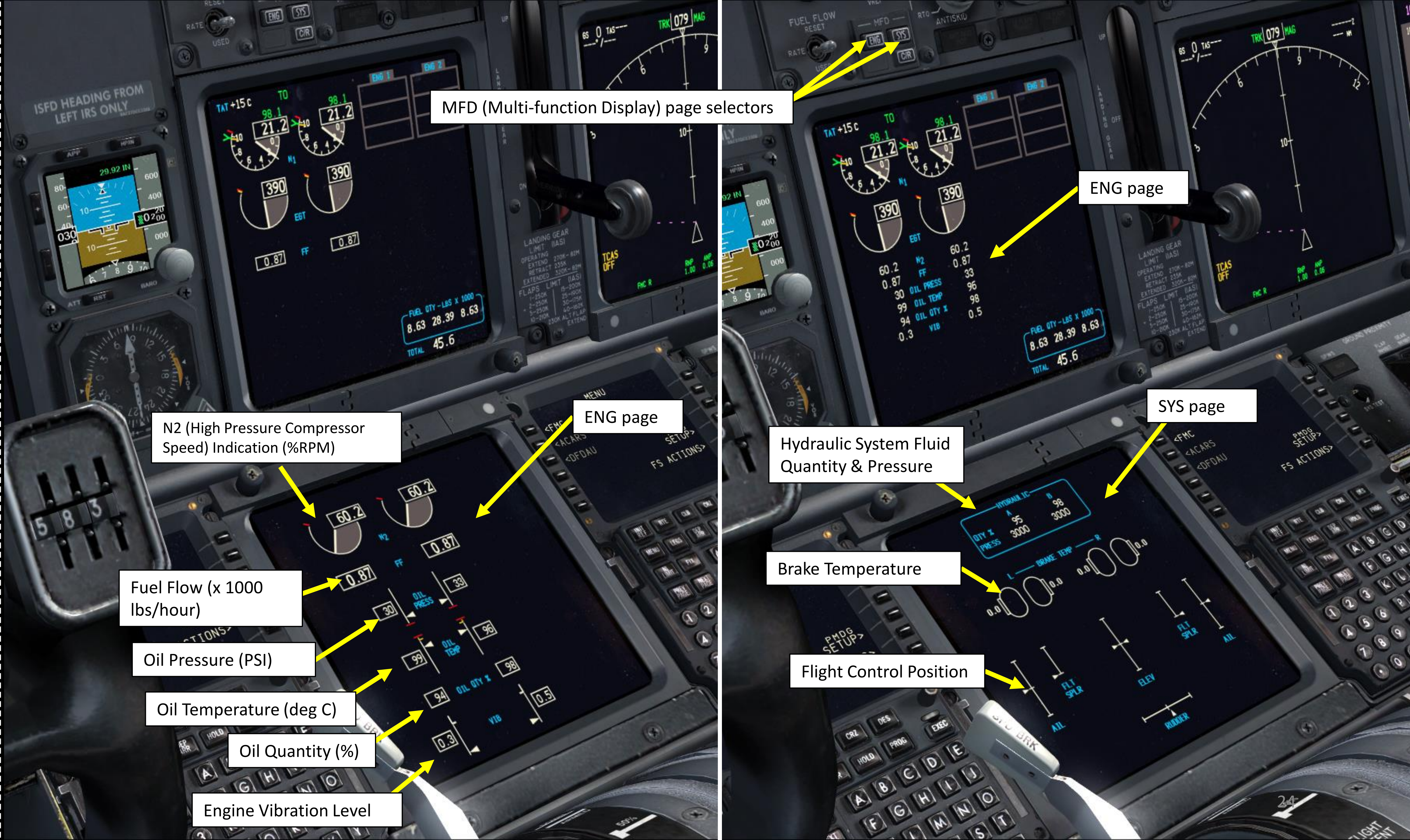
Pressing ***SYS*** *shows brake temperature and control surfaces positions on lower DU on the center pedestal.*

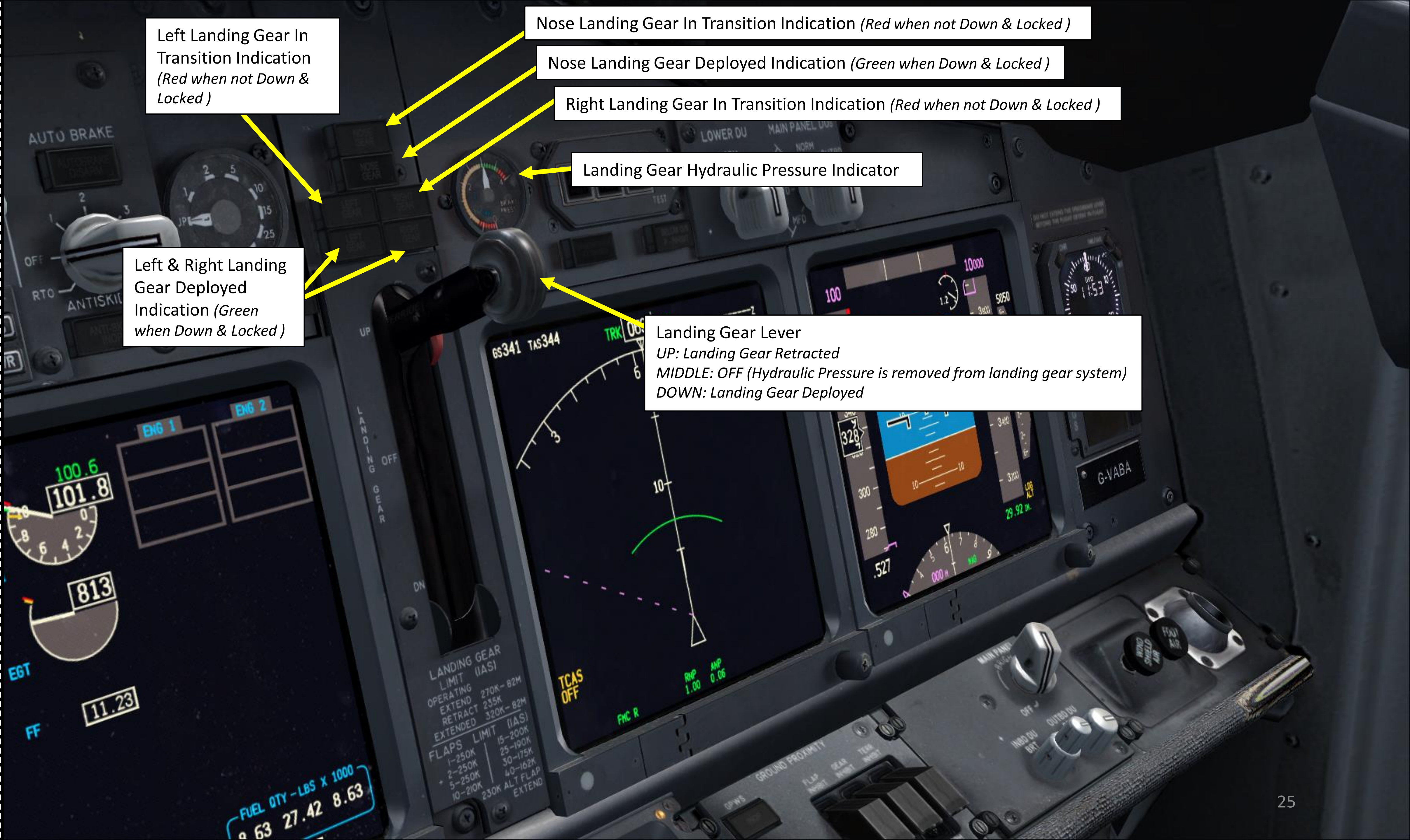
Antiskid Inoperative Light

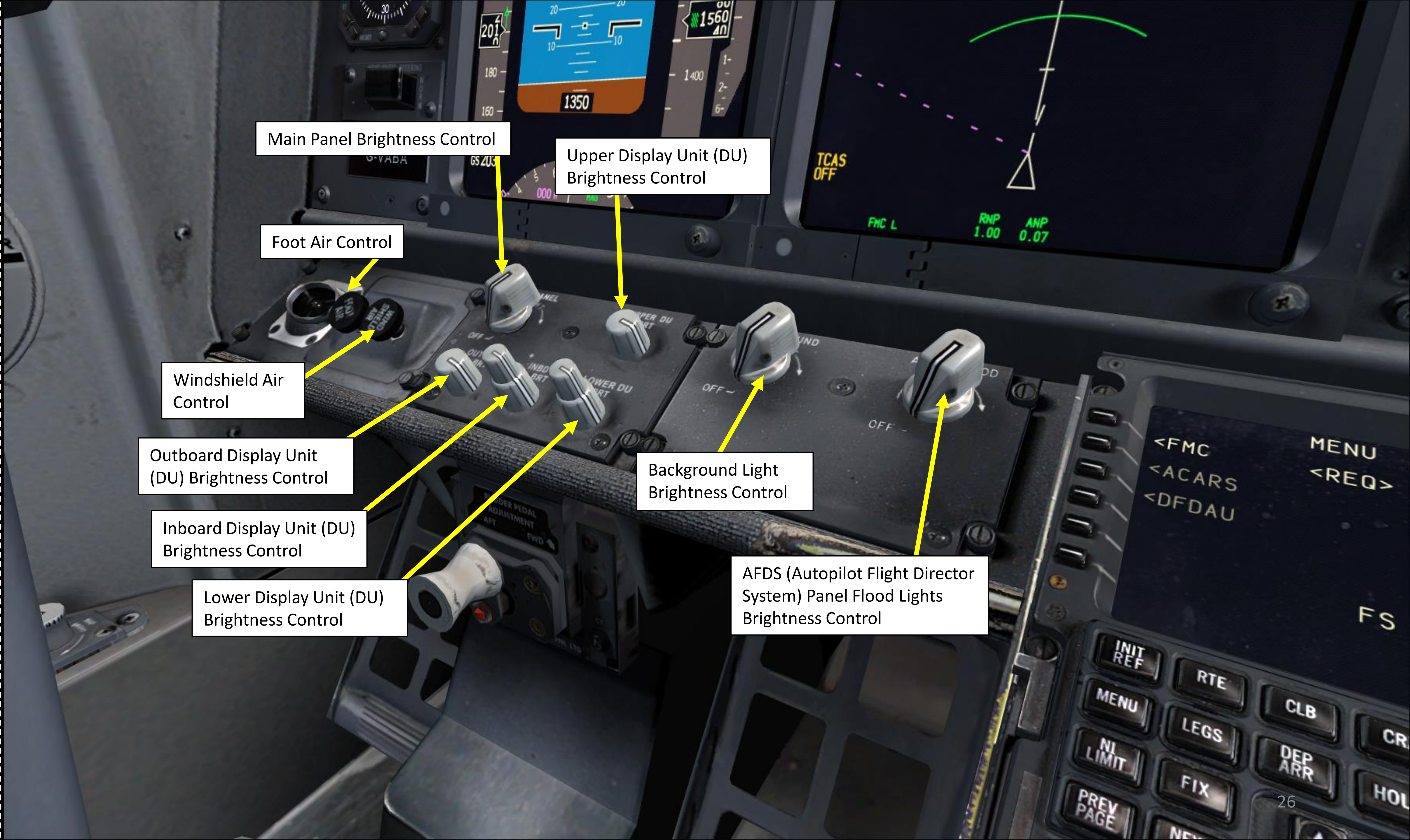
LE (Leading Edge) Flaps In Transit light

LE (Leading Edge) Flaps Extended light

Flaps Indicator (degrees)


MFD (Multi-function Display) page selectors
N2 (High Pressure Compressor Speed) Indication (%RPM)
ENG page
Fuel Flow (x 1000 lbs/hour)
Oil Pressure (PSI)
Oil Temperature (deg C)
Oil Quantity (%)
Engine Vibration Level
ENG page
SYS page
Hydraulic System Fluid Quantity & Pressure
Brake Temperature
Flight Control Position


Left Landing Gear In Transition Indication *(Red when not Down & Locked)*
Nose Landing Gear In Transition Indication *(Red when not Down & Locked)*
Nose Landing Gear Deployed Indication *(Green when Down & Locked)*
Right Landing Gear In Transition Indication *(Red when not Down & Locked)*
Landing Gear Hydraulic Pressure Indicator
Left & Right Landing Gear Deployed Indication *(Green when Down & Locked)*
Landing Gear Lever
UP: Landing Gear Retracted
MIDDLE: OFF (Hydraulic Pressure is removed from landing gear system)
DOWN: Landing Gear Deployed

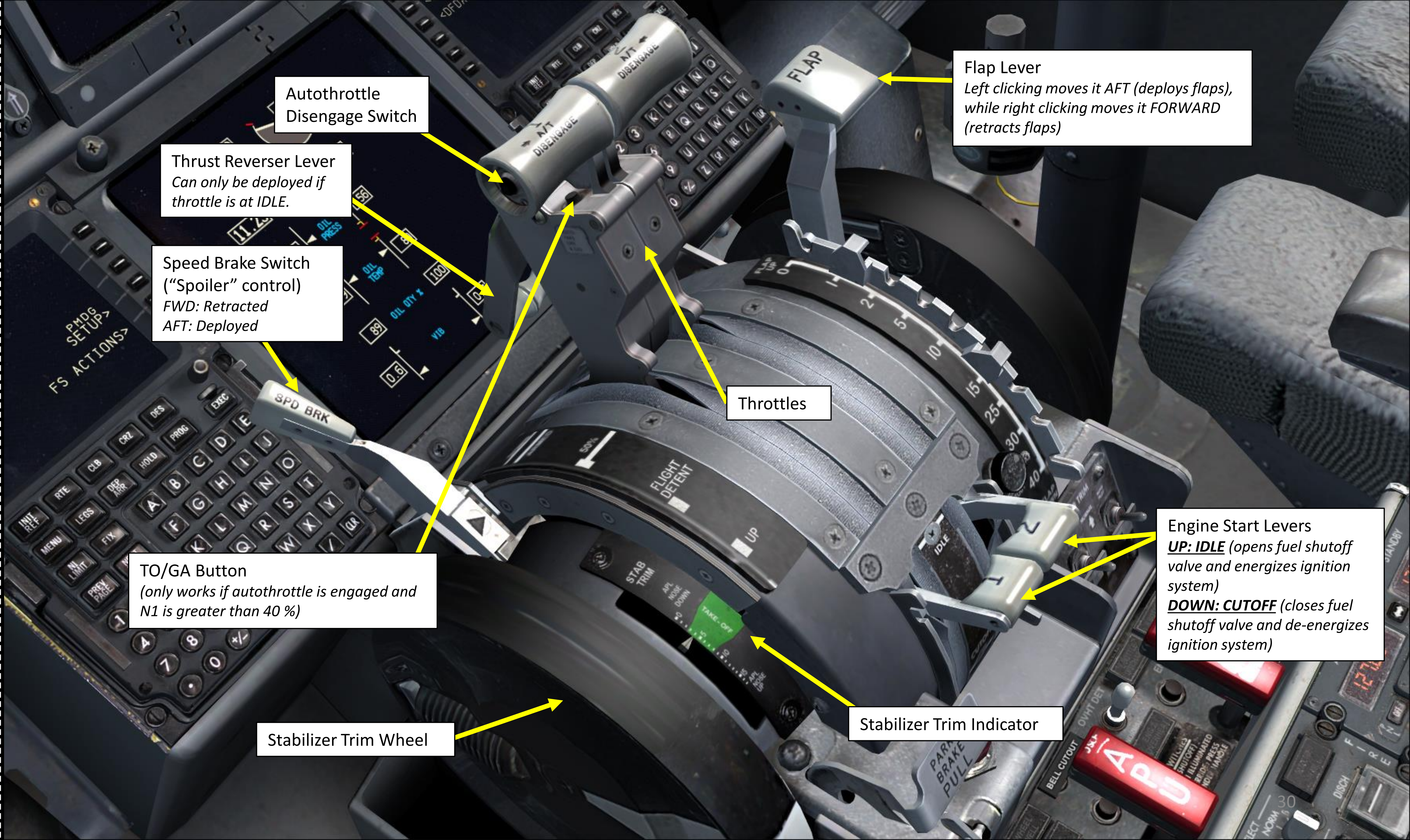

Main Panel Brightness Control
Upper Display Unit (DU) Brightness Control
Foot Air Control
Windshield Air Control
Outboard Display Unit (DU) Brightness Control
Inboard Display Unit (DU) Brightness Control
Lower Display Unit (DU) Brightness Control
Background Light Brightness Control
AFDS (Autopilot Flight Director System) Panel Flood Lights Brightness Control

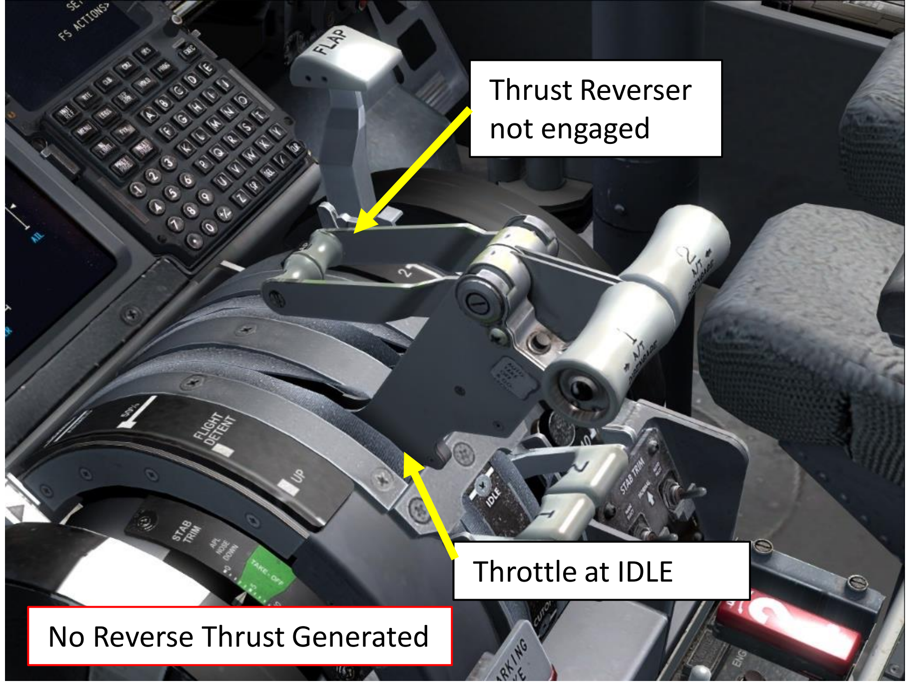
FMS (Flight Management System) CDU (Control Display Unit)

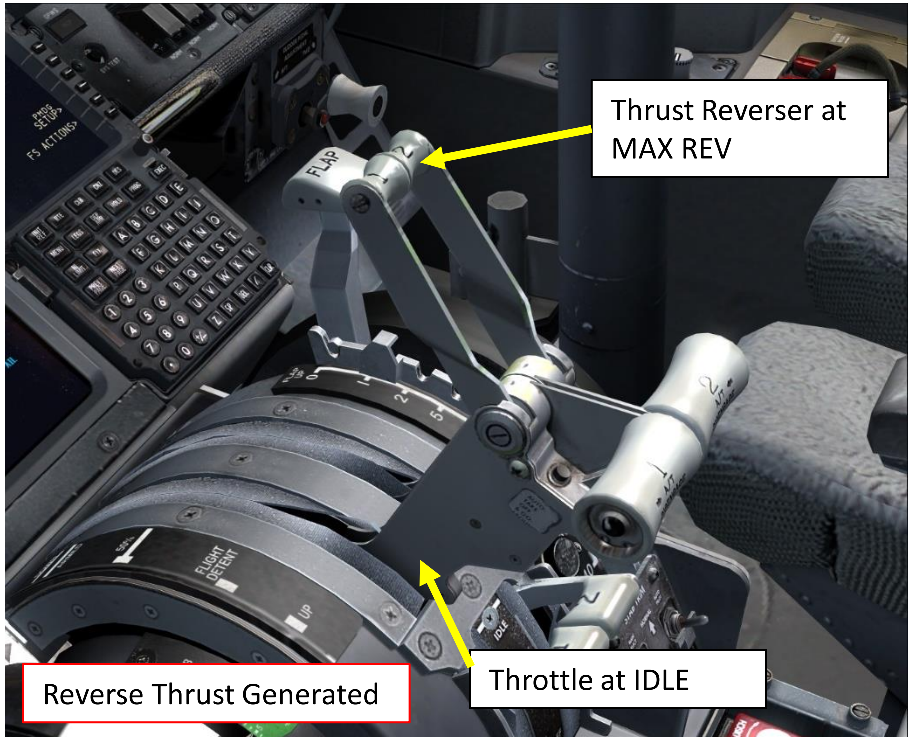
- An **FMS** is a specialized computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew to the point that modern civilian aircraft no longer carry flight engineers or navigators. A primary function is in-flight management of the flight plan.
- The FMS 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**).

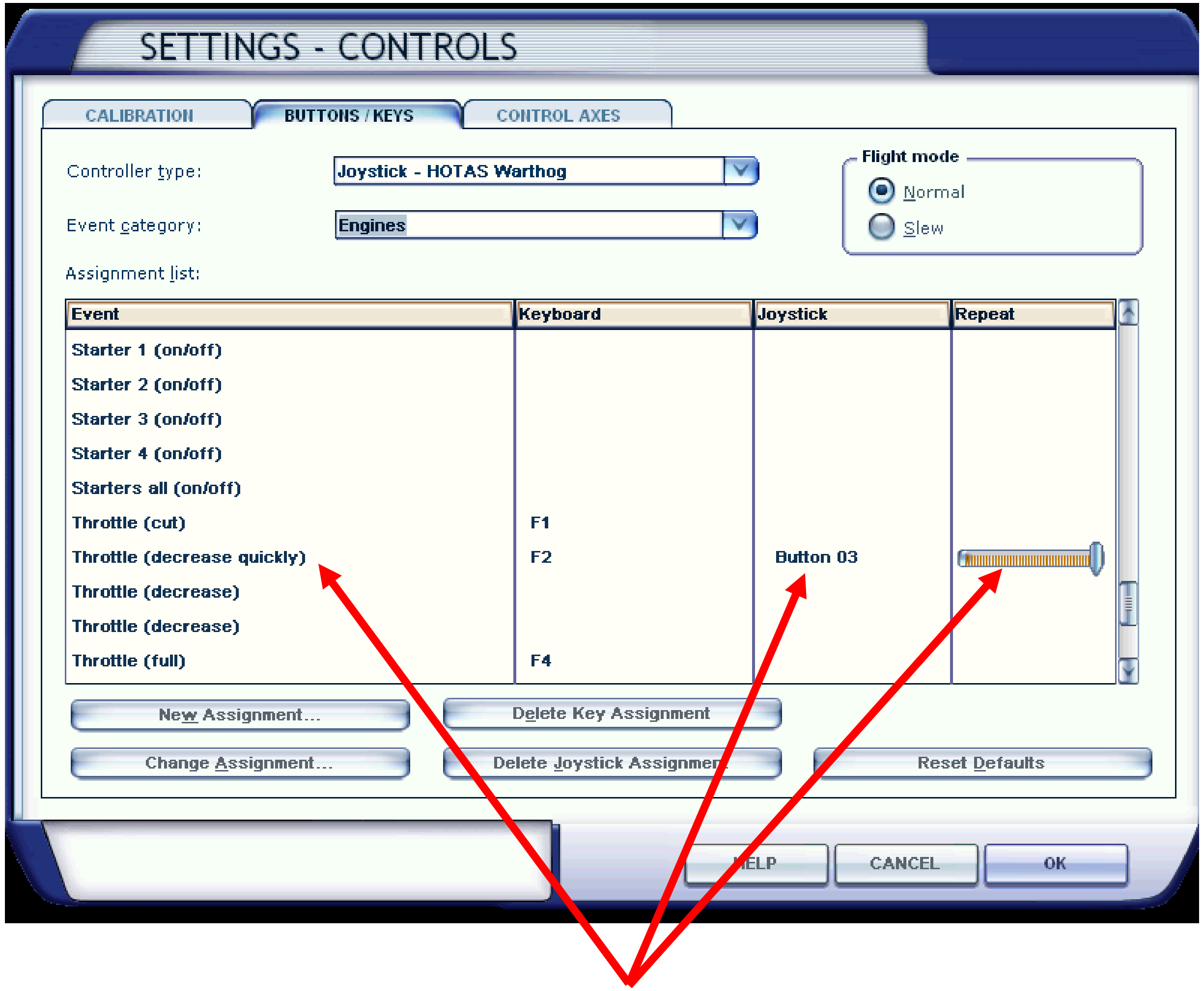

GPWS (Ground Proximity Warning System) Inoperative Light
GPWS System Test Switch
GPWS Flap Inhibit Switch
Inhibits ground proximity TOO LOW FLAPS alert
GPWS Gear Inhibit Switch
Inhibits ground proximity TOO LOW GEAR alert
GPWS TERR (Terrain) Inhibit Switch
Inhibits look-ahead terrain alerts and terrain display


Pedestal


Autothrottle Disengage Switch
Thrust Reverser Lever
Can only be deployed if throttle is at IDLE.
Speed Brake Switch (“Spoiler” control)
FWD: Retracted
AFT: Deployed
Flap Lever
Left clicking moves it AFT (deploys flaps), while right clicking moves it FORWARD (retracts flaps)
Throttles
Engine Start Levers
UP: IDLE *(opens fuel shutoff valve and energizes ignition system)*
DOWN: CUTOFF *(closes fuel shutoff valve and de-energizes ignition system)*
TO/GA Button
(only works if autothrottle is engaged and N1 is greater than 40 %)
Stabilizer Trim Wheel
Stabilizer Trim Indicator

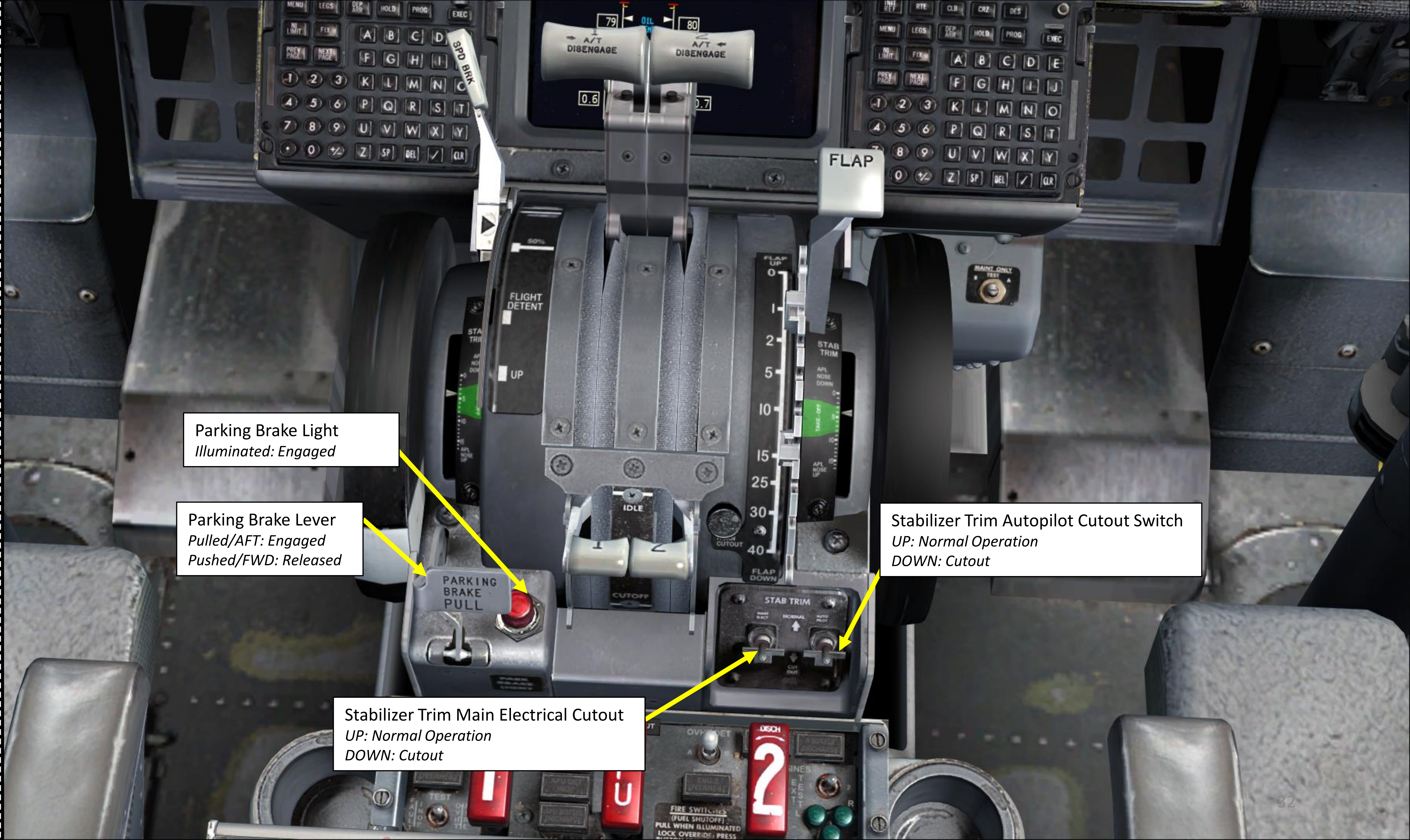


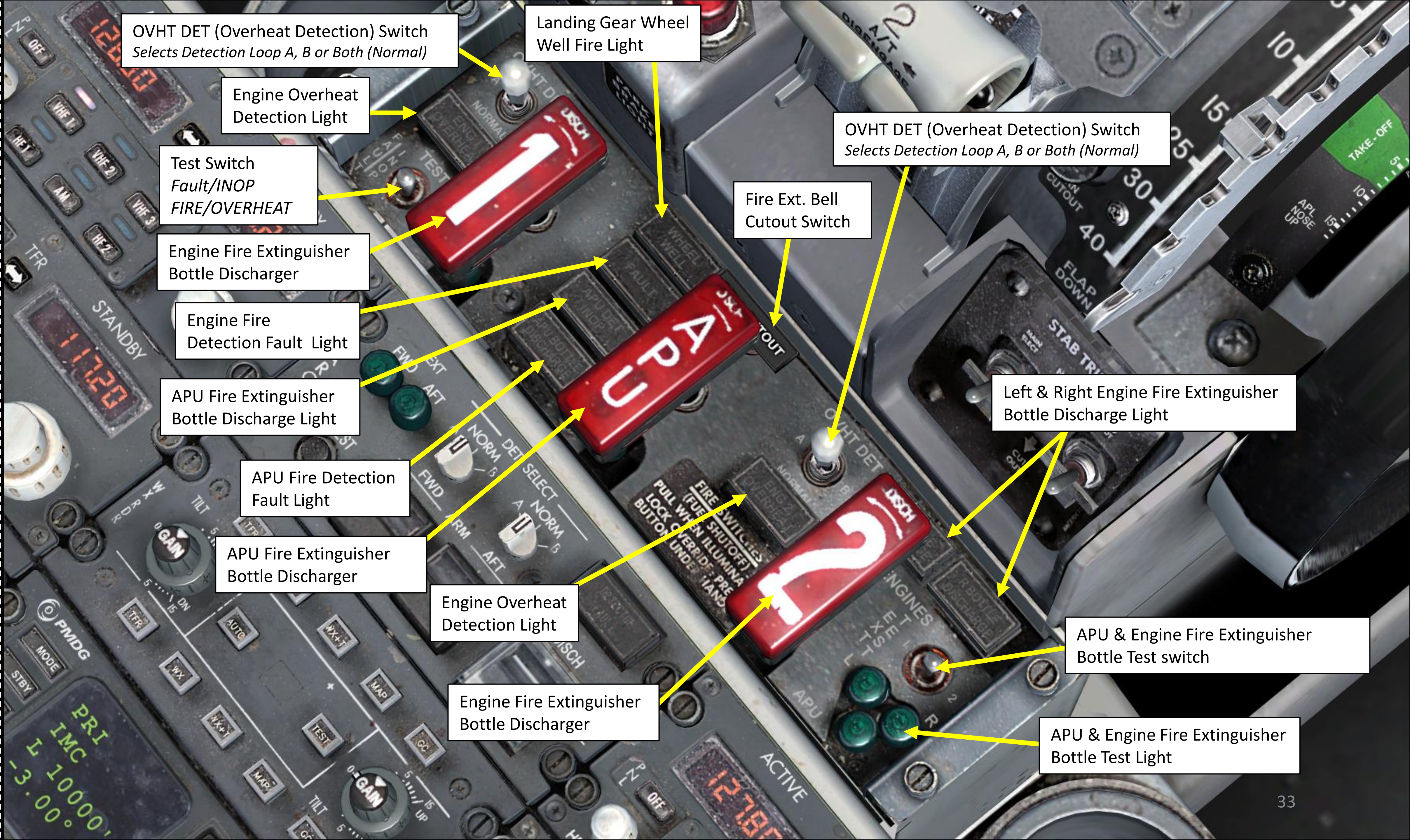


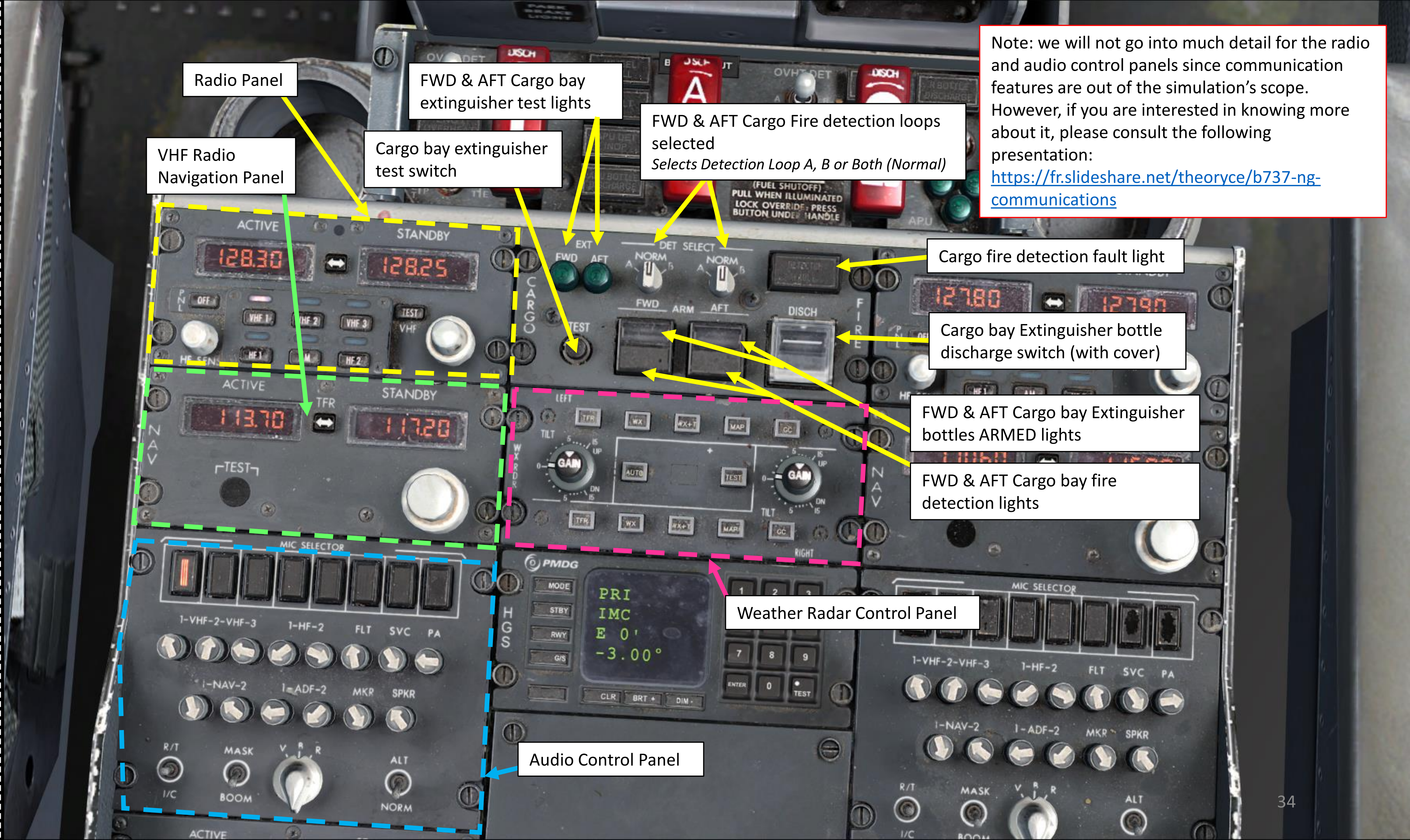


The Thrust Reverser lever can be moved by pressing and holding the “Throttle (decrease quickly)” control mapped to your joystick. Make sure that the “Repeat” slider is set fully to the right. The default key binding is “F2”.

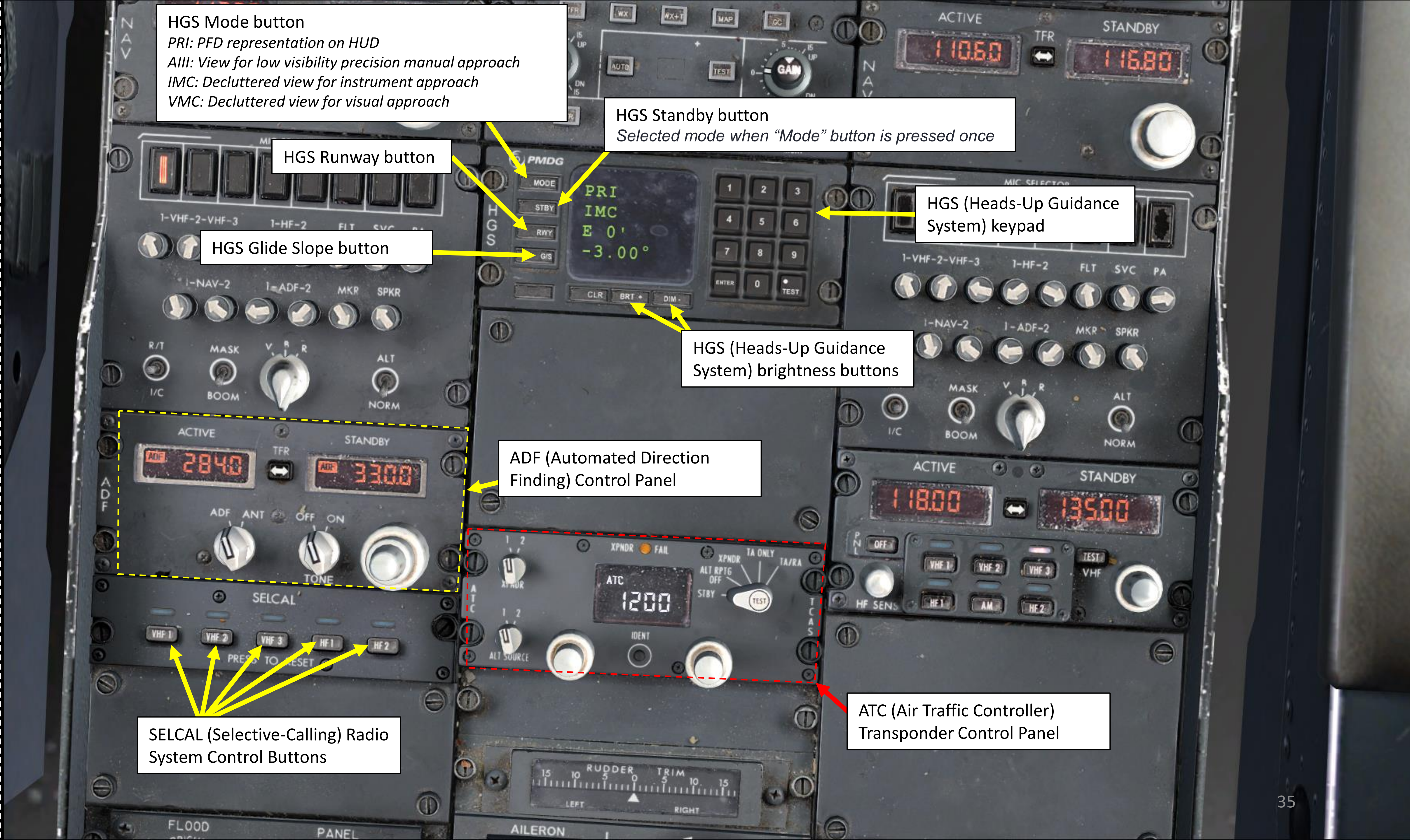
Take note that the Reverse Thrust lever can only be engaged if your throttle is at IDLE. The reason for that is a mechanical stopper that prevents you from engaging thrust reversers at high throttle settings.

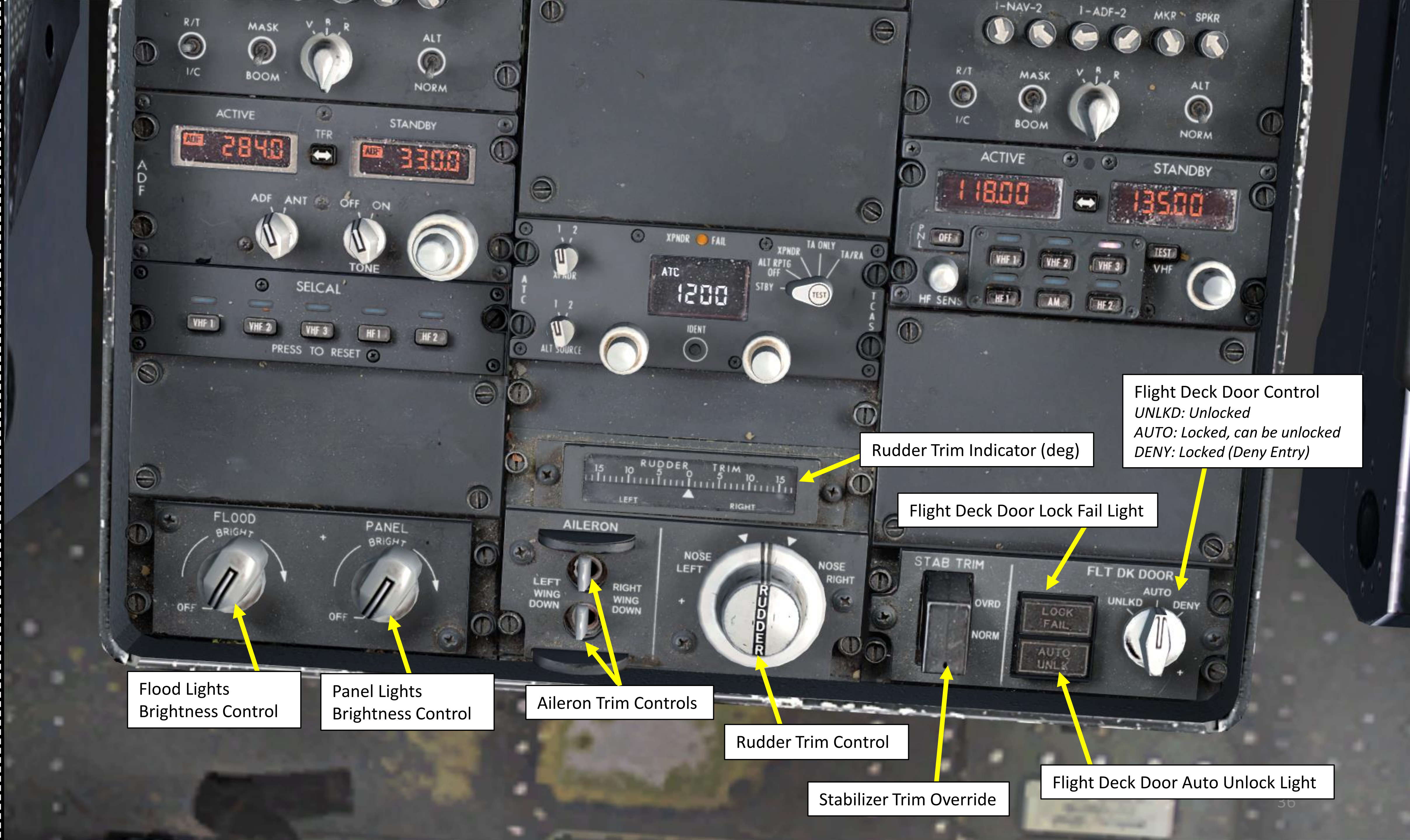

Parking Brake Light
Illuminated: Engaged
Parking Brake Lever
Pulled/AFT: Engaged
Pushed/FWD: Released
Stabilizer Trim Autopilot Cutout Switch
UP: Normal Operation
DOWN: Cutout
Stabilizer Trim Main Electrical Cutout
UP: Normal Operation
DOWN: Cutout
PARKING BRAKE PULL
STAB TRIM
FLAP
SPD BRK
A/T DISENGAGE
FLIGHT DETENT
UP
IDLE
CUTOFF
FLAP UP
FLAP DOWN
STAB TRIM
DISCH
FIRE SWITCHES (FUEL SHUTOFF) PULL WHEN ILLUMINATED LOCK OVERRIDE: PRESS

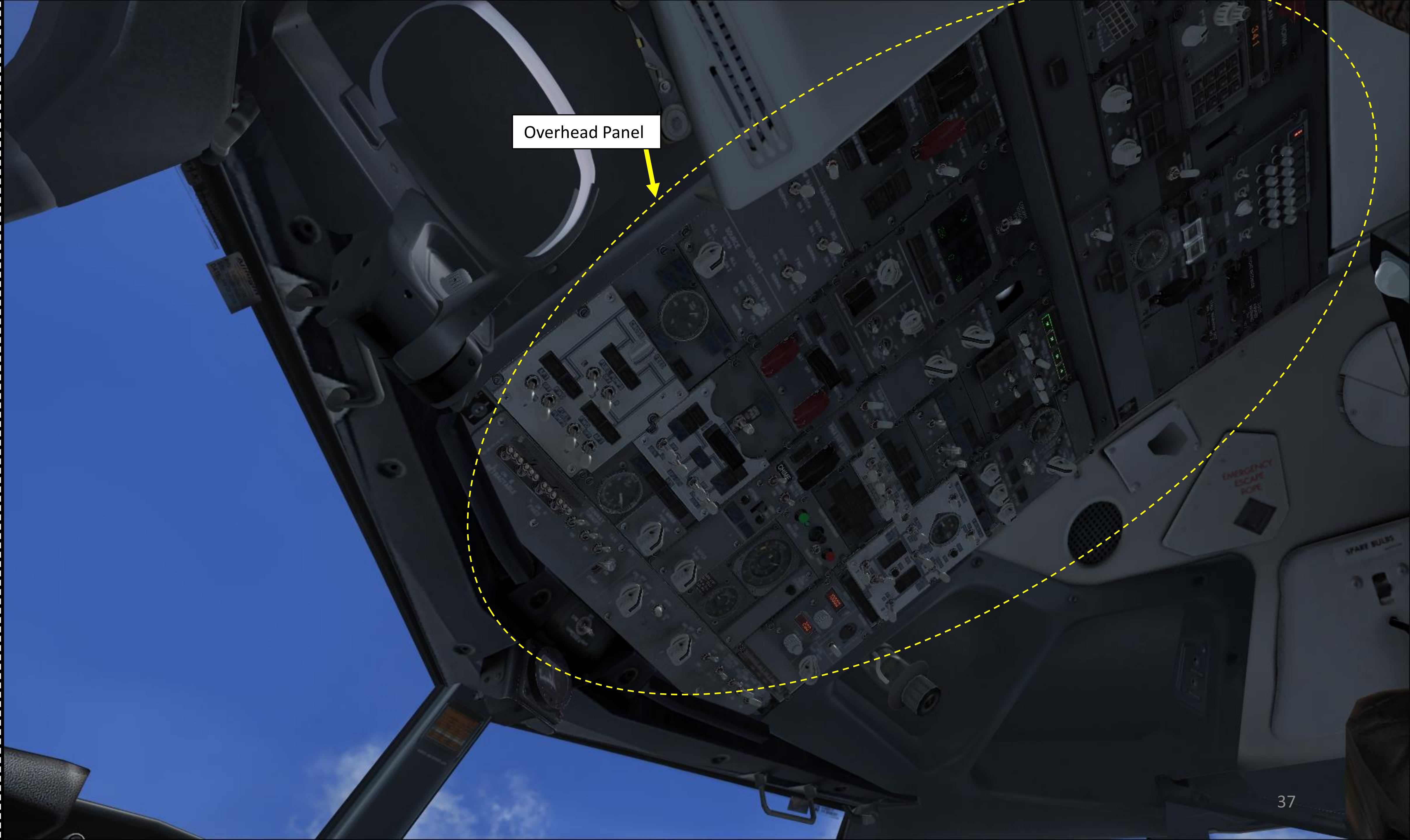

OVHT DET (Overheat Detection) Switch
Selects Detection Loop A, B or Both (Normal)
Landing Gear Wheel Well Fire Light
Engine Overheat Detection Light
Test Switch
Fault/INOP
FIRE/OVERHEAT
Engine Fire Extinguisher Bottle Discharger
Engine Fire Detection Fault Light
APU Fire Extinguisher Bottle Discharge Light
APU Fire Detection Fault Light
APU Fire Extinguisher Bottle Discharger
Engine Overheat Detection Light
Engine Fire Extinguisher Bottle Discharger
OVHT DET (Overheat Detection) Switch
Selects Detection Loop A, B or Both (Normal)
Fire Ext. Bell Cutout Switch
Left & Right Engine Fire Extinguisher Bottle Discharge Light
APU & Engine Fire Extinguisher Bottle Test switch
APU & Engine Fire Extinguisher Bottle Test Light



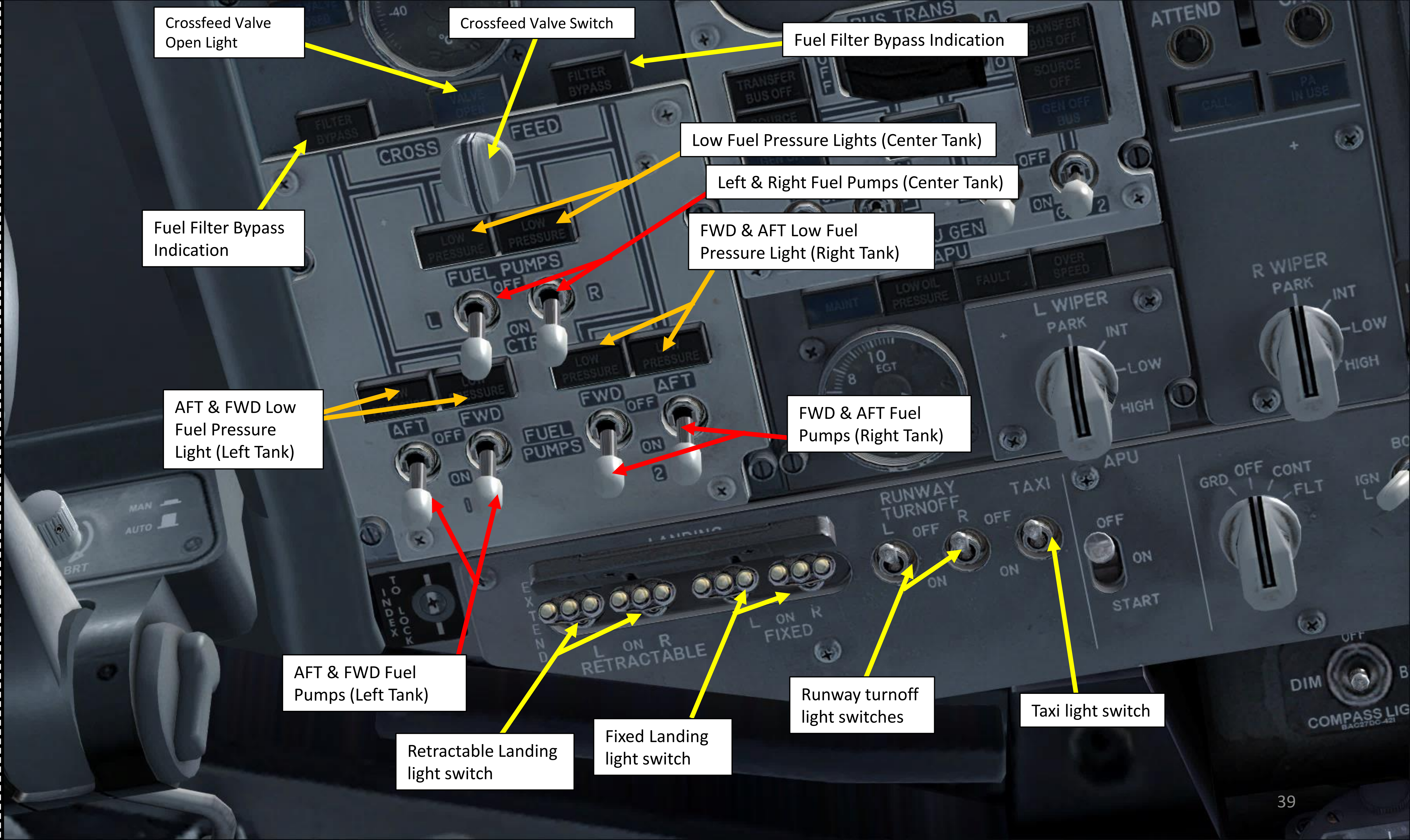
Note: we will not go into much detail for the radio and audio control panels since communication features are out of the simulation's scope. However, if you are interested in knowing more about it, please consult the following presentation: https://fr.slideshare.net/theoryce/b737-ng-communications

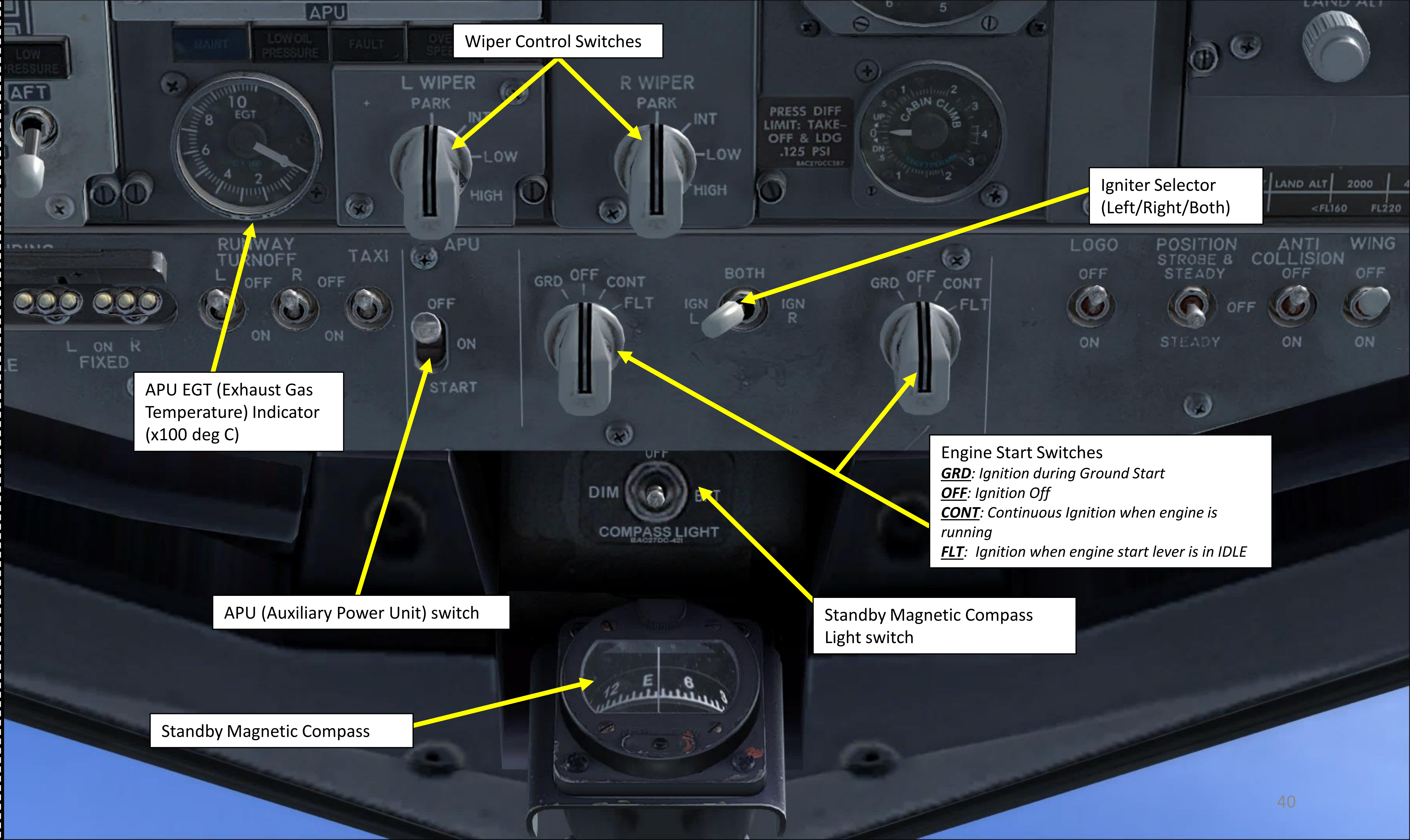

HGS Mode button
PRI: PFD representation on HUD
AIII: View for low visibility precision manual approach
IMC: Decluttered view for instrument approach
VMC: Decluttered view for visual approach
HGS Standby button
Selected mode when "Mode" button is pressed once
HGS Runway button
HGS Glide Slope button
HGS (Heads-Up Guidance System) keypad
HGS (Heads-Up Guidance System) brightness buttons
ADF (Automated Direction Finding) Control Panel
ATC (Air Traffic Controller) Transponder Control Panel
SELCAL (Selective-Calling) Radio System Control Buttons

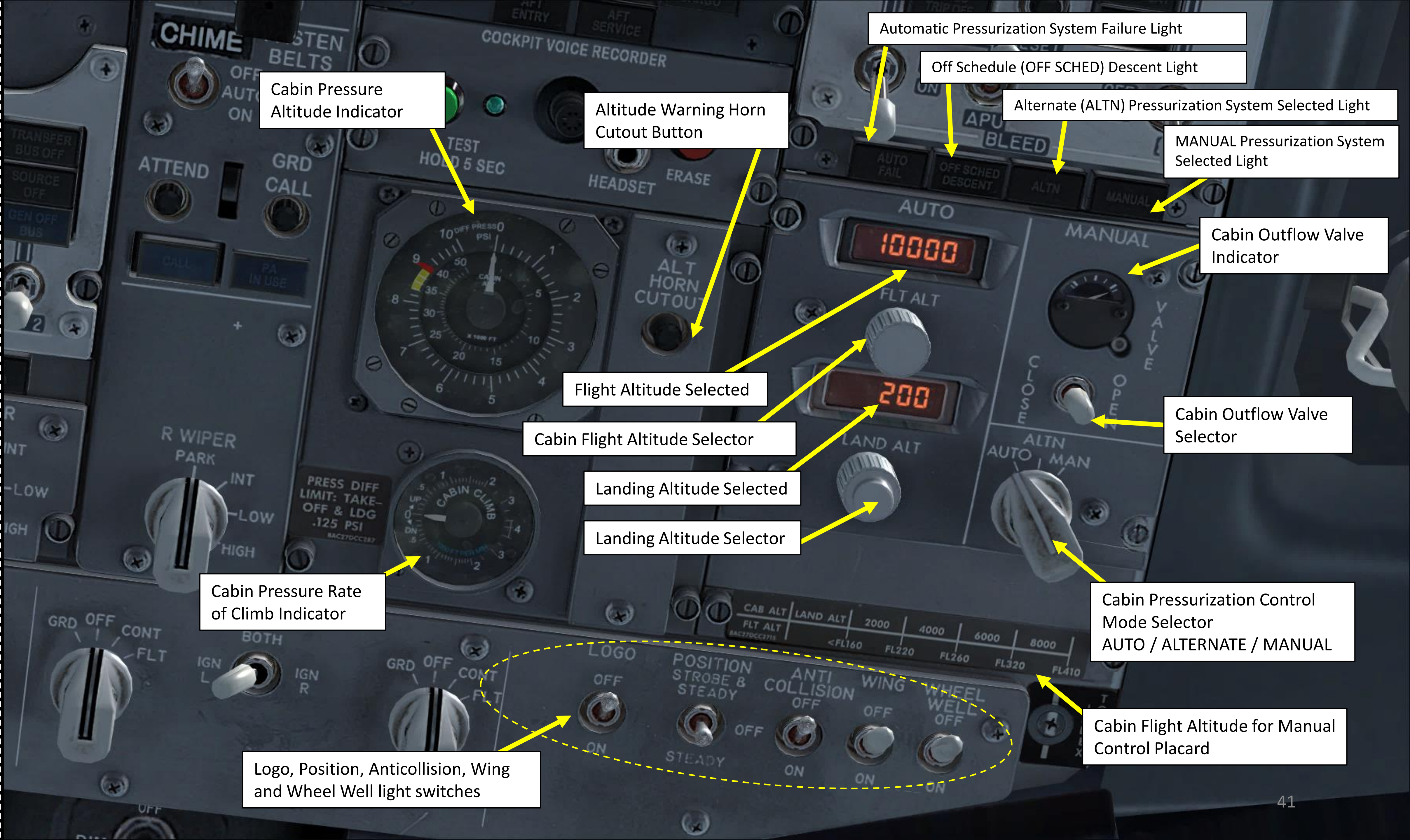

Flight Deck Door Control
UNLKD: Unlocked
AUTO: Locked, can be unlocked
DENY: Locked (Deny Entry)
Rudder Trim Indicator (deg)
Flight Deck Door Lock Fail Light
Flood Lights Brightness Control
Panel Lights Brightness Control
Aileron Trim Controls
Rudder Trim Control
Stabilizer Trim Override
Flight Deck Door Auto Unlock Light

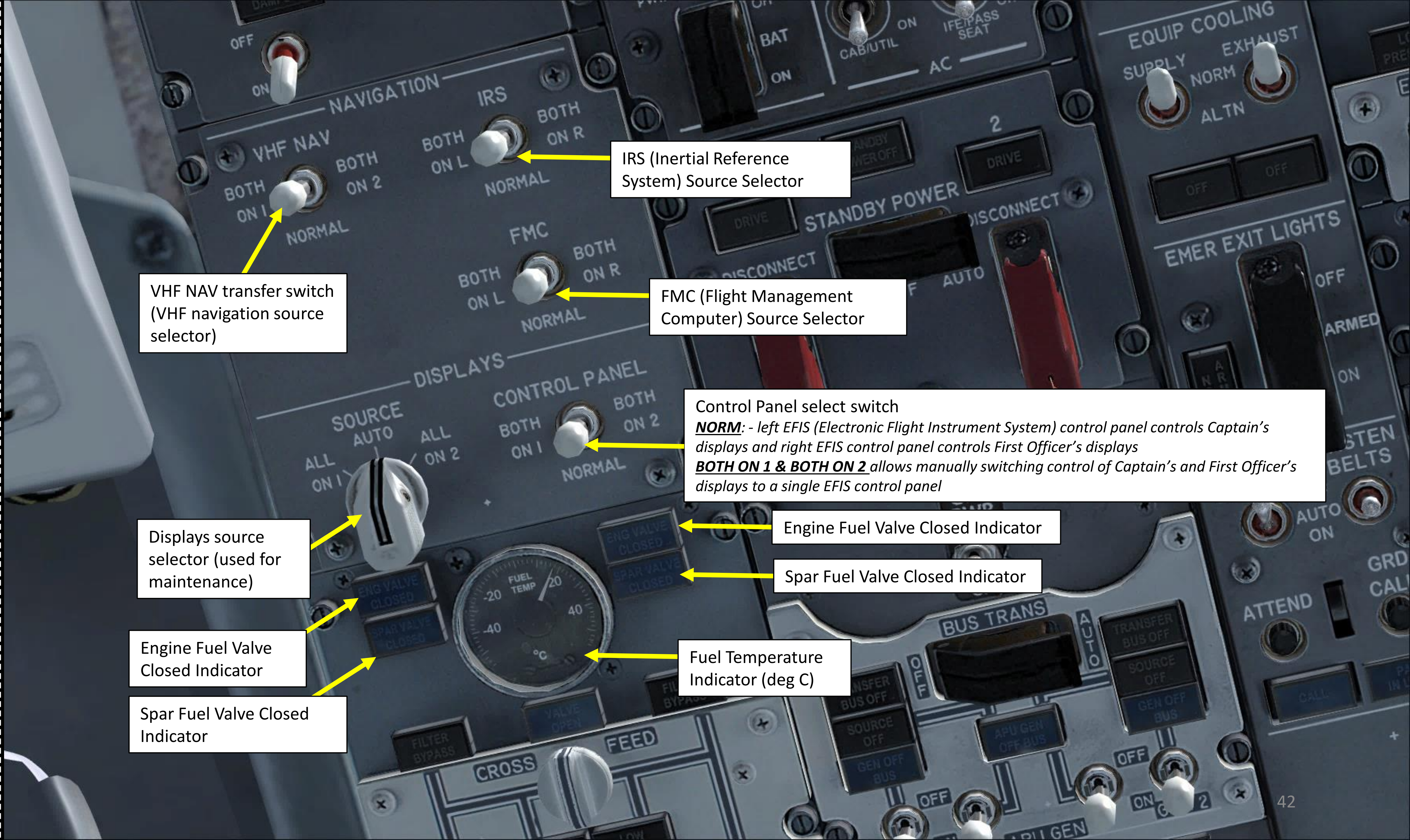

Overhead Panel

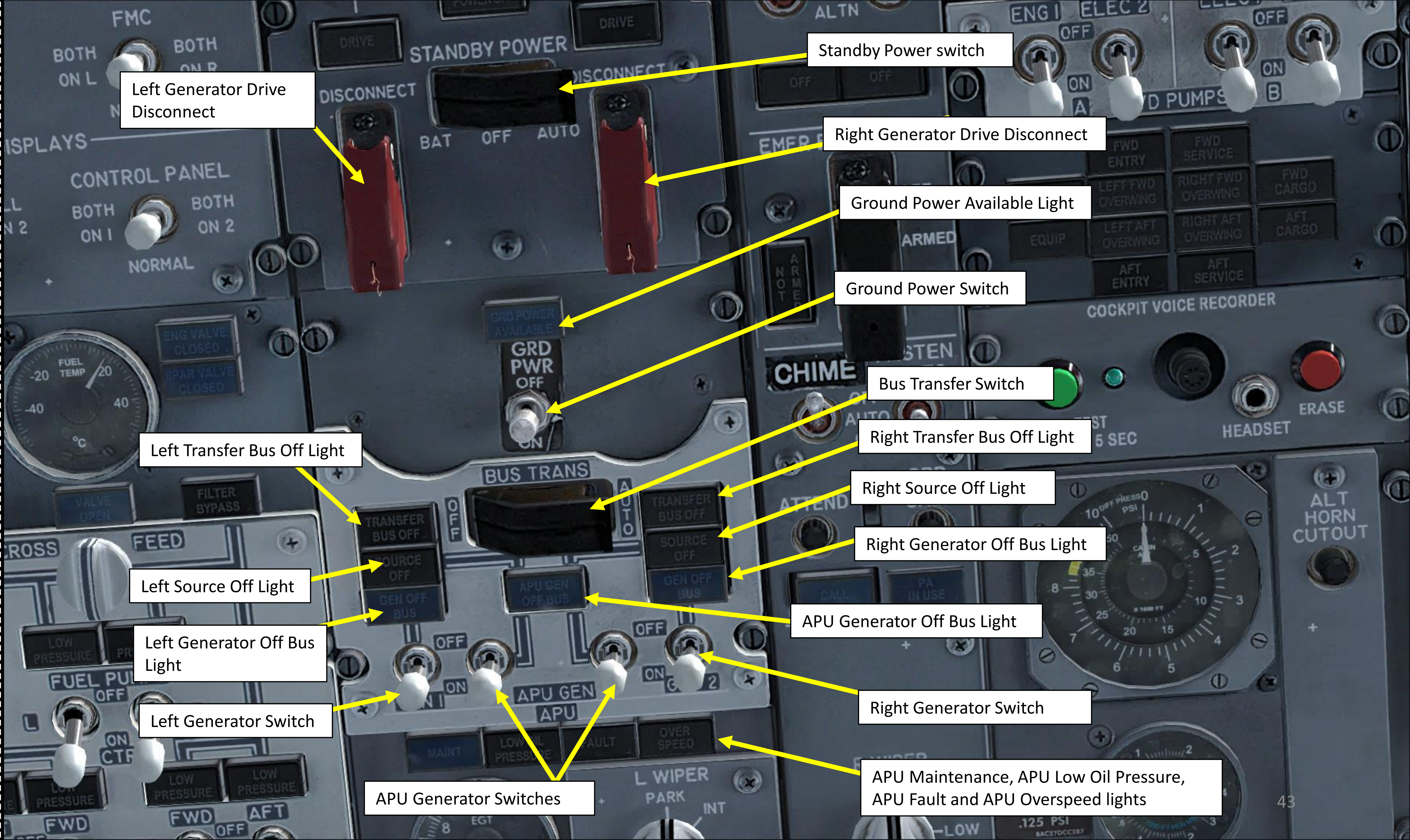

Flight Controls Control Panel
Navigation Control Panel
Displays Control Panel
Fuel Control Panel
Electrical Panel
APU Panel
Miscellaneous Panel
Air Systems Panel
Hydraulics Control Panel
Cockpit Pressurization Panel
Lights Panel
APU & Engine Ignition Panel
Lights Panel

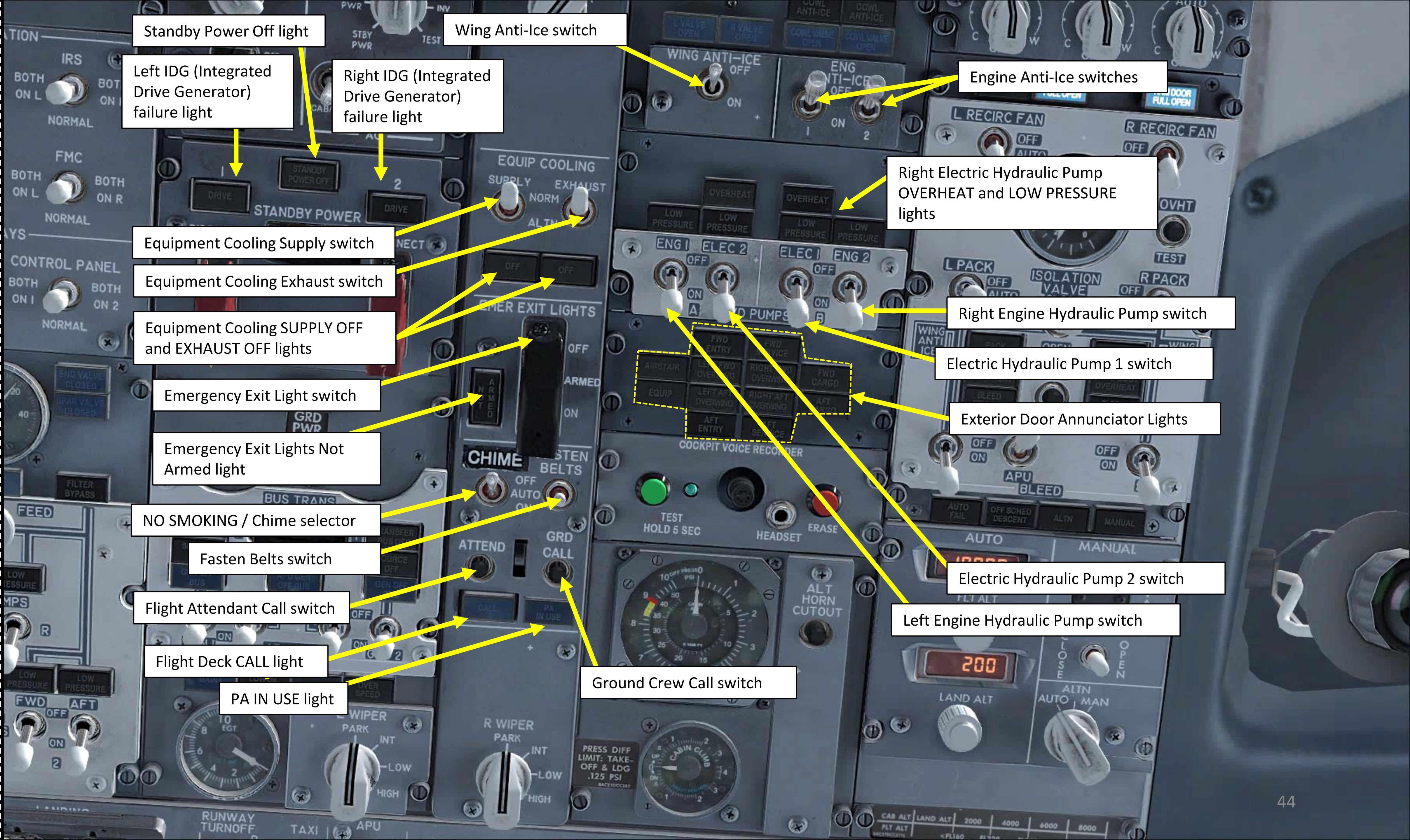

Crossfeed Valve Open Light
Crossfeed Valve Switch
Fuel Filter Bypass Indication
Low Fuel Pressure Lights (Center Tank)
Left & Right Fuel Pumps (Center Tank)
Fuel Filter Bypass Indication
FWD & AFT Low Fuel Pressure Light (Right Tank)
AFT & FWD Low Fuel Pressure Light (Left Tank)
FWD & AFT Fuel Pumps (Right Tank)
AFT & FWD Fuel Pumps (Left Tank)
Retractable Landing light switch
Fixed Landing light switch
Runway turnoff light switches
Taxi light switch
CROSS
FEED
FUEL PUMPS
RETRACTABLE
FIXED
RUNWAY TURNOFF
TAXI
L WIPER
R WIPER
ATTEND
COMPASS LIG

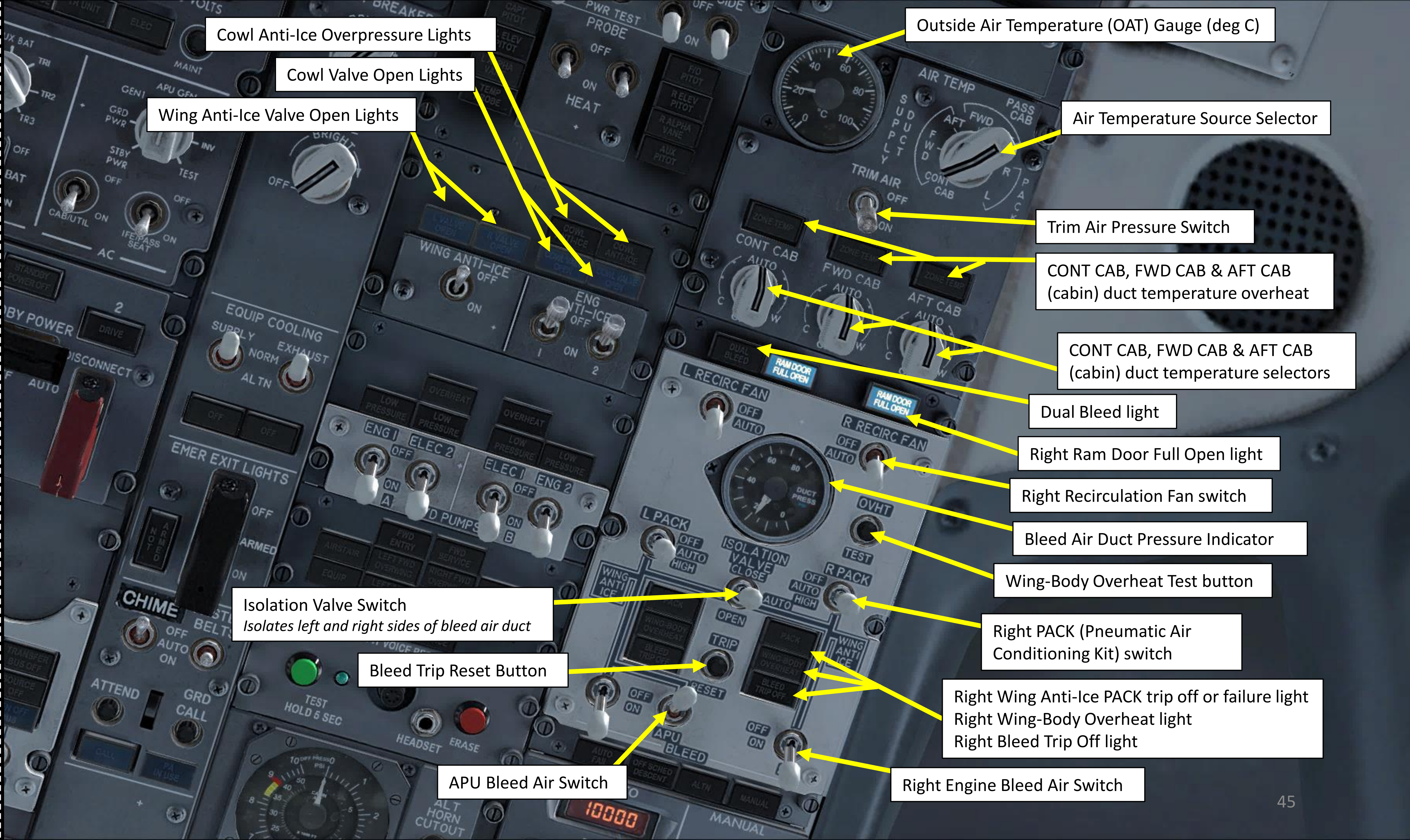

Wiper Control Switches
Igniter Selector (Left/Right/Both)
APU EGT (Exhaust Gas Temperature) Indicator (x100 deg C)
Engine Start Switches
GRD: *Ignition during Ground Start*
OFF: *Ignition Off*
CONT: *Continuous Ignition when engine is running*
FLT: *Ignition when engine start lever is in IDLE*
APU (Auxiliary Power Unit) switch
Standby Magnetic Compass Light switch
Standby Magnetic Compass

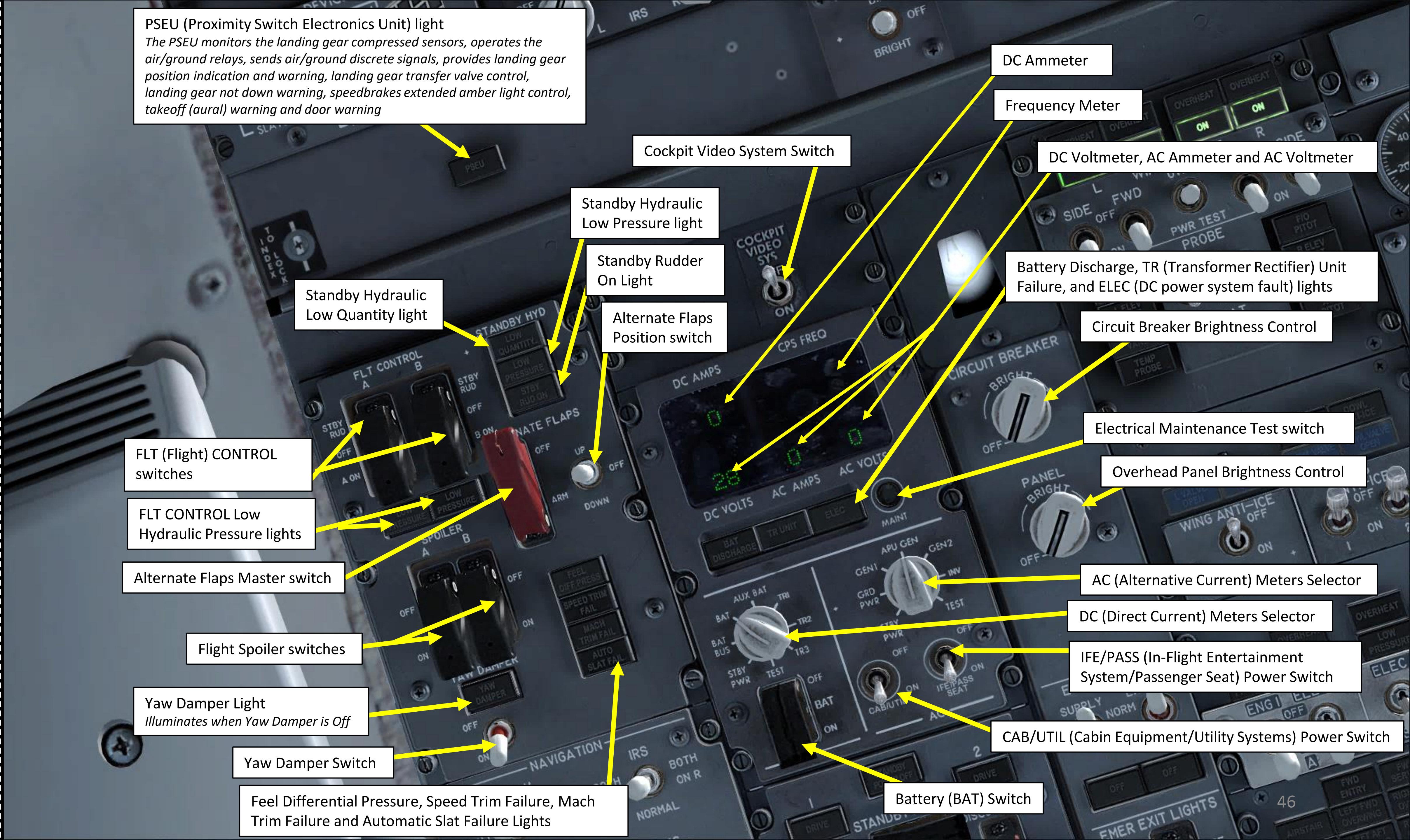

Cabin Pressure Altitude Indicator
Altitude Warning Horn Cutout Button
Automatic Pressurization System Failure Light
Off Schedule (OFF SCHED) Descent Light
Alternate (ALTN) Pressurization System Selected Light
MANUAL Pressurization System Selected Light
Cabin Outflow Valve Indicator
Flight Altitude Selected
Cabin Flight Altitude Selector
Landing Altitude Selected
Landing Altitude Selector
Cabin Outflow Valve Selector
Cabin Pressure Rate of Climb Indicator
Cabin Pressurization Control Mode Selector AUTO / ALTERNATE / MANUAL
Cabin Flight Altitude for Manual Control Placard
Logo, Position, Anticollision, Wing and Wheel Well light switches

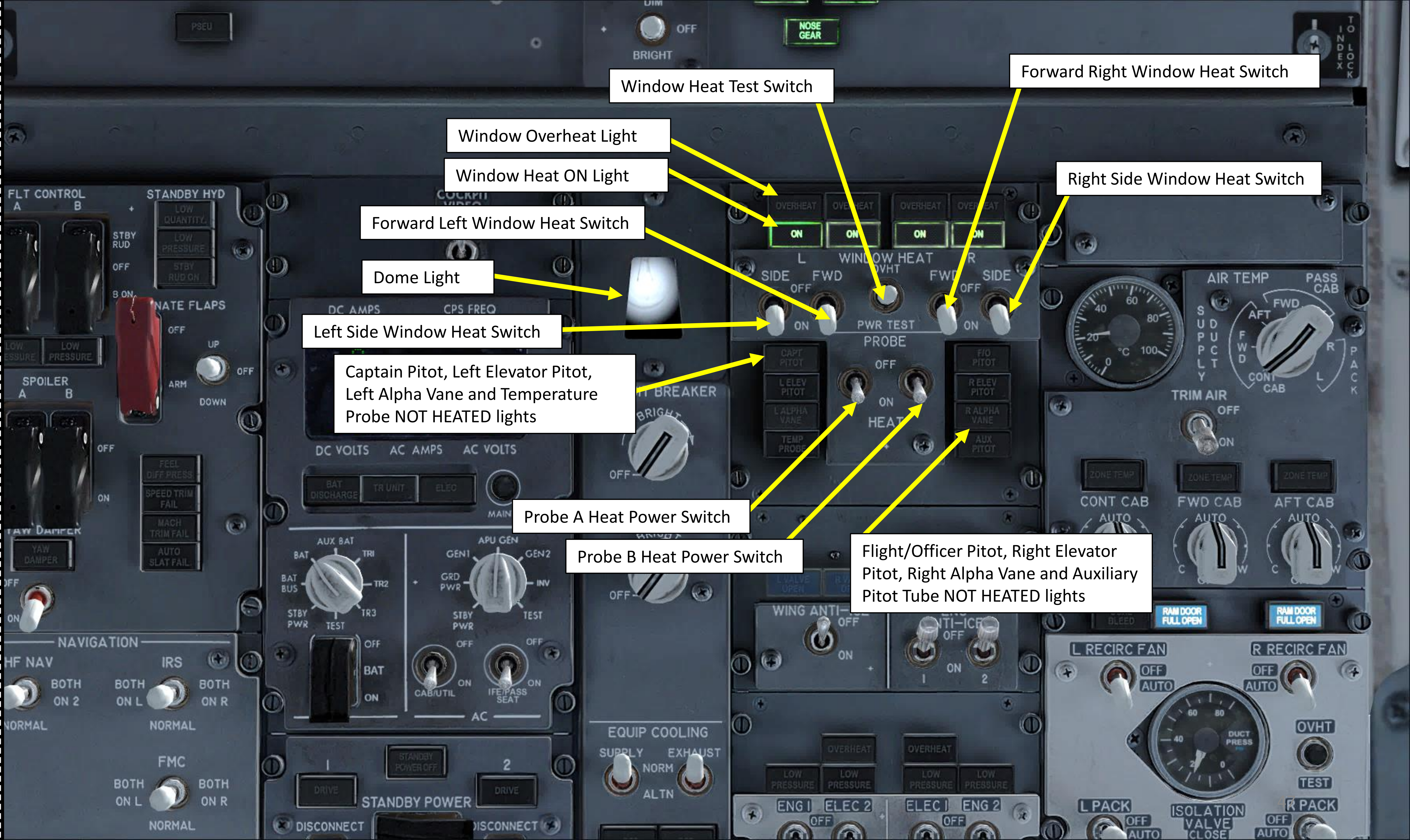

IRS (Inertial Reference System) Source Selector
VHF NAV transfer switch (VHF navigation source selector)
FMC (Flight Management Computer) Source Selector
Control Panel select switch
NORM: - left EFIS (Electronic Flight Instrument System) control panel controls Captain’s displays and right EFIS control panel controls First Officer’s displays
BOTH ON 1 & BOTH ON 2 allows manually switching control of Captain’s and First Officer’s displays to a single EFIS control panel
Engine Fuel Valve Closed Indicator
Spar Fuel Valve Closed Indicator
Displays source selector (used for maintenance)
Engine Fuel Valve Closed Indicator
Fuel Temperature Indicator (deg C)
Spar Fuel Valve Closed Indicator

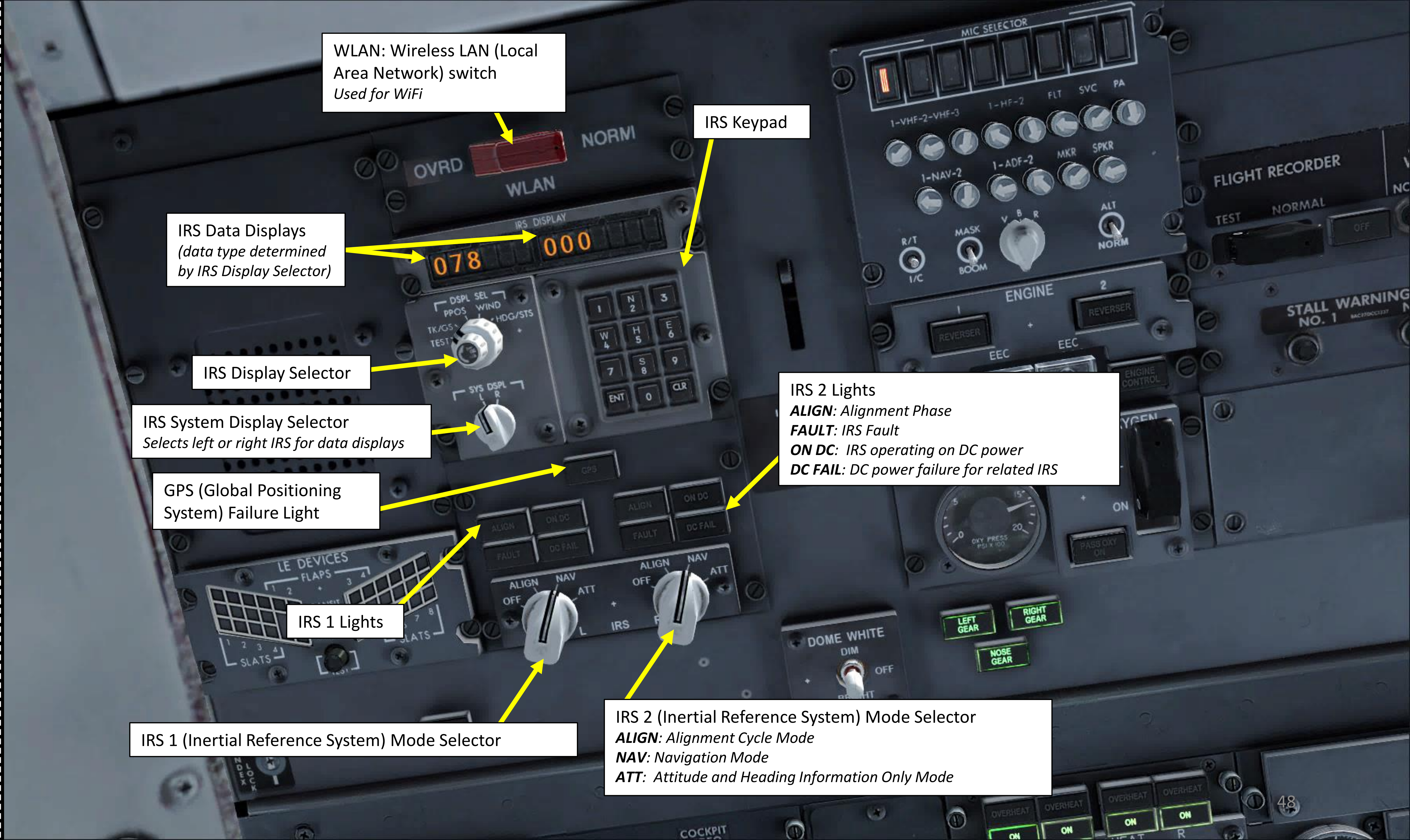

Standby Power switch
Left Generator Drive Disconnect
Right Generator Drive Disconnect
Ground Power Available Light
Ground Power Switch
Bus Transfer Switch
Left Transfer Bus Off Light
Right Transfer Bus Off Light
Right Source Off Light
Right Generator Off Bus Light
Left Source Off Light
APU Generator Off Bus Light
Left Generator Off Bus Light
Right Generator Switch
Left Generator Switch
APU Maintenance, APU Low Oil Pressure, APU Fault and APU Overspeed lights
APU Generator Switches

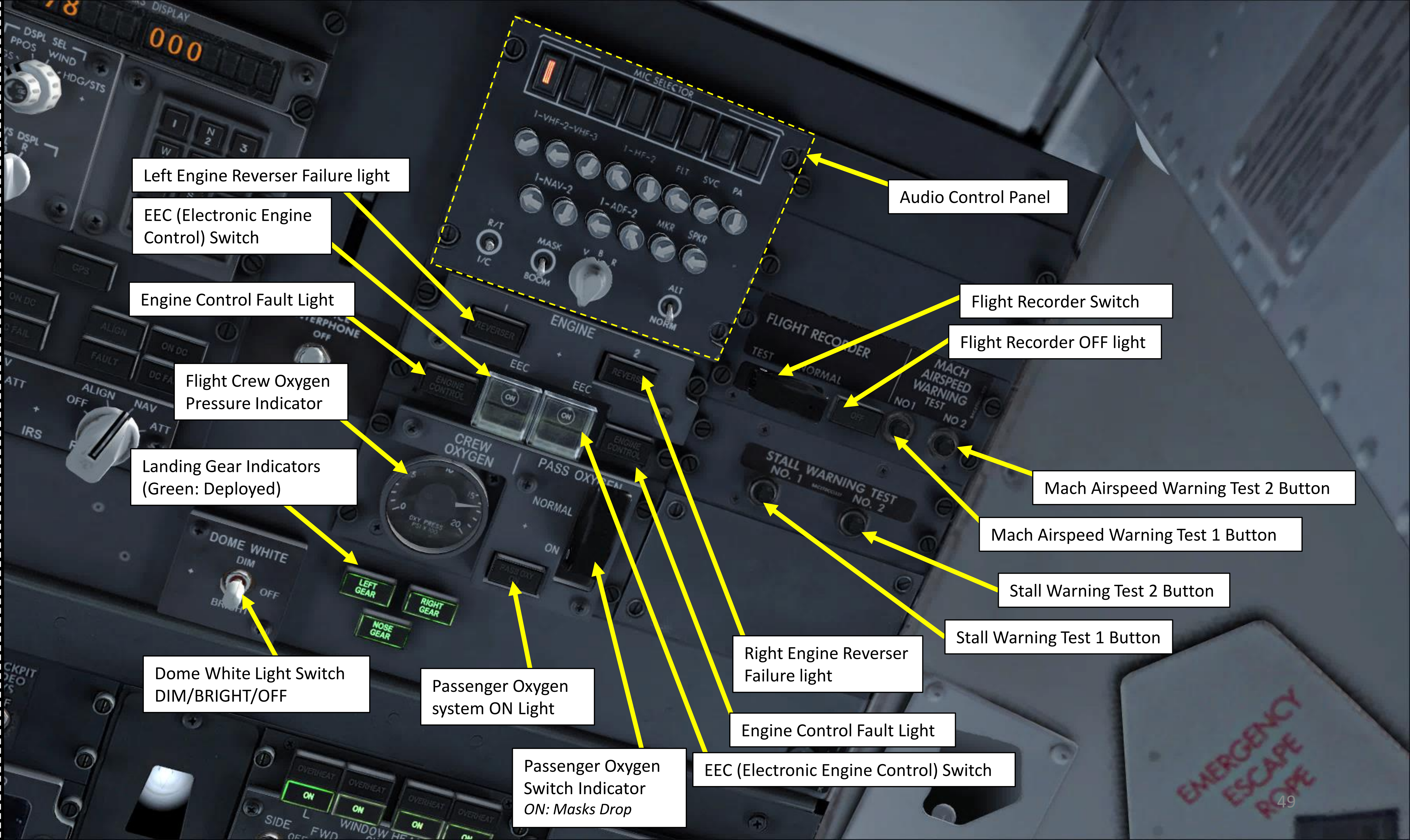

Standby Power Off light
Wing Anti-Ice switch
Left IDG (Integrated Drive Generator) failure light
Right IDG (Integrated Drive Generator) failure light
Engine Anti-Ice switches
Right Electric Hydraulic Pump OVERHEAT and LOW PRESSURE lights
Equipment Cooling Supply switch
Equipment Cooling Exhaust switch
Equipment Cooling SUPPLY OFF and EXHAUST OFF lights
Right Engine Hydraulic Pump switch
Electric Hydraulic Pump 1 switch
Emergency Exit Light switch
Exterior Door Annunciator Lights
Emergency Exit Lights Not Armed light
NO SMOKING / Chime selector
Fasten Belts switch
Electric Hydraulic Pump 2 switch
Flight Attendant Call switch
Left Engine Hydraulic Pump switch
Flight Deck CALL light
Ground Crew Call switch
PA IN USE light

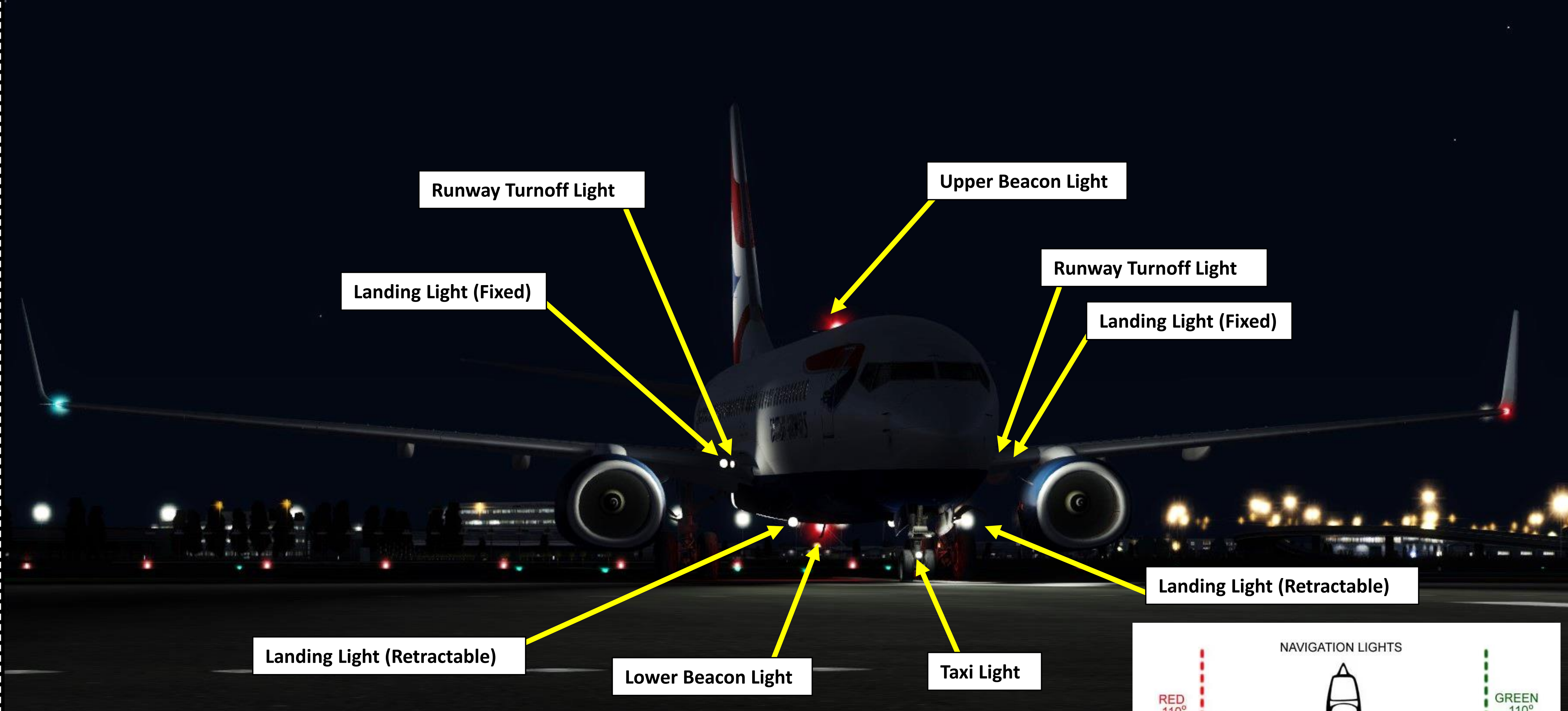

Cowl Anti-Ice Overpressure Lights
Cowl Valve Open Lights
Wing Anti-Ice Valve Open Lights
Outside Air Temperature (OAT) Gauge (deg C)
Air Temperature Source Selector
Trim Air Pressure Switch
CONT CAB, FWD CAB & AFT CAB (cabin) duct temperature overheat
CONT CAB, FWD CAB & AFT CAB (cabin) duct temperature selectors
Dual Bleed light
Right Ram Door Full Open light
Right Recirculation Fan switch
Bleed Air Duct Pressure Indicator
Wing-Body Overheat Test button
Isolation Valve Switch
Isolates left and right sides of bleed air duct
Right PACK (Pneumatic Air Conditioning Kit) switch
Bleed Trip Reset Button
Right Wing Anti-Ice PACK trip off or failure light
Right Wing-Body Overheat light
Right Bleed Trip Off light
APU Bleed Air Switch
Right Engine Bleed Air Switch


PSEU (Proximity Switch Electronics Unit) light
The PSEU monitors the landing gear compressed sensors, operates the air/ground relays, sends air/ground discrete signals, provides landing gear position indication and warning, landing gear transfer valve control, landing gear not down warning, speedbrakes extended amber light control, takeoff (aural) warning and door warning
Cockpit Video System Switch
DC Ammeter
Frequency Meter
DC Voltmeter, AC Ammeter and AC Voltmeter
Standby Hydraulic Low Pressure light
Standby Rudder On Light
Standby Hydraulic Low Quantity light
Alternate Flaps Position switch
Battery Discharge, TR (Transformer Rectifier) Unit Failure, and ELEC (DC power system fault) lights
Circuit Breaker Brightness Control
Electrical Maintenance Test switch
Overhead Panel Brightness Control
FLT (Flight) CONTROL switches
FLT CONTROL Low Hydraulic Pressure lights
Alternate Flaps Master switch
AC (Alternative Current) Meters Selector
DC (Direct Current) Meters Selector
Flight Spoiler switches
IFE/PASS (In-Flight Entertainment System/Passenger Seat) Power Switch
Yaw Damper Light
Illuminates when Yaw Damper is Off
CAB/UTIL (Cabin Equipment/Utility Systems) Power Switch
Yaw Damper Switch
Feel Differential Pressure, Speed Trim Failure, Mach Trim Failure and Automatic Slat Failure Lights
Battery (BAT) Switch

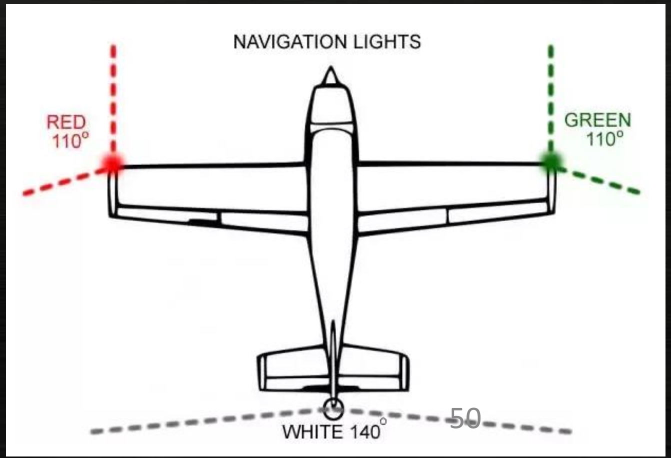

Window Heat Test Switch
Forward Right Window Heat Switch
Window Overheat Light
Window Heat ON Light
Right Side Window Heat Switch
Forward Left Window Heat Switch
Dome Light
Left Side Window Heat Switch
Captain Pitot, Left Elevator Pitot, Left Alpha Vane and Temperature Probe NOT HEATED lights
Probe A Heat Power Switch
Probe B Heat Power Switch
Flight/Officer Pitot, Right Elevator Pitot, Right Alpha Vane and Auxiliary Pitot Tube NOT HEATED lights

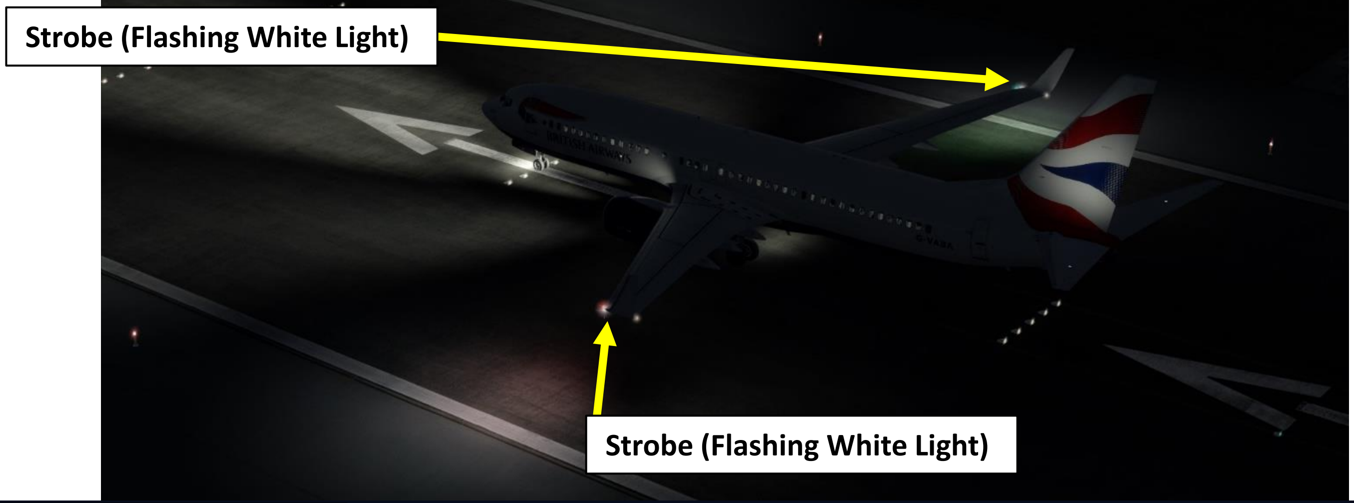

WLAN: Wireless LAN (Local Area Network) switch
Used for WiFi
OVRD
NORM
WLAN
IRS Keypad
IRS Data Displays
(data type determined by IRS Display Selector)
IRS DISPLAY
078
000
IRS Display Selector
DSPL SEL
PPOS
WIND
HDG/STS
TK/GS
TEST
SYS DSPL
IRS System Display Selector
Selects left or right IRS for data displays
GPS
GPS (Global Positioning System) Failure Light
IRS 2 Lights
ALIGN: *Alignment Phase*
FAULT: *IRS Fault*
ON DC: *IRS operating on DC power*
DC FAIL: *DC power failure for related IRS*
ALIGN
ON DC
FAULT
DC FAIL
OFF
NAV
ATT
IRS
IRS 1 Lights
IRS 1 (Inertial Reference System) Mode Selector
IRS 2 (Inertial Reference System) Mode Selector
ALIGN: *Alignment Cycle Mode*
NAV: *Navigation Mode*
ATT: *Attitude and Heading Information Only Mode*
MIC SELECTOR
1-VHF-2-VHF-3
1-HF-2
FLT
SVC
PA
1-NAV-2
1-ADF-2
MKR
SPKR
R/T
I/C
MASK
BOOM
ALT
NORM
FLIGHT RECORDER
TEST
NORMAL
ENGINE
REVERSER
EEC
STALL WARNING NO. 1
LE DEVICES
FLAPS
SLATS
DOME WHITE
DIM
OFF
LEFT GEAR
RIGHT GEAR
NOSE GEAR
OXY PRESS
PASS OXY ON
OVERHEAT
ON
COCKPIT


Left Engine Reverser Failure light
EEC (Electronic Engine Control) Switch
Engine Control Fault Light
Flight Crew Oxygen Pressure Indicator
Landing Gear Indicators (Green: Deployed)
Dome White Light Switch DIM/BRIGHT/OFF
Passenger Oxygen system ON Light
Passenger Oxygen Switch Indicator
ON: Masks Drop
Audio Control Panel
Flight Recorder Switch
Flight Recorder OFF light
Mach Airspeed Warning Test 2 Button
Mach Airspeed Warning Test 1 Button
Stall Warning Test 2 Button
Stall Warning Test 1 Button
Right Engine Reverser Failure light
Engine Control Fault Light
EEC (Electronic Engine Control) Switch

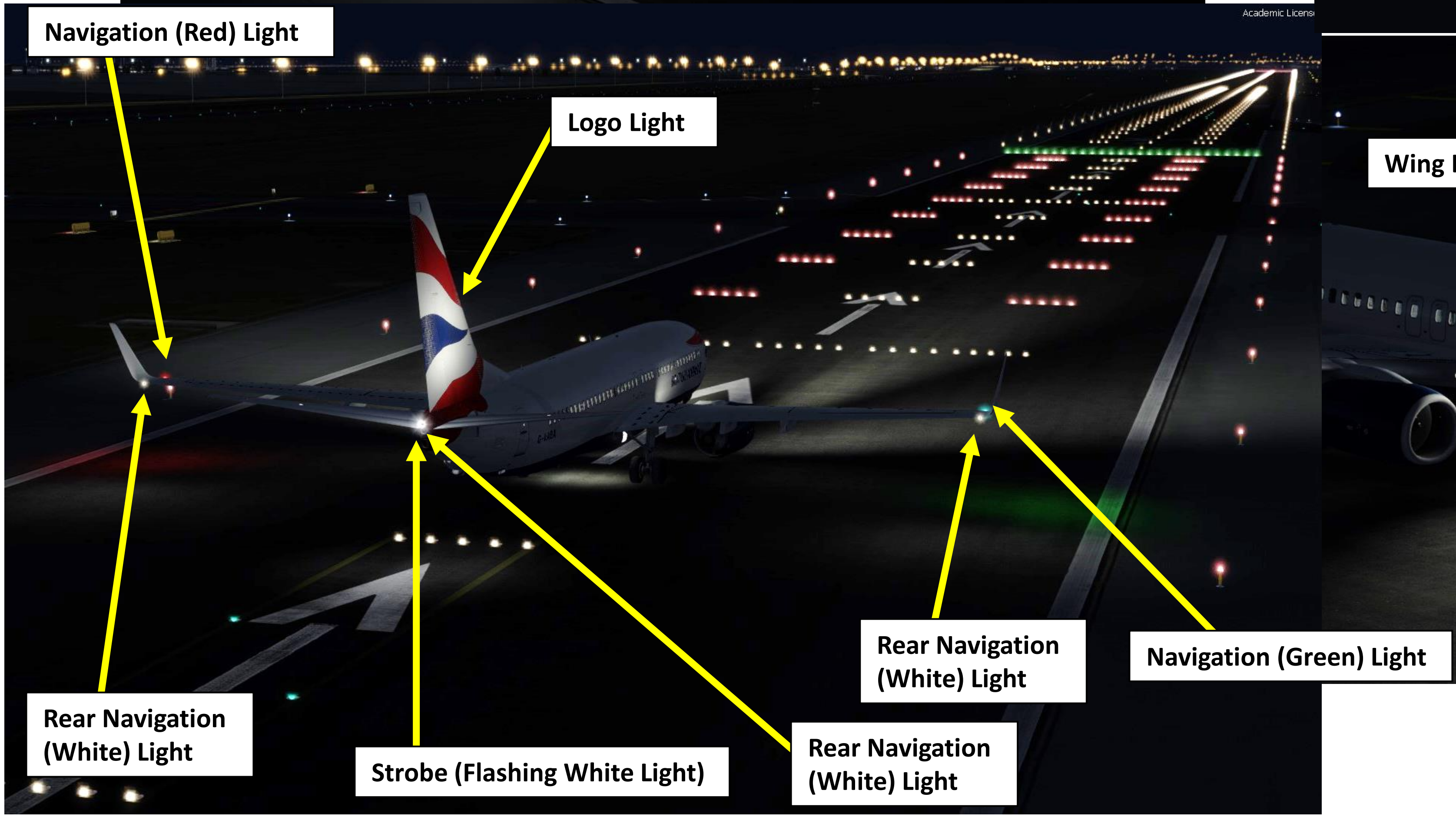


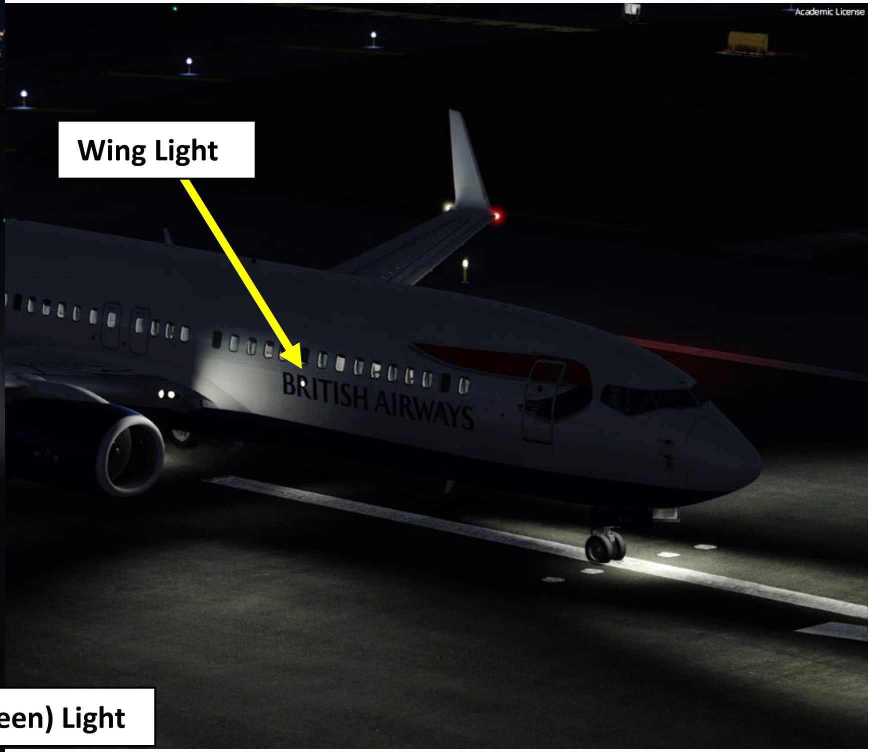
- **Landing** Lights: used to illuminate runway during landing
- **Runway Turnoff** Lights: used to aid the crew in seeing the turn in the taxiway/runway
- **Taxi** Lights: used to illuminate area in front of nosewheel during taxi
- **Beacon (Anti-Collision)** Lights: flashing red light used to prevent 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** 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




Strobe (Flashing White Light)
Strobe (Flashing White Light)


Wheel Well Light


Navigation (Red) Light
Logo Light
Rear Navigation (White) Light
Strobe (Flashing White Light)
Rear Navigation (White) Light
Rear Navigation (White) Light
Navigation (Green) Light


Wing Light
BRITISH AIRWAYS

PLANNING THE FLIGHT

In real life, you cannot just fly a 737 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 Boeing 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:

EHAM *SID* **GORLO** *UL980* **XAMAN** *L980* **LOGAN** *STAR* **EGLL**

Provided by RouteFinder

METAR:

Departure: EHAM 290225Z 15002KT 7000 MIFG NSC 16/15 Q1014 NOSIG
Destination: EGLL 290250Z AUTO 16002KT 9999 NCD 17/15 Q1015 NOSIG

Provided by AVIATION WEATHER CENTER

Fuel quantity for Boeing 737-800 (iFly/PMDG)

	Fuel	Time
Fuel Usage	2051 kgs	00:52
Reserve Fuel	2955 kgs	01:15
Fuel on Board	5007 kgs	02:07

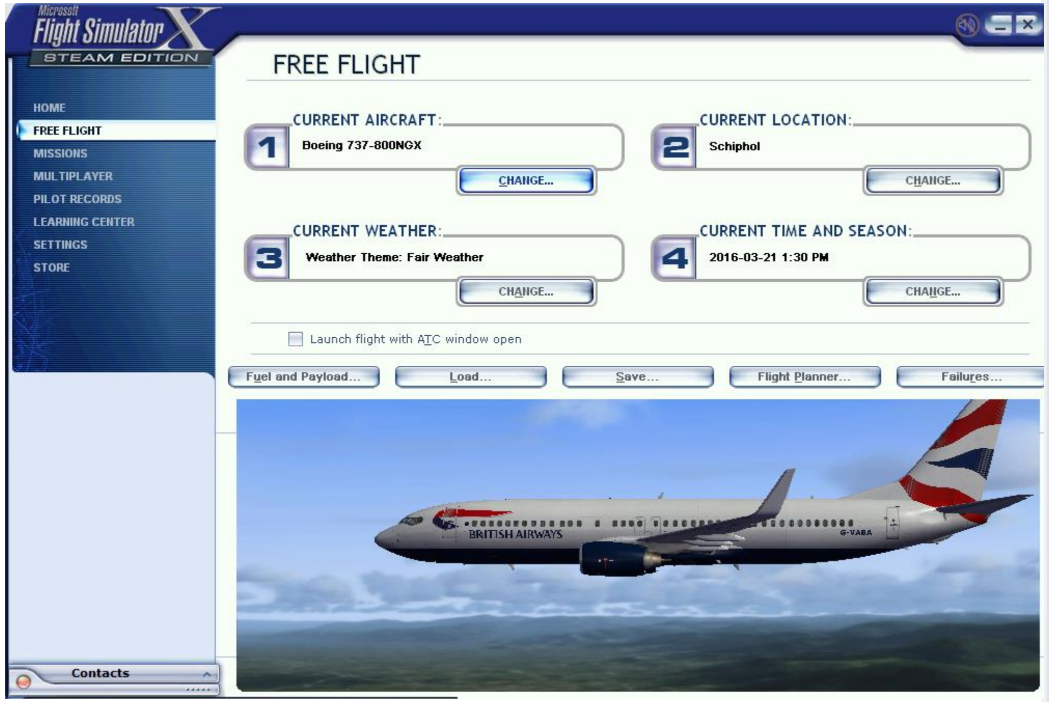
Provided by Fuelplanner.com

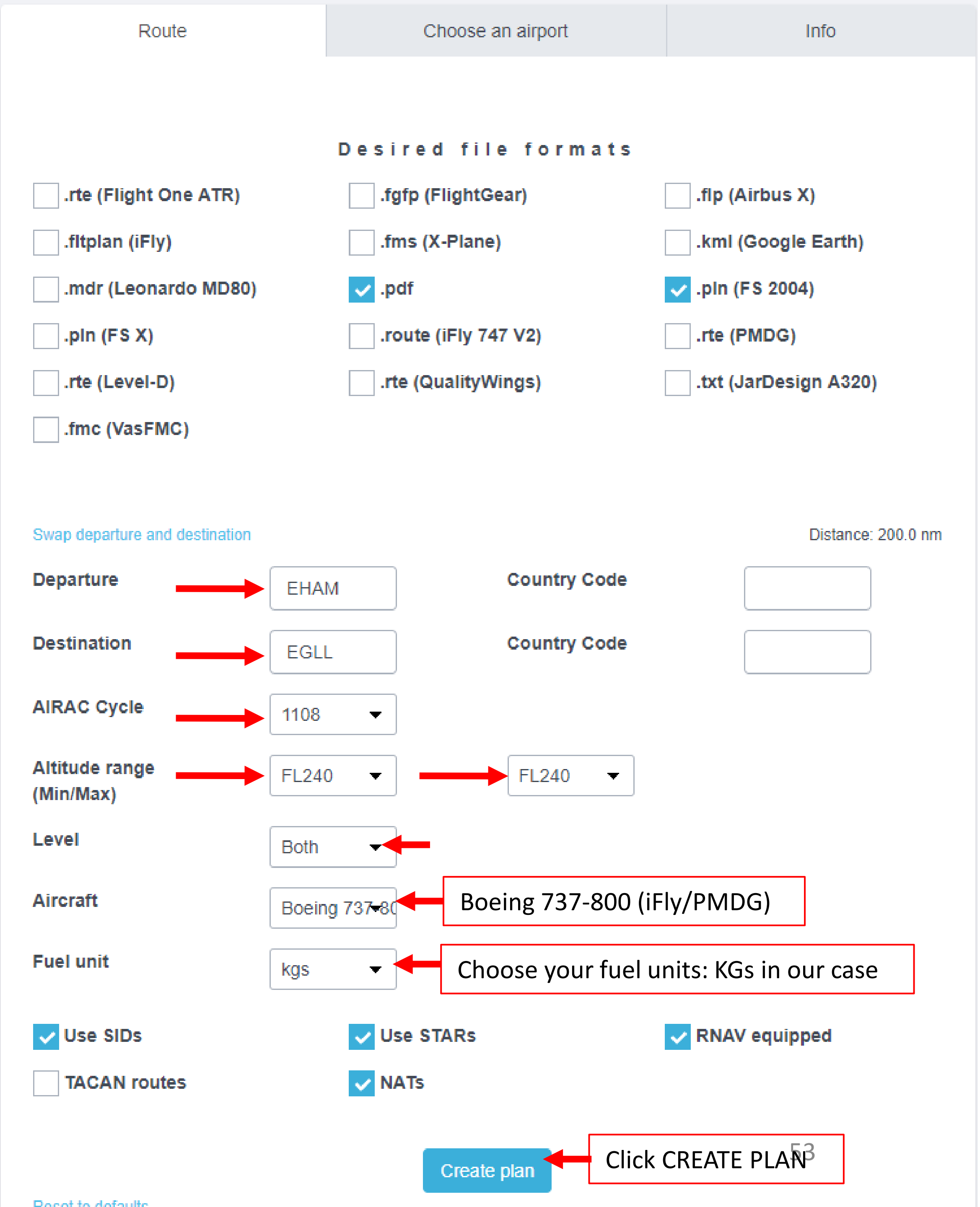
PLANNING THE FLIGHT

Today's flight will start from **AMSTERDAM-SCHIPHOL (EHAM)** and our destination will be **LONDON-HEATHROW (EGLL).**

Using the "Online Flight Planner" available here: http://onlineflightplanner.org/ we will enter the Departure airport (EHAM), the Destination airport (EGLL) and the AIRAC Cycle desired (we will use the **AIRAC cycle 1108** 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 PMDG during early August (period **08**) 20**11** (AIRAC cycle **1108**), 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.)

PLANNING THE FLIGHT

FUEL

For a flight of approx. **200 nm**, fuel planning can be estimated with the following formula:

Imperial Units

Fuel for flight = (Number of 100 nm legs) x (2200 lbs)
= 2 x 2200 lbs = 4400 lbs

Reserve Fuel = 5500 lbs

Total Fuel = Fuel for Flight + Reserve Fuel = 9900 lbs

Metric Units

Fuel for flight = (Number of 100 nm legs) x (1000 kg)
= 2 x 1000 kg = **2000 kg**

Reserve Fuel = **2500 kg**

Total Fuel = Fuel for Flight + Reserve Fuel = **4500 kg**

FLIGHT ROUTE

The flight route we will take is:

EHAM SID **GORLO** UL980 **XAMAN** L980 **LOGAN** STAR **EGLL**

Write this route down.

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

- Depart from Schiphol Airport (EHAM)
- Follow the SID (Standard Instrument Departure) route from EHAM to GORLO
- Navigate to GORLO VOR
- Follow UL980 airway
- Navigate to XAMAN VOR
- Follow L980 airway
- Navigate to LOGAN VOR
- Follow the STAR (Standard Terminal Arrival Route) from LOGAN to EGLL
- Land at Heathrow Airport (EGLL)

Amsterdam Airport Schiphol (EHAM) ⇒ London Heathrow Airport (EGLL)

ID	Frequency	Track	Distance (nm)	Coordinates		Name/Remarks
EHAM	-	0	0	N52°18'29.00"	E004°45'51.00"	AMSTERDAM/SCHIPHOL
GORLO	-	249	63	N51°55'26.64"	E003°10'18.61"	GORLO
REFSO	-	250	20	N51°48'34.44"	E002°40'00.87"	REFSO
XAMAN	-	264	17	N51°47'05.13"	E002°13'27.22"	XAMAN
LOGAN	-	264	23	N51°44'51.00"	E001°36'43.00"	LOGAN
EGLL	-	258	79	N51°28'39.00"	W000°27'41.00"	LONDON HEATHROW

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

6 fixes, 202 nm.

Airways:

EHAM *SID* ***GORLO*** *UL980* ***XAMAN*** *L980* ***LOGAN*** *STAR* ***EGLL***

Provided by RouteFinder

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

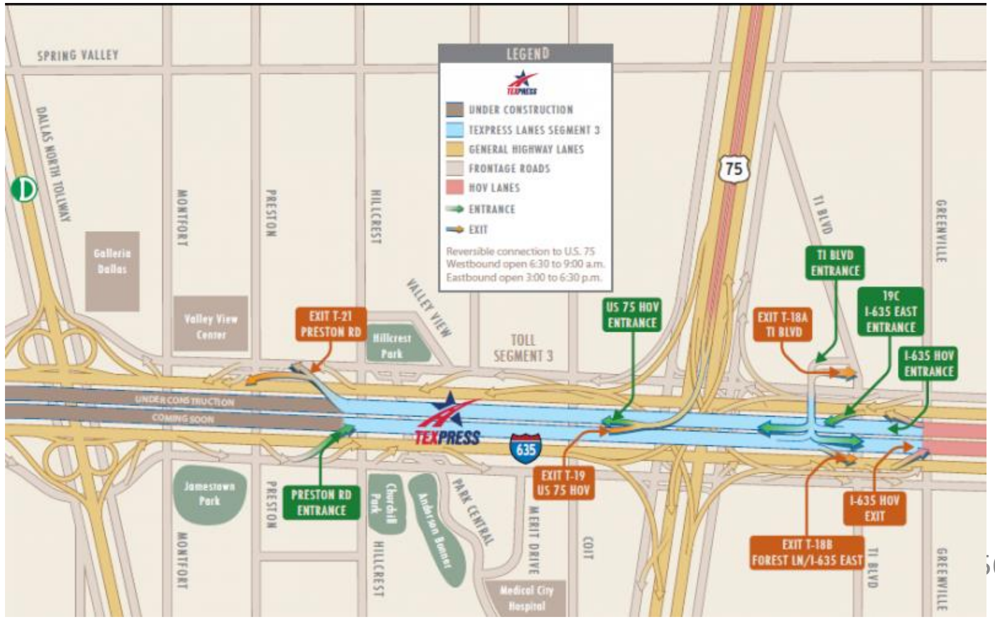
A **SID** (Standard Instrument Departure) is a small initial route which leads an aircraft from the runway they've just taken off from to the first point in his/her intended route. An airport usually has a lot of aircraft departing from it's runways. To save confusion (and for safety), a busy airport 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.

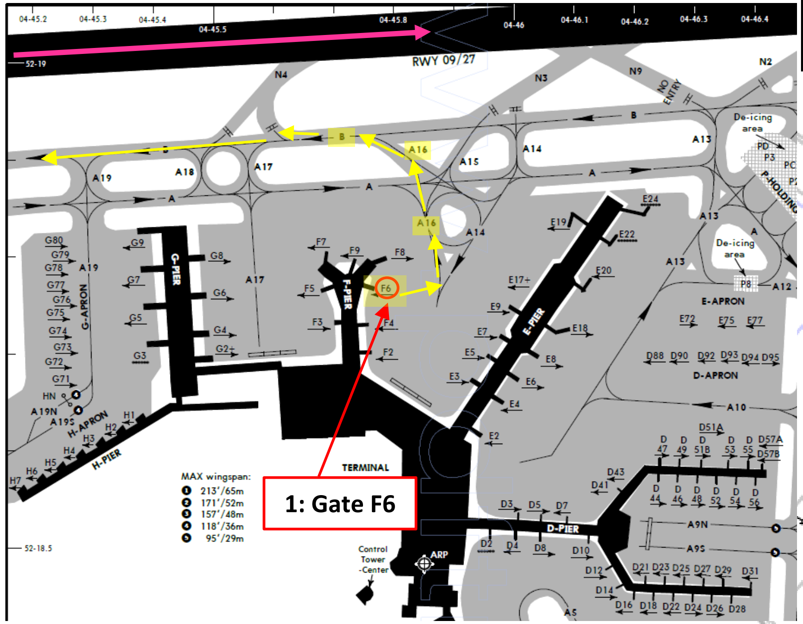
Typically, SIDs and STARs are provided by the ATC (Air Traffic Controller). Since we're doing a tutorial, I will just give you the SID and STAR to plug in the FMC.

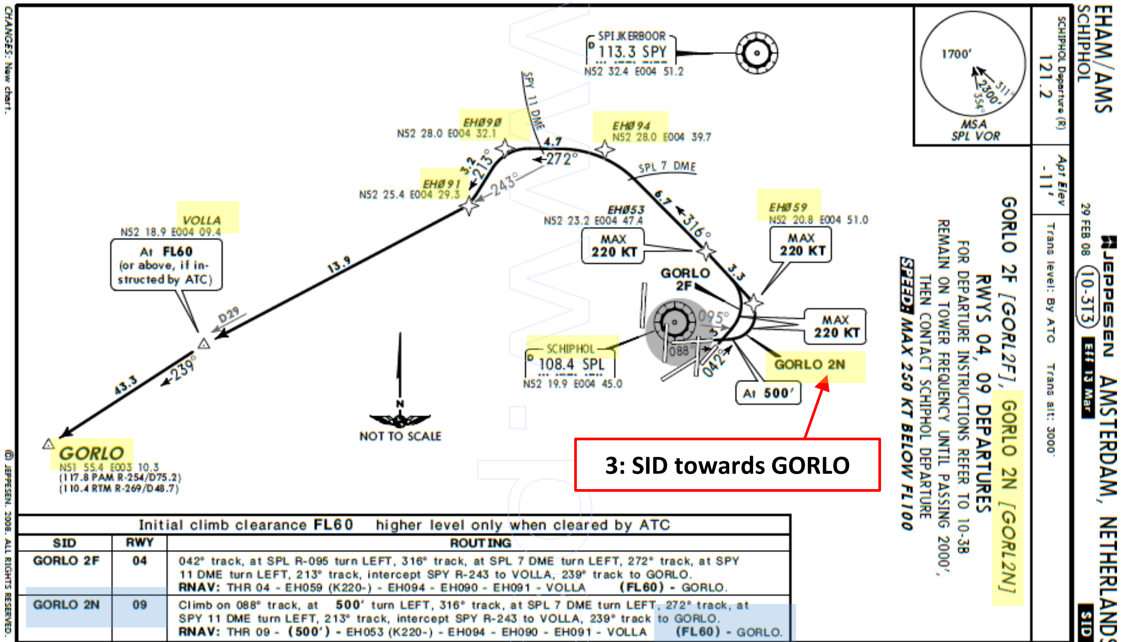


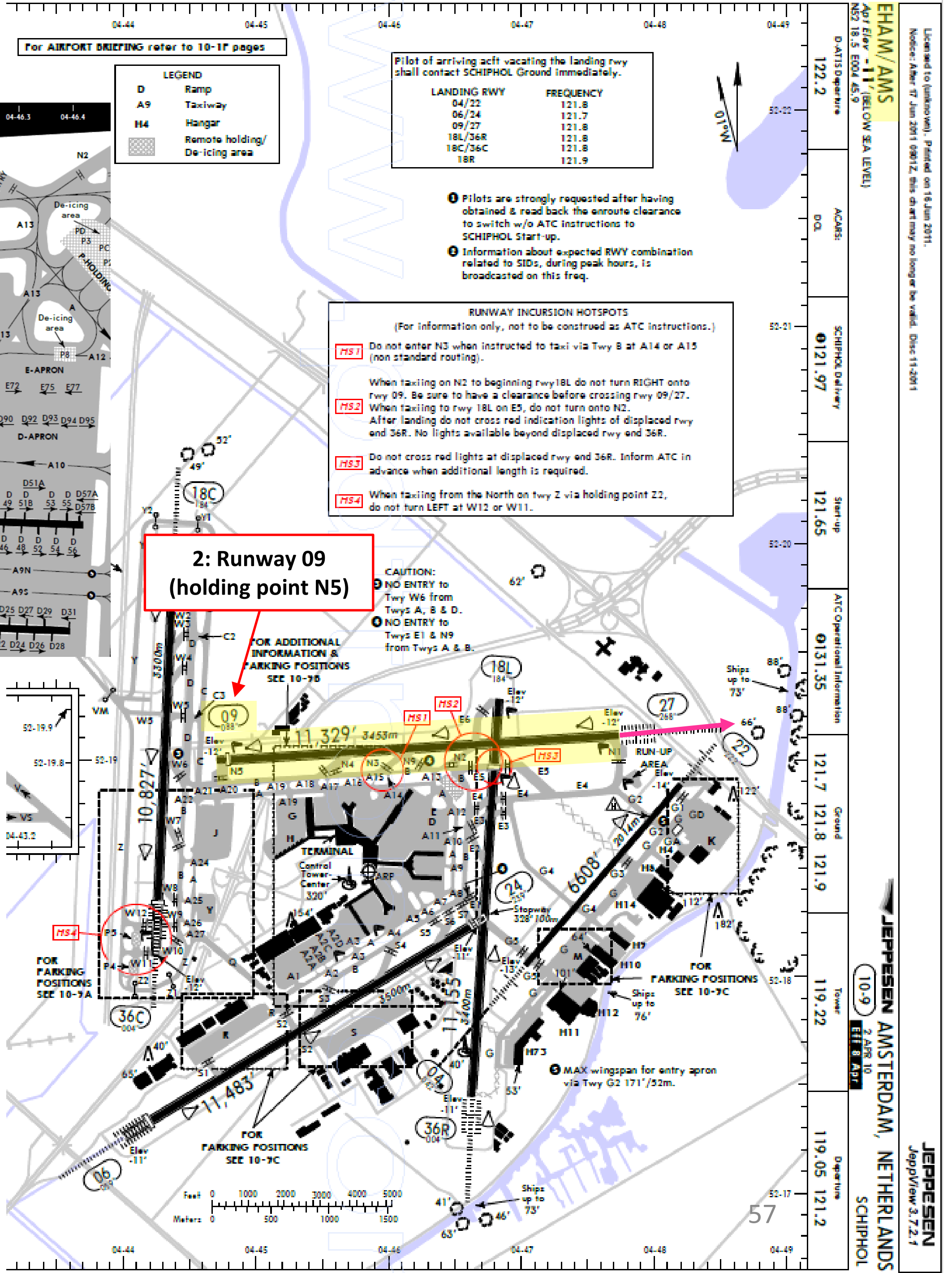
PLANNING THE DEPARTURE - SID

These charts are for the SID (Standard Instrument Departure) from Schiphol (EHAM) to GORLO. We intend to:

1. Spawn at Gate F6 (personal preference)
2. Taxi towards **runway 09** (orientation: 090) using taxiways A16, Bravo (B) and holding point N5.
3. Depart from EHAM using the SID from EHAM to GORLO (GORL2N) to a target altitude of 6000 ft (FL060)
4. Climb to a cruising altitude of 24,000 ft



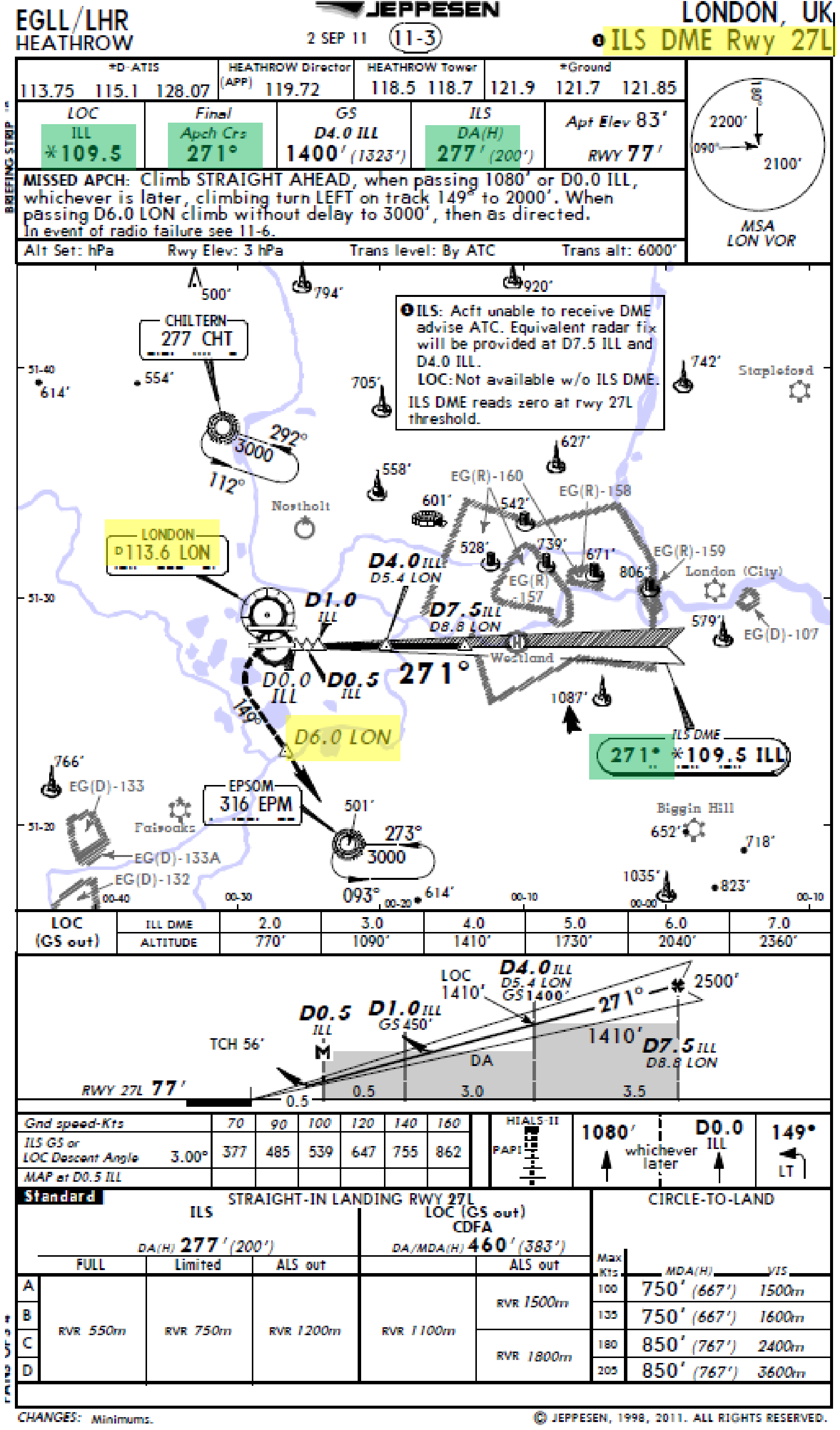


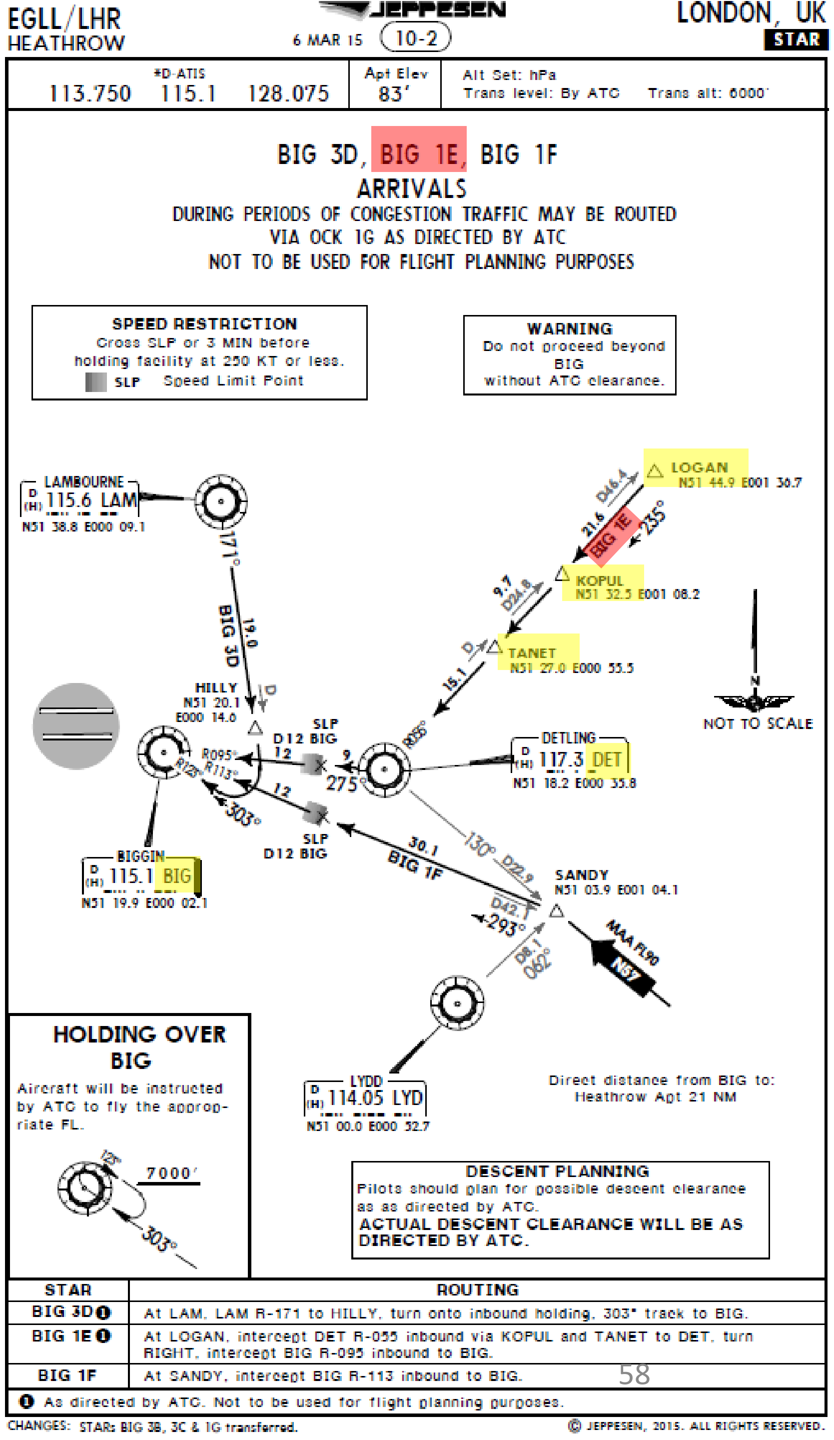


PLANNING THE APPROACH - STAR

These charts are for the STAR (Standard Terminal Arrival Route) from LOGAN to EGLL. We intend to:

1. Come from LOGAN waypoint
2. Fly from LOGAN towards the BIG1E arrival route.
3. Follow the STAR (BIG1E -> KOPUL -> TANET -> DET -> BIG)
4. Select an AIF (Approach Initial Fix) from the FMC database (in our case CI27L) and follow the approach towards the runway, guided by the EGLL airport's ILS (Instrumented Landing System).
5. Land at Heathrow (EGLL) on **runway 27L** (orientation: 270 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

Airways:
EHAM *SID* ***GORLO*** *UL980* ***XAMAN*** *L980* ***LOGAN*** *STAR* ***EGLL***

Provided by RouteFinder

METAR:

Departure: EHAM 290225Z 15002KT 7000 MIFG NSC 16/15 Q1014 NOSIG
Destination: EGLL 290250Z AUTO 16002KT 9999 NCD 17/15 Q1015 NOSIG

Provided by AVIATION WEATHER CENTER

Fuel Quantity Input to FMC (taken from an online fuel planner)

Fuel quantity for Boeing 737-800 (iFly/PMDG)

	Fuel	Time
Fuel Usage	2051 kgs	00:52
Reserve Fuel	2955 kgs	01:15
Fuel on Board	5007 kgs	02:07

Provided by Fuelplanner.com

CDU/FMC IN A NUTSHELL

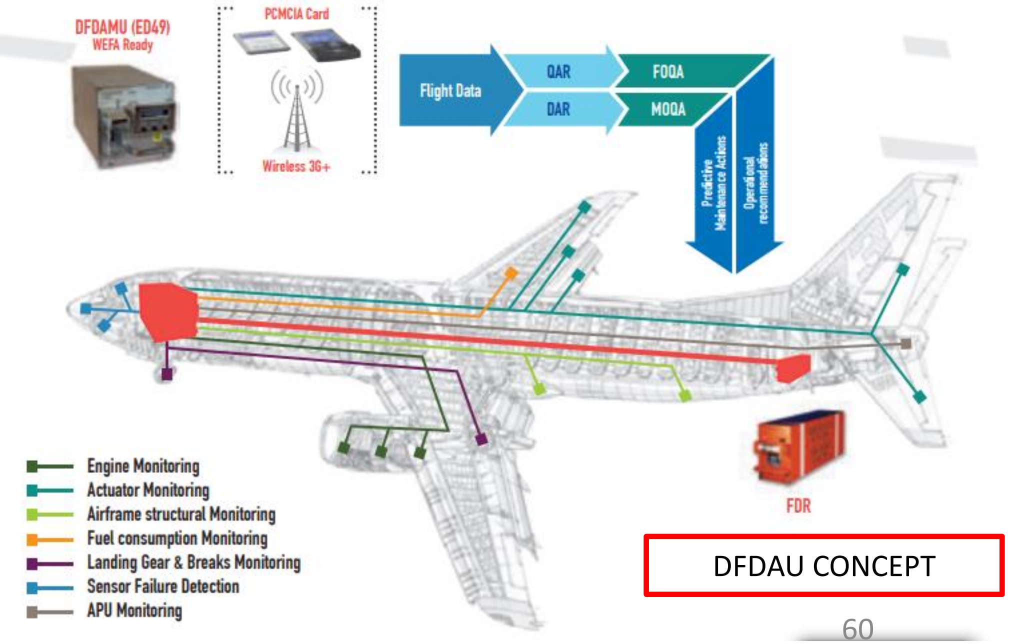
Most of the aircraft setup and flight planning will be done with the help of the CDU, which encompasses various systems such as the FMC system.

CDU: Control Display Unit

MAIN 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.
- **DFDAU** -> Digital Flight Data Acquisition Unit, not simulated
  - Used by airliner operators to acquire data from the aircraft for monitoring purposes
- **PMDG SETUP** -> Setup various aircraft options
  - Allows you to configure aircraft equipment installed on your current airframe, customize various parameters like display parameters, unit system, IRS alignment time, setup cold & dark and other panel states, and configuration of aircraft malfunctions/failures.
- **FS ACTIONS** -> Flight Simulation Actions
  - Allows you to change fuel loads, payloads, ground carts for power and air, door controls, cabin lights or pushback controls. This is a fictional custom interface built by PMDG as a tool for you to work with.

CDU MAIN MENU PAGE



DFDAU CONCEPT

CDU/FMC IN A NUTSHELL

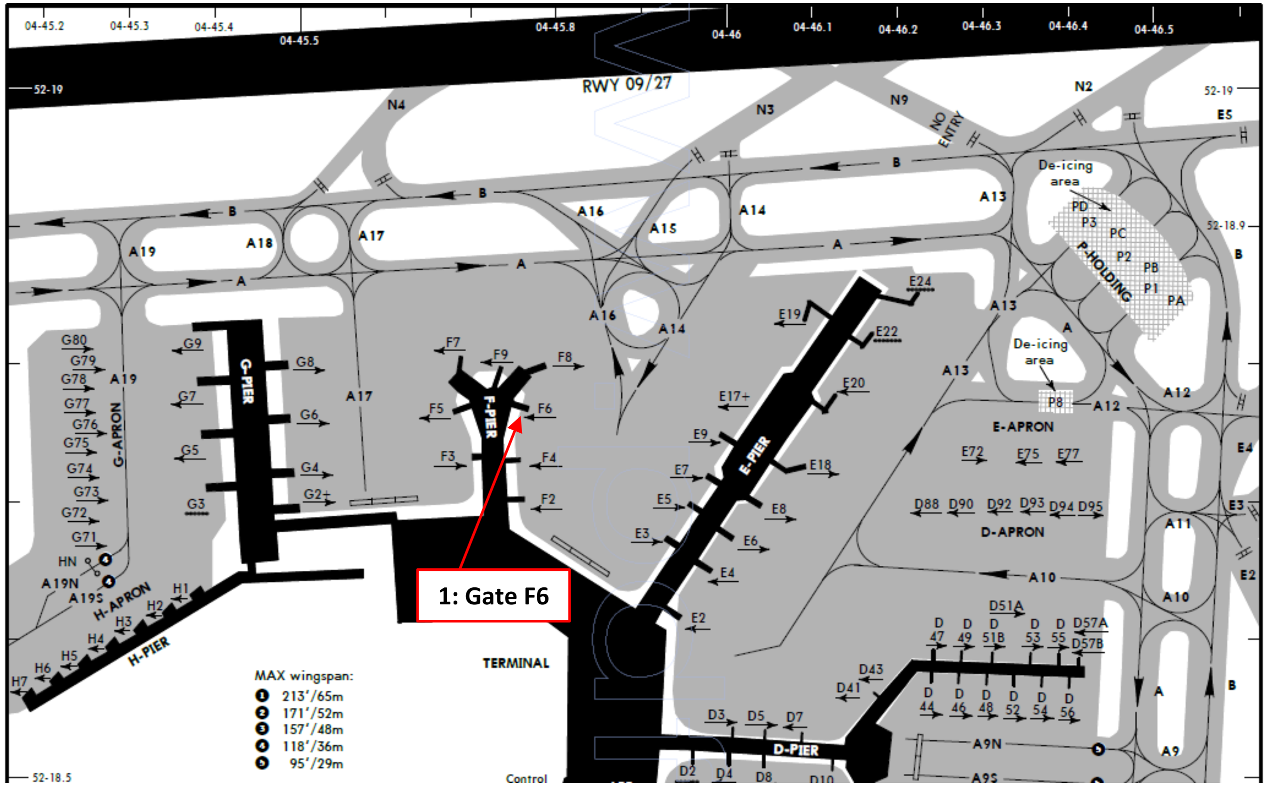
- **FMC** -> Flight Management Computer
  - **INIT REF**: data initialization or for reference data
  - **RTE**: input or change origins, destination or route
  - **CLB**: view or change climb data and cruise altitude
  - **CRZ**: view or change cruise data
  - **DES**: view or change descent data
  - **LEGS**: view or change lateral and vertical data
  - **DEP ARR**: input or change departure and arrival procedures
  - **HOLD**: create and show holding pattern data
  - **PROG**: shows progression of dynamic flight and navigation data, including waypoint estimated time of arrival, fuel remaining, etc.
  - **N1 LIMIT**: view or change N1 thrust limits
  - **FIX**: create reference points (fix) on map display

  - **MENU**: view the main menu page (see previous page)
  - **PREV PAGE / NEXT PAGE** : Cycles through previous and next page of selected FMC page
  - **EXEC**: Makes data modifications active

SPAWN COLD & DARK

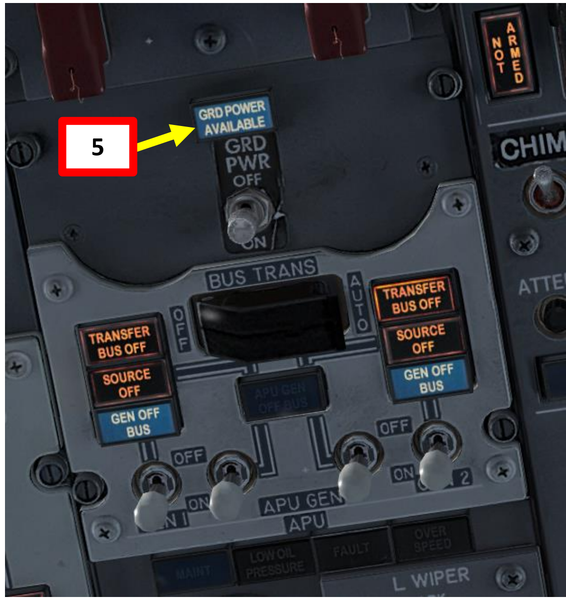
In FSX, you will generally spawn with your engines running. A “cold & dark” start-up means that your aircraft is in an unpowered state with engines and every other system off. Here is the procedure to spawn in such a state:

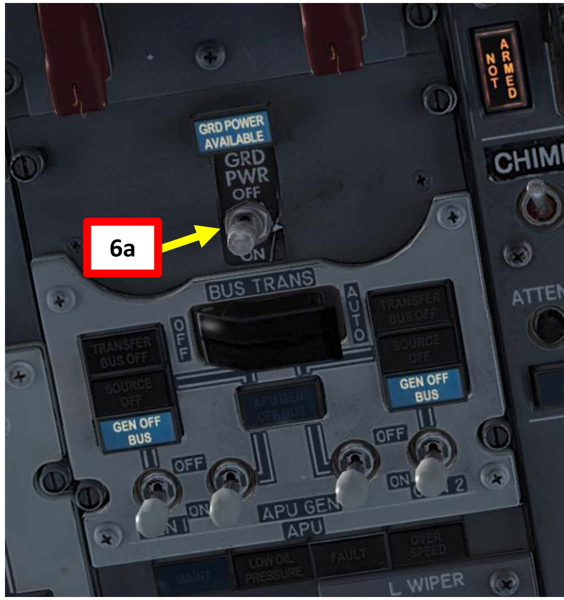
1. Spawn like you normally would at Gate F6 in EHAM (departure airport).
2. Go on CDU main menu and reset aircraft to COLD and DARK configuration.
    a) Select PMDG SETUP
    b) Select PANEL STATE LOAD
    c) Select NGX CLDDRK setup
    d) Click “EXEC” on CDU keypad
    e) Aircraft should be set to Cold and Dark configuration as shown



POWER UP AIRCRAFT

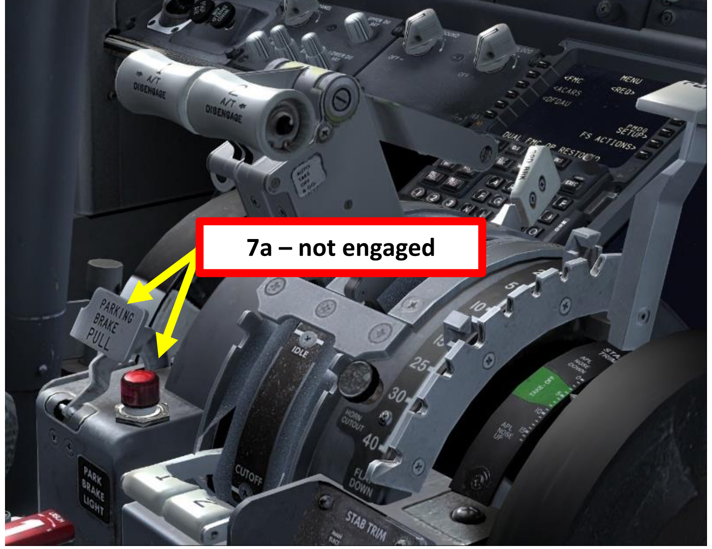
3. On Overhead panel, flip the battery cover and set the battery switch to ON
4. Go on CDU main menu to install wheel chocks, connect ground power cart to the aircraft and remove pitot covers
    a) Select FS ACTIONS
    b) Select GROUND CONNECTIONS
    c) Click on the “WHEEL CHOCKS” LSK to set wheel chocks to “SET”
    d) Click on the “GROUND POWER” LSK to set ground power to “CONNECTED”
    e) Click on the “PITOT COVERS” LSK to set pitot tube covers to “REMOVED”
    f) Return to main MENU
5. On Overhead panel, confirm that the “GRD PWR AVAILABLE” indication is illuminated
6. Click on the “GRD PWR” switch to power the aircraft

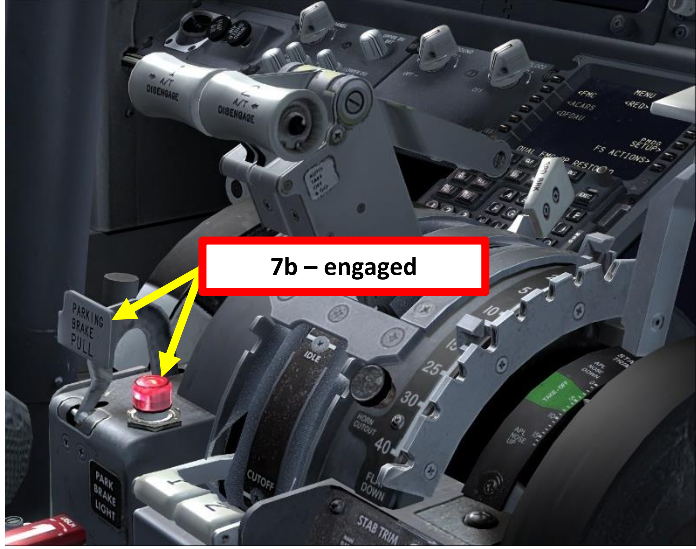




START IRS ALIGNMENT

7. Engage Parking Brake (aircraft movement can screw up your navigation system alignment)
8. On Overhead panel, set both IRS (Inertial Reference System) switches to ALIGN, and then to NAV by right-clicking.
9. The “ON DC” caution illuminates during the IRS’s self-test phase.
10. The “ALIGN” caution illuminates during the IRS’s alignment phase.
11. This alignment phase usually takes between 7 and 10 minutes. IRS alignment is complete once a full PFD (Primary Flight Display) and ND (Navigation Display) are displayed on your display units. “ALIGN” cautions will then extinguish.





FMC SETUP - UNITS

12. Go on CDU main menu and set aircraft fuel weight units to your desired system (lbs or kg). We will choose KGs.
    a) Select PMDG SETUP
    b) Select AIRCRAFT
    c) Select DISPLAYS
    d) Click “Next Page” until you reach Page 9: FUEL/CTRLS
    e) Set Weight to KGS
    f) Return to main MENU

12a

12b

12e

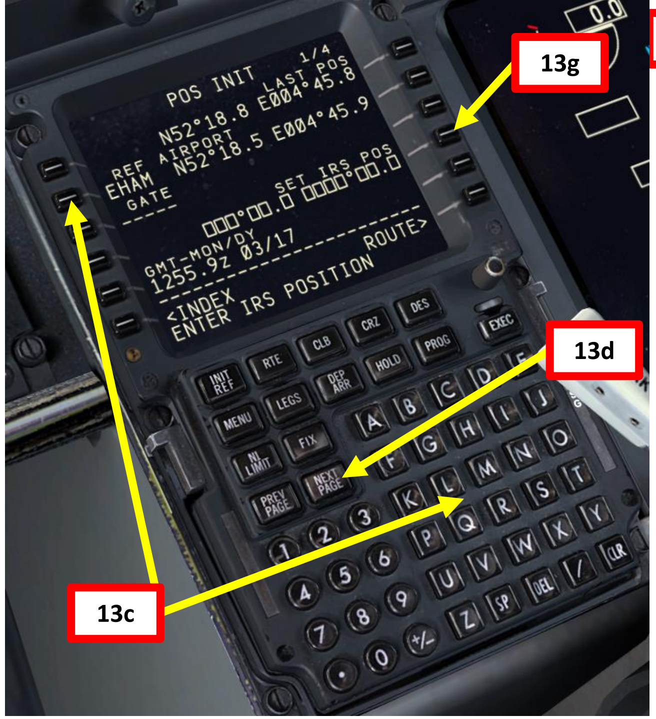
12f

12d

12c

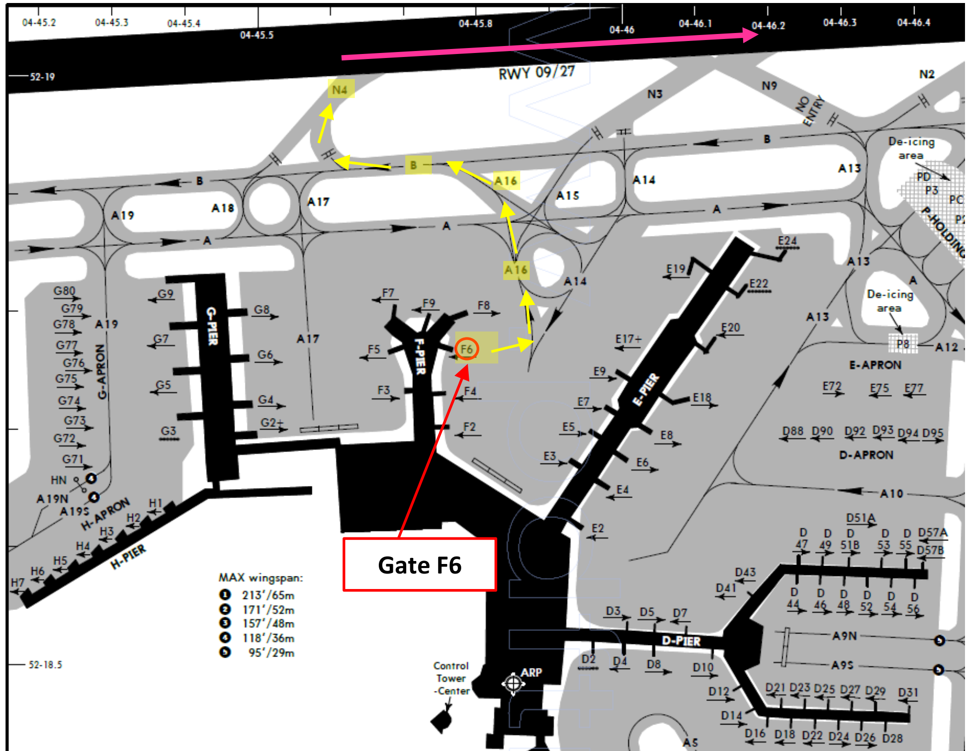
FMC SETUP - POSITION

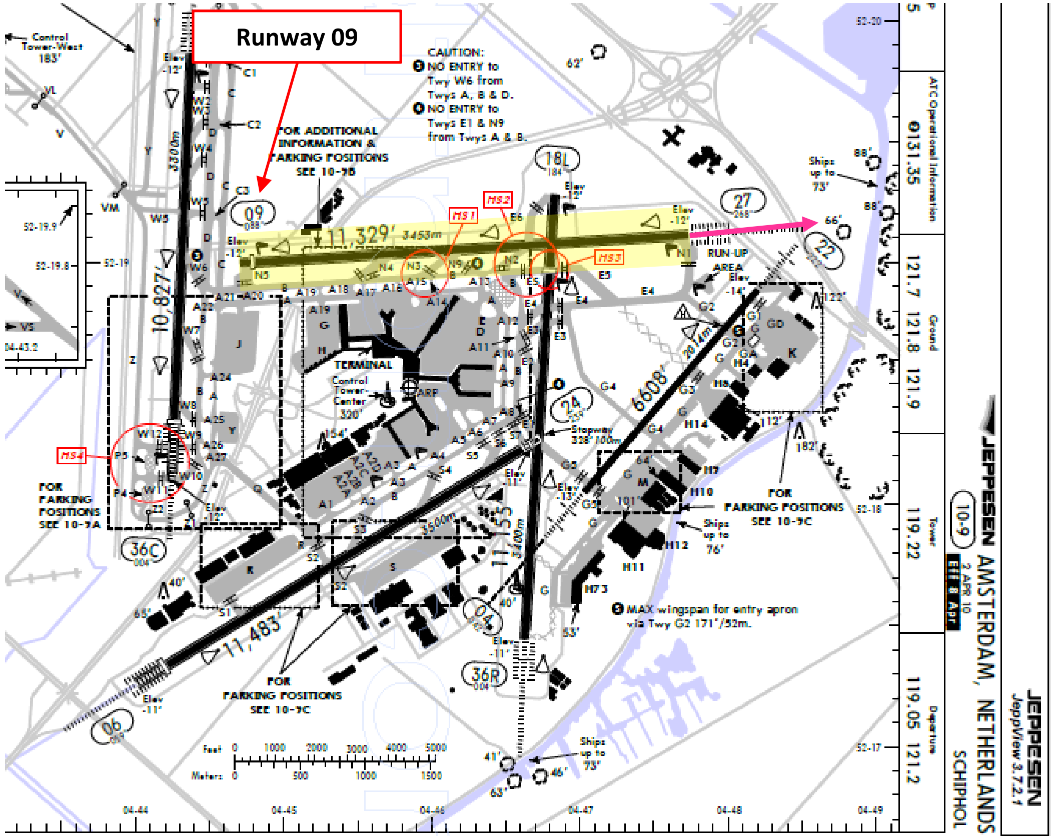
13. Go on FMC (Flight Management Computer) and set initial position for the IRS
    a) Select FMC
    b) Select POS INIT
    c) Type “EHAM” on the CDU keypad and select LSK next to REF AIRPORT since we spawned at Schiphol Airport (EHAM)
    d) Click on “NEXT PAGE” to access the POS REF page (2/4)
    e) Select GPS L line to copy the coordinates to your keypad
    f) Click on “PREV PAGE” to access the POS INIT page (1/4)
    g) Click on the SET IRS POS to paste the coordinates, setting your IRS (Inertial Reference System) your initial reference position.
    h) Congratulations! Your aircraft’s navigation system now knows where you are.



FMC SETUP - ROUTE

14. Go on FMC (Flight Management Computer) and set aircraft route
    a) In POS INIT menu, select ROUTE menu
    b) EHAM will already be "pasted" on the keypad since the FMC assumes that we takeoff from Schiphol. Click 'ORIGIN' to paste it and set EHAM as your takeoff airport.
    c) Consult navigation chart of EHAM (Schiphol) Airport and find runway from which you will takeoff from (Runway 09).
    d) Type "09" (for Runway 090) on CDU keypad and click on RUNWAY.
    e) Type "EGLL" on the CDU keypad and click on "DEST" to set HEATHROW as your destination
    f) Type your flight number (i.e. Flight No. BAW106) on the CDU keypad and click on FLT NO.





FMC SETUP - WAYPOINTS

NOTE: Flight Plan = **EHAM** SID **GORLO** UL980 **XAMAN** L980 **LOGAN** STAR **EGLL**
SID: GORL2N STAR: BIG1E

15. Go on FMC (Flight Management Computer) and set flight waypoints and airways
    a) Click on “DEP ARR” (Departure Arrival) and click on “DEP – EHAM” to set Schiphol as our Departure Point
    b) Select Runway 09
    c) Select SID (Standard Instrument Departure) for GORLO2N as determined when we generated our flight plan.
    d) Select ROUTE menu and click “NEXT PAGE” on the CDU keypad to select the Airway/Waypoint menu.
    e) Type “UL980” on the CDU keypad and click on the LSK next to the dashed line on the left column (AIRWAYS) to set your next Airway.
    f) Type “XAMAN” on the CDU keypad and click on the LSK next to the squared line on the right column (WAYPOINTS) to set your next Waypoint to XAMAN.
    g) Enter remaining Airways and Waypoints as shown in steps e) and f) to complete the flight (L980, LOGAN). See picture to see the final result. We will enter the approach to Heathrow later while in the air.
    h) Select ACTIVATE and click on EXECUTE

FMC SETUP - WAYPOINTS

NOTE: Flight Plan = **EHAM** SID **GORLO** UL980 **XAMAN** L980 **LOGAN** STAR **EGLL**
SID: GORL2N STAR: BIG1E

15. Go on FMC (Flight Management Computer) and set flight waypoints and airways
    i) Click on “DEP ARR” (Departure Arrival) and click on “EGLL – ARR” to set Heathrow as our Arrival Point
    j) Select ILS 27L as our landing runway
    k) Select STAR (Standard Terminal Arrival Route) for BIG1E as determined when we generated our flight plan.
    l) Click on EXECUTE on the CDU keypad to activate your flight plan update

FMC SETUP - WAYPOINTS

NOTE: Flight Plan = **EHAM** SID **GORLO** UL980 **XAMAN** L980 **LOGAN** STAR **EGLL**
SID: GORL2N STAR: BIG1E

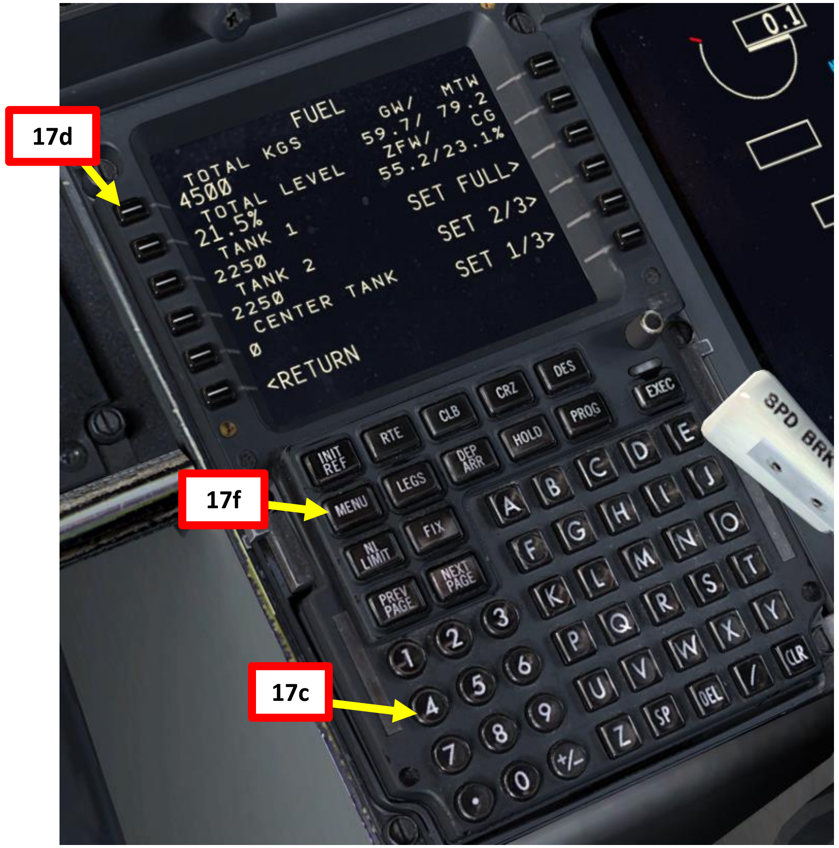
16. Go on FMC (Flight Management Computer) and verify all waypoints and any look for any discontinuity
    a) Click on "LEGS" and cycle through all different legs pages of the flight using "NEXT" button on FMC.
    b) There is a route discontinuity between the BIG waypoint of our STAR and the ILS 27L runway. Click on the LSK next to the desired approach fix (in our case "CI27L") to copy it on the FMC screen.
    c) Click on the LSK next to the squared line "THEN" to set approach fix CI27L in order to fix flight plan discontinuity.
    d) Click on EXECUTE to update flight plan

FMC SETUP - FUEL

NOTE: Remember our fuel calculations of earlier:
Reserve Fuel = **2500 kg**
Total Fuel = Fuel for Flight + Reserve Fuel = **4500 kg**

17. Go to CDU Main Menu and set fuel payload
    a) Select FS ACTIONS
    b) Select FUEL
    c) Type “4500” on the CDU keypad (since we need 4500 kgs)
    d) Click on “TOTAL KGS” menu to set fuel payload
    e) Ta-dah! The aircraft fuel load is now properly set in the sim instead of having to go through the FSX main menu
    f) Click on MENU to return to main menu

NOTE: Normally, there is a whole procedure to set up your payload (passengers + cargo) but since we are short on time, we will simply skip it and assume that we are not overweight and that we are within safe CG (center of gravity) boundaries.

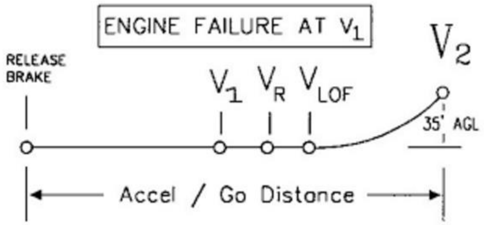


FMC SETUP – PERF INIT

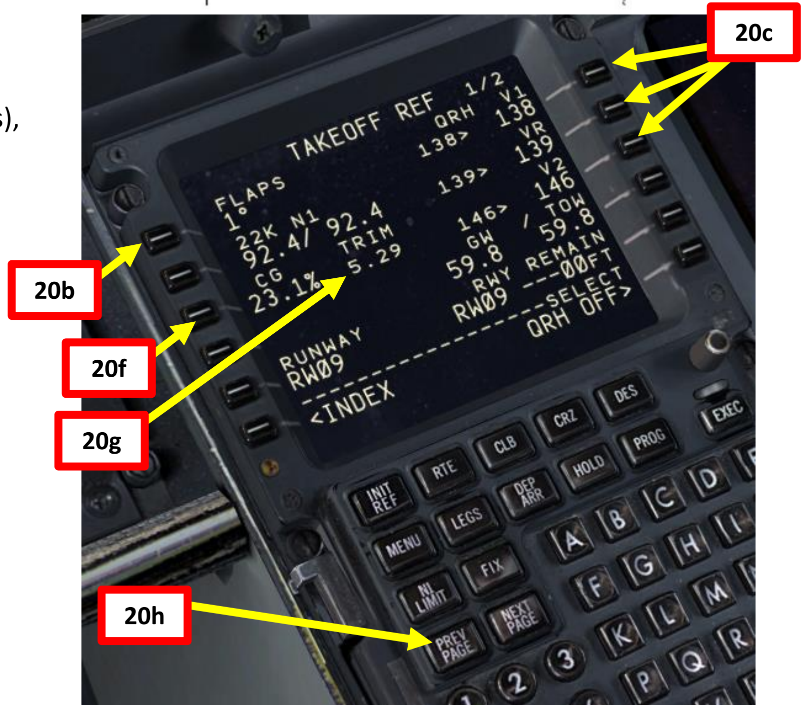
18. Go on FMC (Flight Management Computer) and set aircraft performance parameters
    a) Select "FMC" menu on the CDU. The PERF INIT page will automatically be displayed
    b) Double-Click on ZFW (Zero Fuel Weight) button
    c) Type "2.5" on CDU keypad and select RESERVES to set reserve fuel weight determined by Fuel Planner tool (2.5 x 1000 for 2500 kg)
    d) Type "38" on CDU keypad and select COST INDEX (cost index is generally given to you by the airline company, so you shouldn't really care about it within the scope of this simulation)
    e) Set cruising altitude to FL240 (24000 ft) by typing "240" on the CDU keypad and selecting TRIP/CRZ ALT.
    f) Set transition altitude to 3000 ft by typing "3000" on the CDU keypad and selecting TRANS ALT (as per Europe norms, but you would use 18000 ft in North America).
    g) For simplification purposes, we will leave the temperature values as is.
    h) Click on EXECUTE.
19. Select required N1 Limit in order to limit your engines' thrust.
    a) Select N1 Limit menu
    b) Click on the "TO-2" (22K DERATE) N1 Limit to set engine N1 limit to 22,000 lbf of thrust

Note: TO, TO-1, and TO-2 are engine de-ratings. De-rating means that the aircraft uses reduced thrust on takeoff in order to reduce engine wear, prolong engine life, reduce fuel consumption, and more importantly comply with noise reduction and runway safety requirements. *Airbus aircraft have a similar concept called "FLEX". "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/De-rating is also known in other companies as "Assumed Temperature Derate", "Assumed Temperature Thrust Reduction" or "Reduced Takeoff Thrust" or "Factored Takeoff Thrust".*

FMC SETUP – PERF INIT



20. Go on FMC (Flight Management Computer) and set TAKEOFF parameters
    a) Select TAKEOFF menu
    b) Type “1” on CDU keypad and select LSK next to “FLAPS” to set takeoff flaps to 1 degree
    c) Click on the LSKs next to V1, VR and V2 to automatically calculate your V speeds.
    d) Observe the resulting V1, VR and V2 speeds resulting of this flap setting and current aircraft weight: **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).
    e) V1 Speed is 138 kts
       VR Speed is 139 kts
       V2 Speed is 146 kts
    f) Click on the LSK next to CG twice to automatically calculate the CG position.
    g) Observe the resulting TAKEOFF TRIM setting: 5.29.
    h) Click on NEXT PAGE button
    i) Type 3000 on the CDU keypad and click on the LSK next to ACCEL HT to set your Acceleration Height to 3000 ft AGL.
    j) Type 1500 on the CDU keypad and click on the LSK next to REDUCTION to set your Thrust Reduction Height to 1500 ft AGL.
    k) Type 800 on the CDU keypad and click on the LSK next to EO ACCEL HT to set your Engine Out Acceleration Height to 800 ft AGL.



FMC SETUP – PERF INIT

NOTE:

The Acceleration, Thrust Reduction and Engine Out Acceleration Heights may seem like plugging random numbers in a computer at first, but there is a valid reason for that. Special heights for Thrust Reduction/Acceleration Height, and OEI Acceleration more often than not are dependent on whether there is a NAP (Noise Abatement Procedure), or if there are some company SOP (Standard Operating Procedure) for other factors like terrain clearance. You can consult Jeppesen charts to see what these Noise Abatement procedures are for a particular airport. If no particular procedures are listed, you can follow the standard procedures in the following document:
ICAO Document 8168, Vol 1, Section 7 - Noise Abatement Procedures
Link: http://www.chcheli.com/sites/default/files/icao_doc_8168_vol_1.pdf

Like I said before, the main wear on engines, especially turbine engines, is heat. If you reduce heat, the engine will have greater longevity. This is why takeoff power is often time limited and a height established that thrust is reduced. The difference between takeoff thrust and climb thrust may only be a few percent, but the lowering of EGT (Exhaust Gas Temperature) reduces heat and extends engine life significantly. Acceleration Height is the altitude above ground level (AGL) that a pilot accelerates the aircraft by reducing the aircraft's pitch, to allow acceleration to a speed safe enough to raise flaps and slats, and then reach the desired climb speed. The thrust reduction height is where the transition from takeoff to climb thrust takes place.

Acceleration Height (3,000 ft in our case) is when the nose is to be lowered to allow the aircraft to accelerate. When the aircraft starts accelerating is when the flight crew will retract flaps as per the schedule. Our value was taken directly from the Jeppesen document.

Thrust Reduction Height (1,500 ft in our case) is when the autothrottle will decrease the engine power to the preselected climb thrust; thereby reducing engine wear and tear. Both may occur simultaneously or at differing heights above ground level. Both can be configured in the CDU. Our value was taken directly from the Jeppesen document. If no such value was specified, then we'd have to use 800 ft as the minimal value as per the ICAO document.

EO ACCEL HT (800 ft in our case) is is the safe altitude that you can lower the nose and start accelerating the aircraft in the event of an engine failure. It is based mainly on company SOP or a prescribed procedure (EO SID, as an example), which, unless someone gave you one, you wouldn't know what the SOP value is. For the purposes of the sim, you can just leave it at 800 ft. Some UK pilots add the airport elevation to this value.

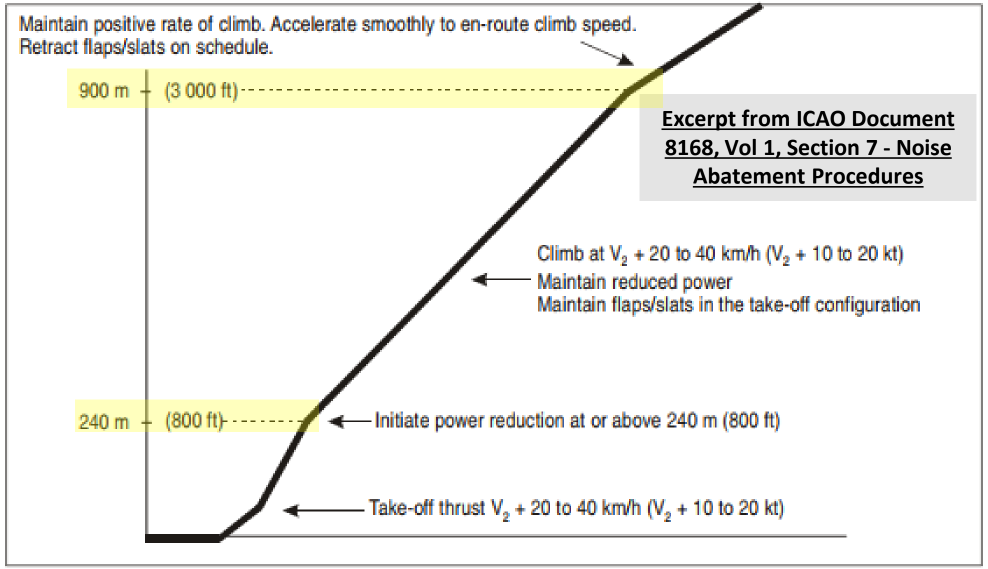
EHAM/AMS
SCHIPHOL
JEPPESEN 23 APR 10 10-1P14 Eff 6 May
AMSTERDAM, NETHERLANDS
AIRPORT BRIEFING

3.3. NOISE ABATEMENT PROCEDURES
3.3.1. GENERAL
The Standard Instrument Departure routes as shown on Amsterdam SID charts avoid residential areas as much as possible and must be considered as minimum noise routes.

Take-off and climb procedure (jet ACFT only):

Take-off to 1500'	Take-off power Speed at V_2 + 10 KT to 20 KT (or as limited by body angle) Flaps - set as appropriate
1500' - 3000'	Climb power Speed at V_2 + 10 KT to 20 KT Flaps maintain previous setting
After passing 3000'	Retract flaps on schedule and assume normal enroute climb.
3000' - FL 100	MAX 250 KT

Operators/ACFT types unable to comply with the mentioned take-off procedure are requested to inform the APT authority by sending copies of the take-off procedure in use to: Amsterdam Airport Schiphol, Dep. of Capacity Management, P.O. Box 7501, 1118 ZG Schiphol Airport; Fax: +31 (0)20 601 3567.



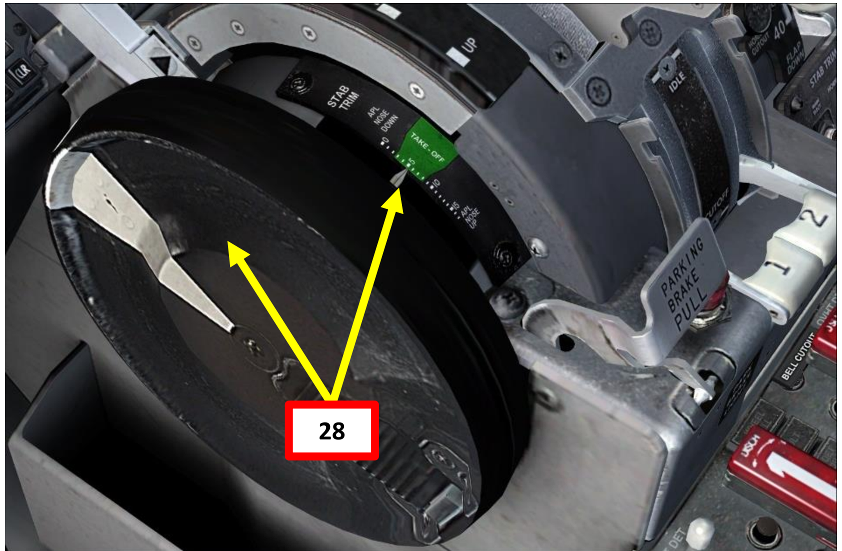
Excerpt from ICAO Document 8168, Vol 1, Section 7 - Noise Abatement Procedures

Figure I-7-3-App-1. Noise abatement take-off climb — Example of a procedure alleviating noise close to the aerodrome (NADP 1)

AUTOPILOT SETUP

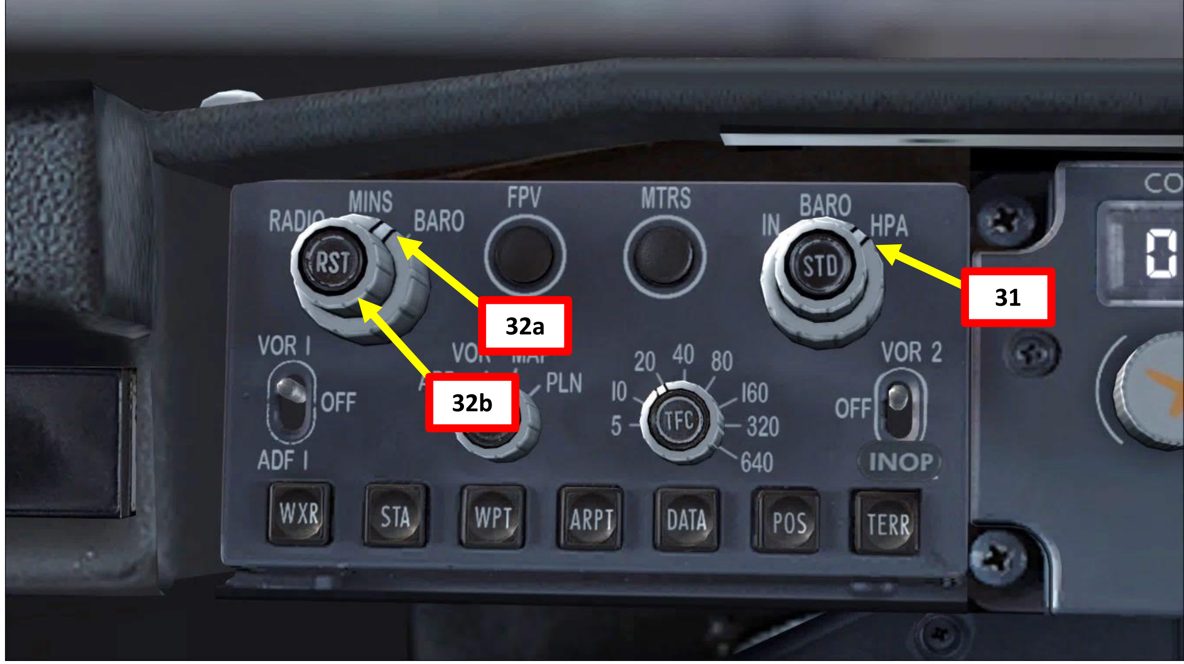
V1 Speed is 138 kts
VR Speed is 139 kts
V2 Speed is 146 kts
Takeoff Trim is 5.29

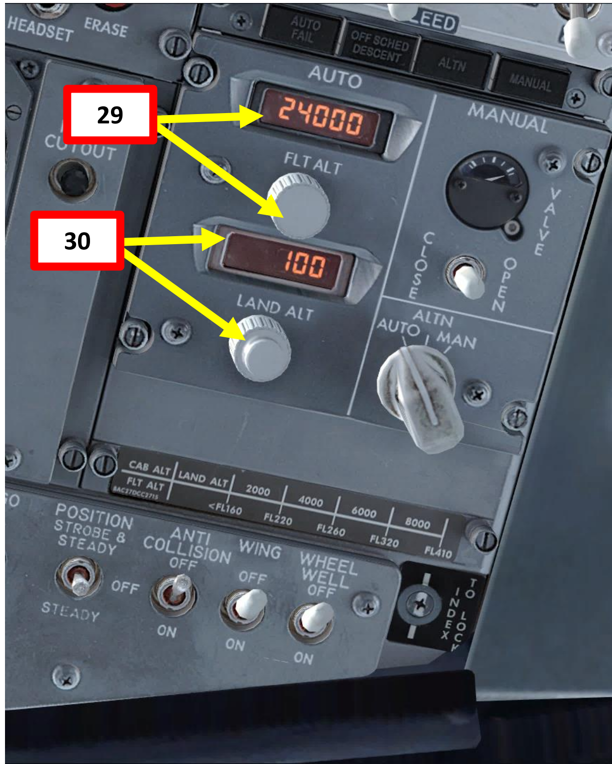
21. Set both COURSE and HEADING knobs to runway QDM (Magnetic) heading 087 as per Jeppesen chart.
22. Turn on both FD (Flight Director) switches – UP POSITION
23. Turn on all VOR switches – UP POSITION
24. As per EHAM SID Chart, set Initial Altitude (FL060, or 6,000 ft) on MCP (Mode Control Panel) by rotating ALTITUDE knob on glareshield until Altitude is set to 6,000 ft
25. Set V2 Speed on MCP (Mode Control Panel) by rotating MCP IAS knob on the glareshield until IAS is set to 146 kts (V2 speed)
26. Flick FUEL FLOW switch to RESET (UP) to reset "fuel used" value
27. Press Master Caution light to reset it
28. Set Takeoff Elevator Trim to approx. 5.29 by scrolling mousewheel button on takeoff trim wheel



CABIN PRESSURE & ALTIMETER SETUP

29. On overhead DCPCS (Digital Cabin Pressure Control System) panel, set FLT ALT (Flight Altitude) to 24,000 ft
30. On overhead panel, set LAND ALT (Landing Altitude) for arrival airport to 100 ft (EGLL elevation = 83 ft).
31. Set Altimeter Setting knob to desired unit system by left clicking on outer BARO knob. We will use Hpa (Hectopascals) instead of in Hg (inches of Mercury).
32. Set Engine Out Acceleration Height in Baro as a reference by setting BARO (left click outer knob) and tuning the BARO value to 800 ft using the inner BARO knob.
33. Click on the Hp/In button on the standby ADI to set the desired unit system (Hpa in our case).





DOORS

34. Go to CDU Main Menu and close doors
    a) Select FS ACTIONS
    b) Select DOORS
    c) Click on “CLOSE DOOR” on any door that is open
    d) Once all doors are closed, every door status should read “OPEN”.
    e) Click on MENU to return to main menu

ENGINE START-UP

APU AUXILIARY POWER UNIT → APU GENERATOR
APU AUXILIARY POWER UNIT → APU BLEED AIR

GROUND POWER CART → EXTERNAL POWER

AIR PRESSURE CART → EXTERNAL AIR

ENGINE (RUNNING) → ENGINE GENERATOR (ENGINE CROSS-START)
ENGINE (RUNNING) → ENGINE BLEED (ENGINE CROSS-START)

FUEL PUMPS → FUEL PUMPS ON

THROTTLE POSITION → THROTTLE AT IDLE

FUEL CUTOFF LEVER → FUEL CUTOFF LEVER AT IDLE (UP)

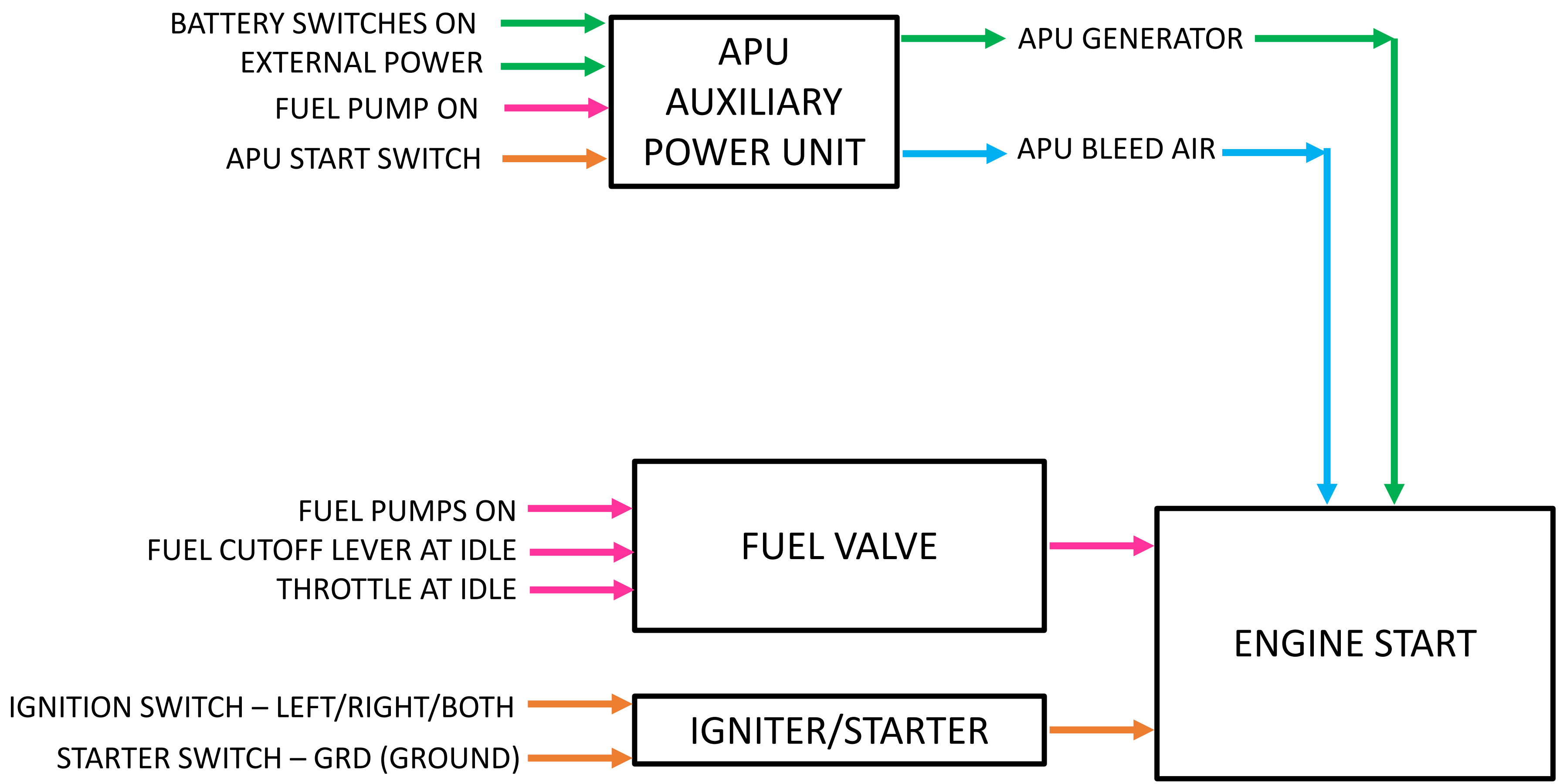
IGNITION SWITCH → IGNITION SWITCH – LEFT/RIGHT/BOTH
IGNITION CONTROLLED BY FADEC

STARTER SWITCH → STARTER SWITCH – GRD (GROUND)

FUEL → ENGINE START
IGNITION/STARTER → ENGINE START
ELECTRICAL POWER → ENGINE START
AIR PRESSURE → ENGINE START

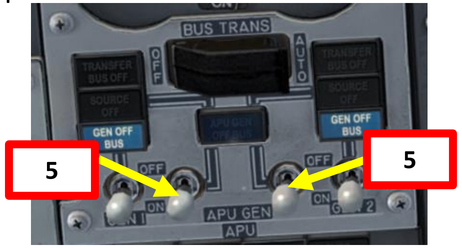
ENGINE START-UP

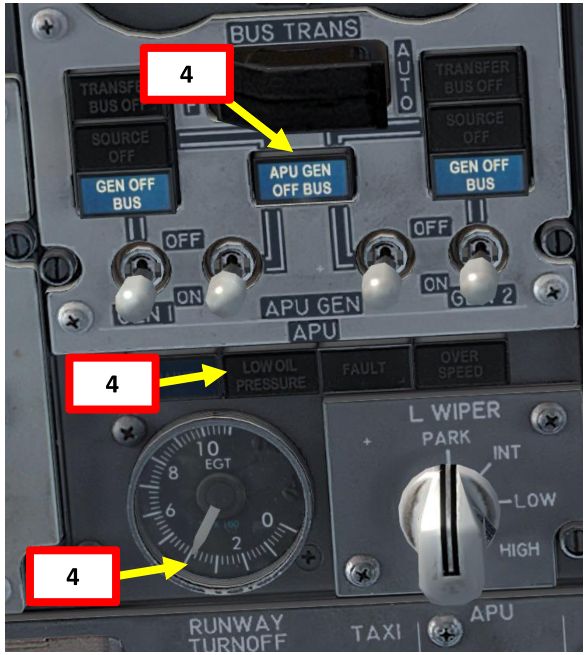
NOTE: It is usually common practice to start your engines during pushback. We will start our engines before that for simplicity.



ENGINE START-UP

1. On Overhead Panel, turn ON AFT LEFT fuel pump
2. Set APU switch to START to initiate start, then set switch to ON after
3. LOW OIL PRESSURE caution should illuminate, and EGT (Exhaust Gas Temperature) should increase within 30 seconds to 800 deg C.
4. When APU reaches IDLE RPM, the LOW OIL PRESSURE caution will extinguish, EGT will stabilize to 400 deg C and the APU GEN OFF caution light will illuminate.
5. Set APU GEN switches #1 and #2 to ON to let the aircraft use the electrical power generated by the APU instead of Ground Power. The APU GEN OFF BUS caution will extinguish.
6. Set APU BLEED switch ON and ISOLATION VALVE Switch to AUTO



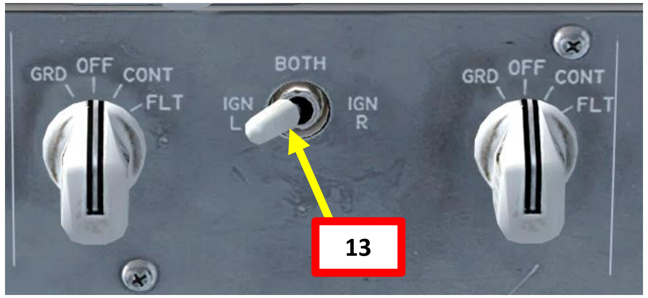


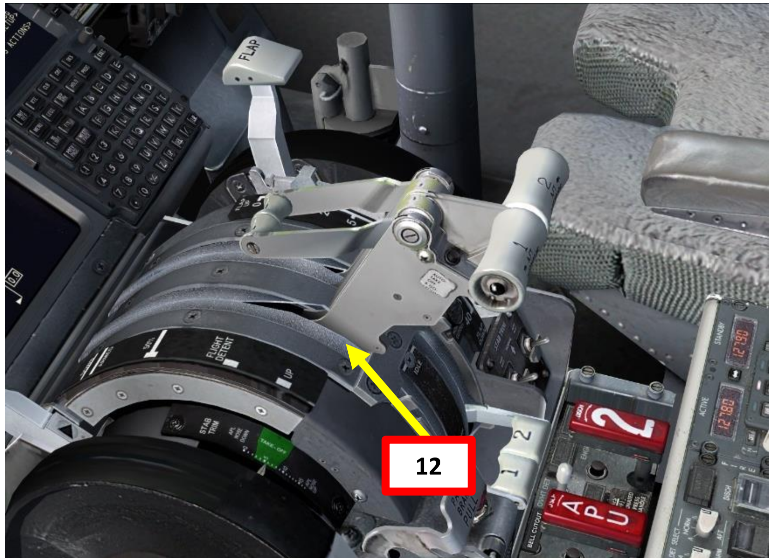
737-800 NG

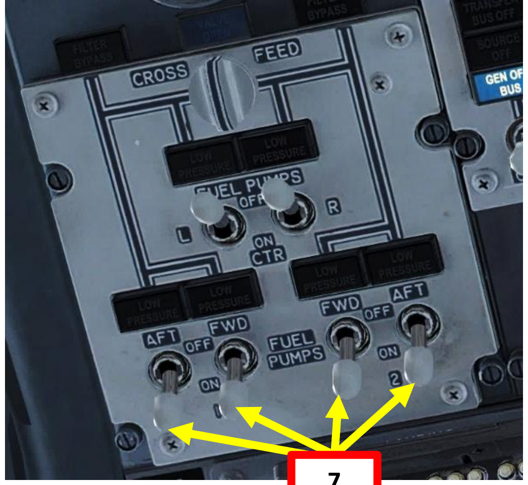
PART 4 – START-UP PROCEDURE

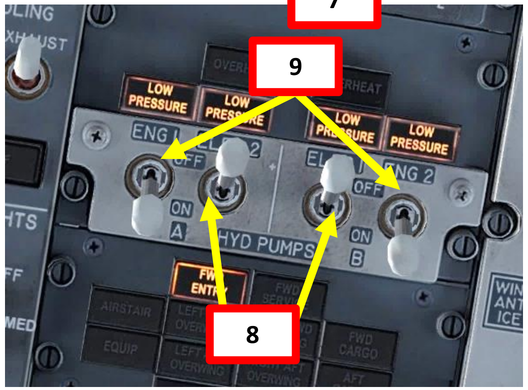
ENGINE START-UP

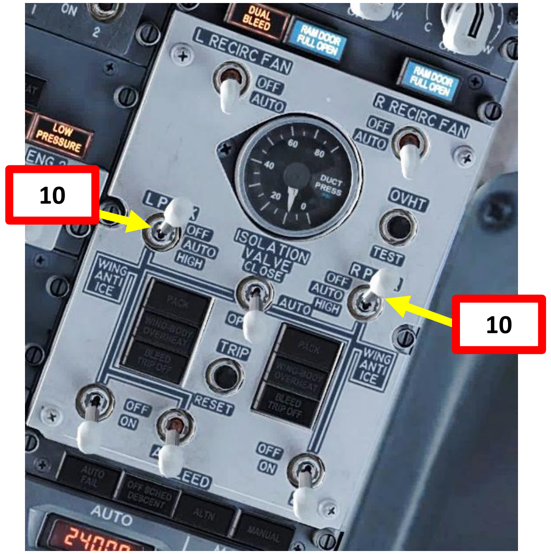
7. On overhead panel, set remaining fuel pump switches (FWD LEFT, FWD RIGHT, AFT RIGHT) – ON
8. Set ELEC 1 & 2 HYDRAULIC PUMP switches – OFF
9. Set ENG 1 & 2 HYDRAULIC PUMP switches – ON
10. LEFT and RIGHT AIR CONDITIONING PACK (Pneumatic Air Conditioning Kit) switches – OFF (to ensure enough APU bleed air pressure is available for engine start)
11. Push “MFD ENG” button to display the engine status page on the main console’s multifunction display (MFD).
12. Set throttle to IDLE.
13. Set IGNITION switch to either LEFT or RIGHT.





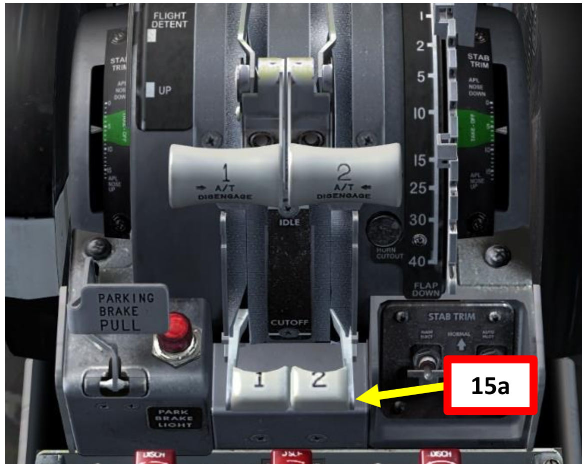


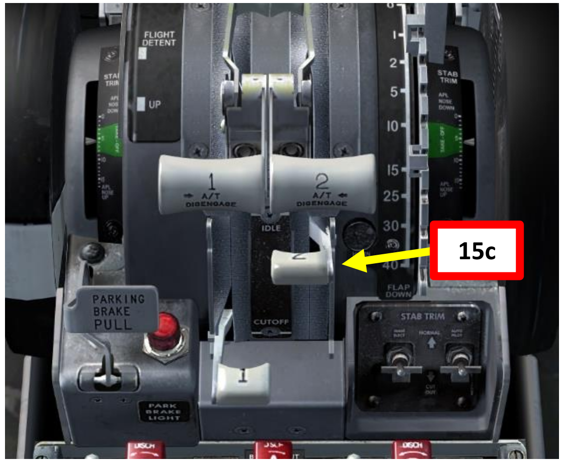




ENGINE START-UP

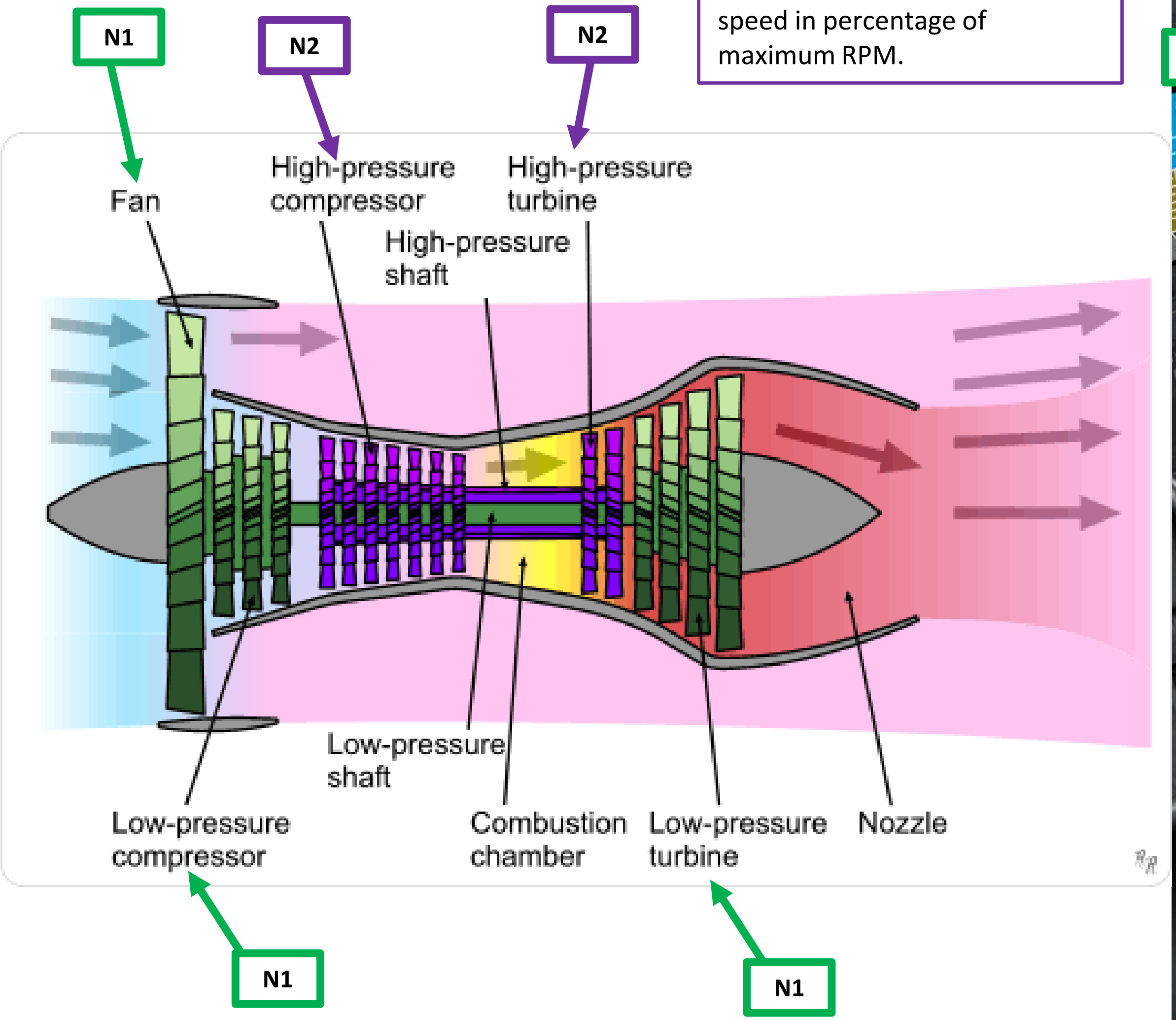
14. Set RIGHT STARTER selector knob to GRD (Ground Start). The right START VALVE OPEN light should illuminate.
15. When No. 2 Engine N2 indication (High Pressure Compressor Rotation Speed) reaches 25 %, set No. 2 Fuel Cutoff Lever to IDLE (UP).
16. N1 indication (Fan Speed / Low Pressure Compressor Rotation Speed), FF (Fuel Flow) and EGT (Exhaust Gas Temperature) for No. 2 Engine should increase.
17. When No. 2 Engine parameters stabilize at about 20% N1 and 60 % N2, RIGHT STARTER selector knob will automatically be reset
18. Set LEFT STARTER selector knob to GRD (Ground Start). The left START VALVE OPEN light should illuminate.
19. When No. 1 Engine N2 indication (High Pressure Compressor Rotation Speed) reaches 25 %, set No. 1 Fuel Cutoff Lever to IDLE (UP).
20. N1 indication (Fan Speed / Low Pressure Compressor Rotation Speed), FF (Fuel Flow) and EGT (Exhaust Gas Temperature) for No. 1 Engine should increase.
21. When No. 1 Engine parameters stabilize at about 20 % N1 and 60 % N2, LEFT STARTER selector knob will automatically be reset to OFF.





ENGINE START-UP

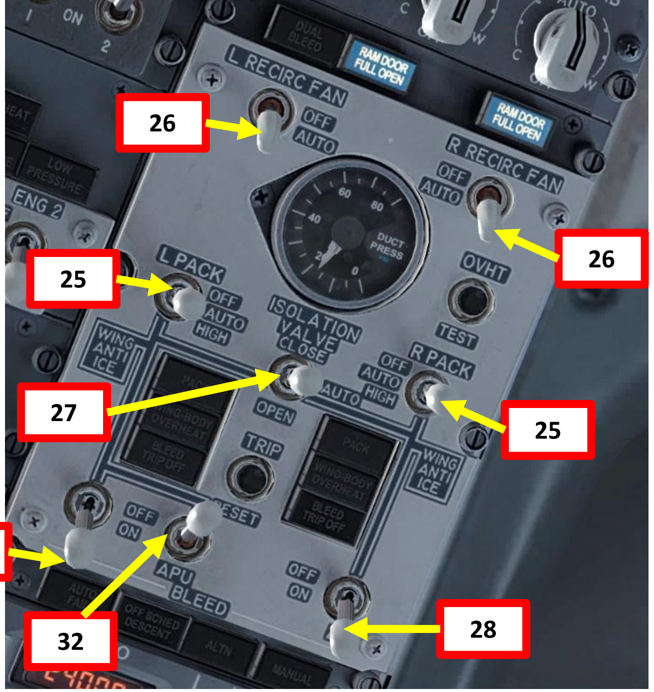
High-pressure compressor and high-pressure turbine are driven by the same shaft. This is N2 speed in percentage of maximum RPM.

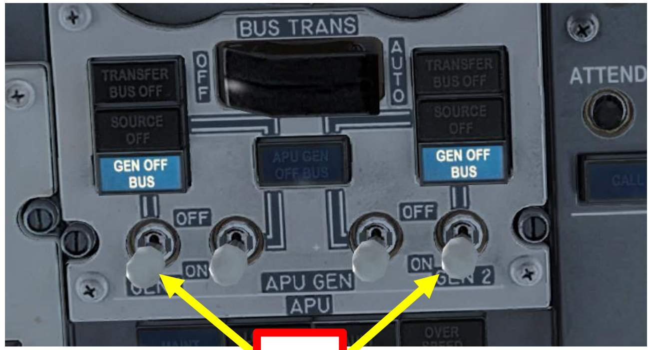


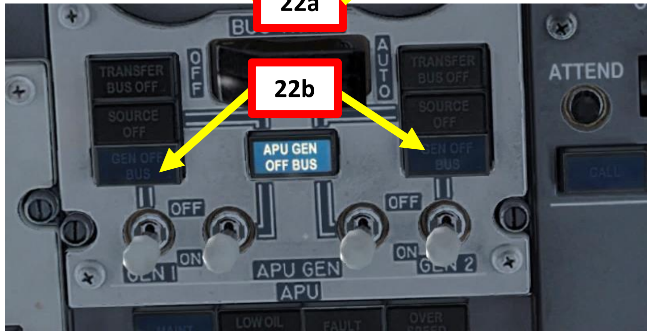
Fan, low-pressure compressor and low-pressure turbine are driven by the same shaft. This is N1 speed in percentage of maximum RPM.

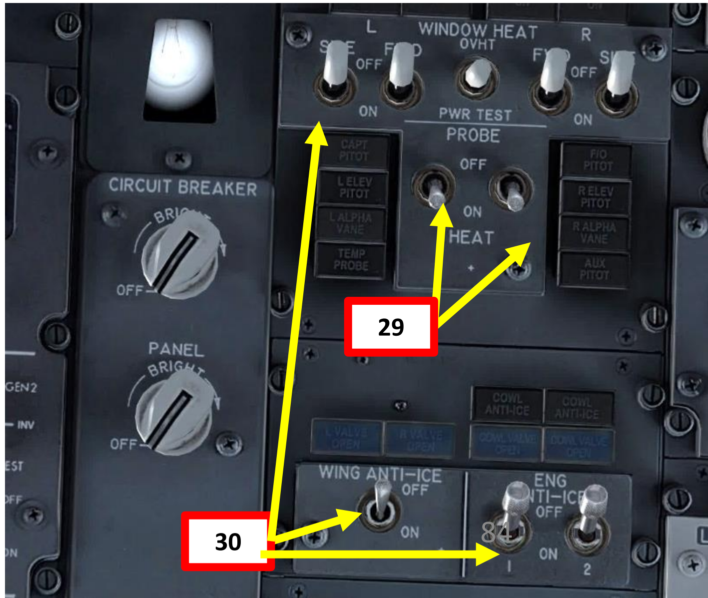
ENGINE START-UP

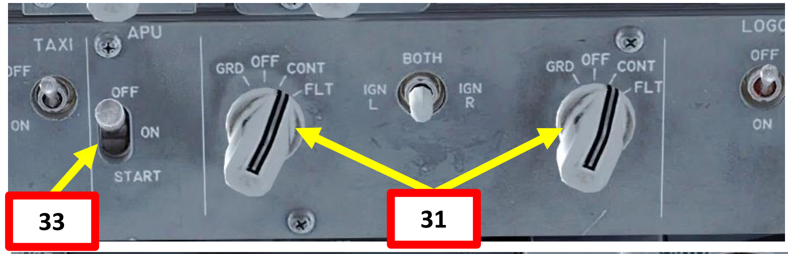
22. Set both Engine GEN 1 and GEN 2 switches to ON
23. Set ELEC 1 & 2 HYDRAULIC PUMP switches – ON
24. Turn OFF ground Power and remove chocks via the CDU
    - FS ACTIONS -> GROUND CONNECTIONS -> GROUND POWER REMOVED
    - FS ACTIONS -> GROUND CONNECTIONS -> WHEEL CHOCKS REMOVED
25. LEFT and RIGHT AIR CONDITIONING PACK (Pneumatic Air Conditioning Kit) switches – AUTO
26. LEFT and RIGHT RECIRCULATION FAN switches – AUTO
27. Isolation valve – AUTO
28. Set ENG 1 and 2 BLEED switches – ON
29. Pitot Heat Probe switches – ON
30. Engine Anti-Ice / Wing Anti-Ice / Window Heat switches – As Required
31. Set LEFT & RIGHT STARTER switches to CONT (Continuous Ignition). In real life, you would do it just before takeoff in order to not wear down the engines.
32. APU BLEED switch – OFF
33. APU switch – OFF





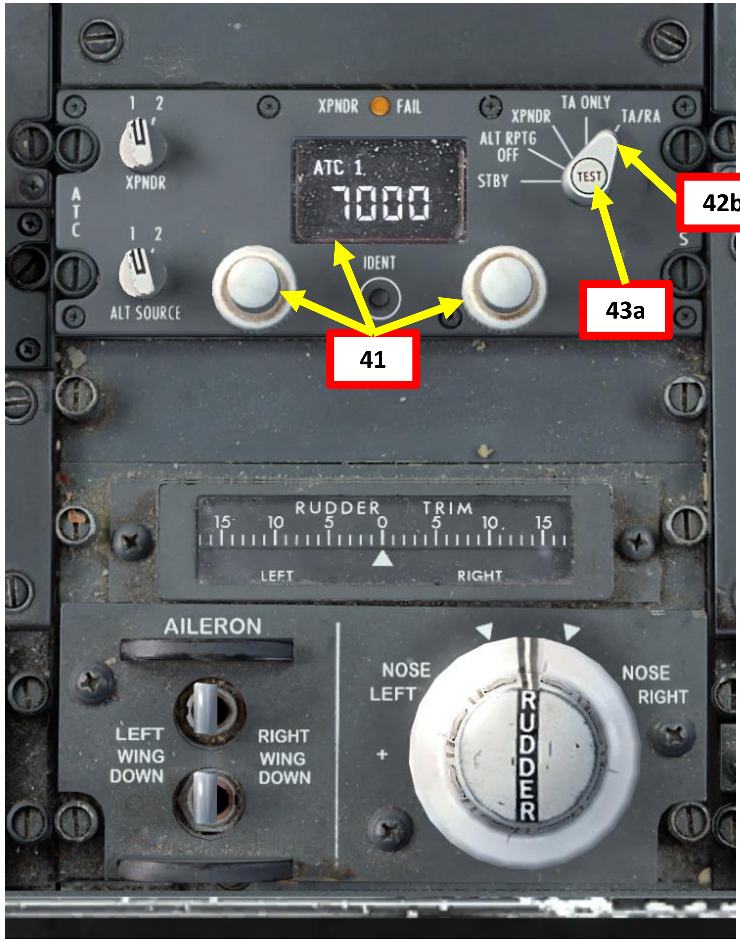


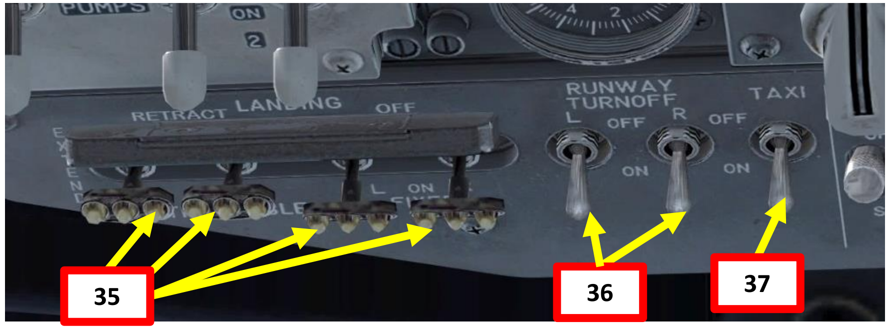


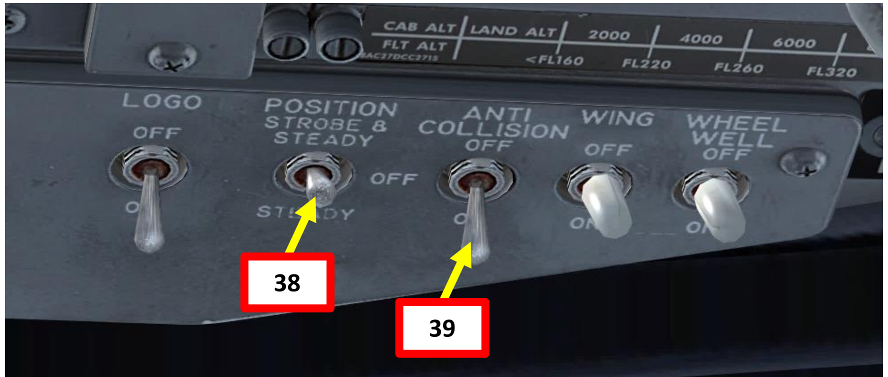


COMPLETE PRE-FLIGHT

34. Yaw damper switch – ON
35. Landing Lights switch – ON
36. Runway Turnoff Lights switches – ON
37. Taxi Light switch – ON
38. Position Lights switch – STROBE & STREADY
39. Anti-Collision Lights switch – ON
40. Emergency Lights – set switch to ARMED and close cover
41. Set Transponder frequency to 7000 (VFR standard squawk code for most of European airspace, or 1200 if in North America)
42. Set TCAS (Traffic Collision and Avoidance System) selector to TA/RA (Traffic Advisory/Resolution Advisory)
43. Push TCAS switch to initiate TCAS test by left-clicking and holding (pushing) the selector switch.
44. Confirm that TCAS test is performed correctly (aural warning and caution on Navigation Display page)

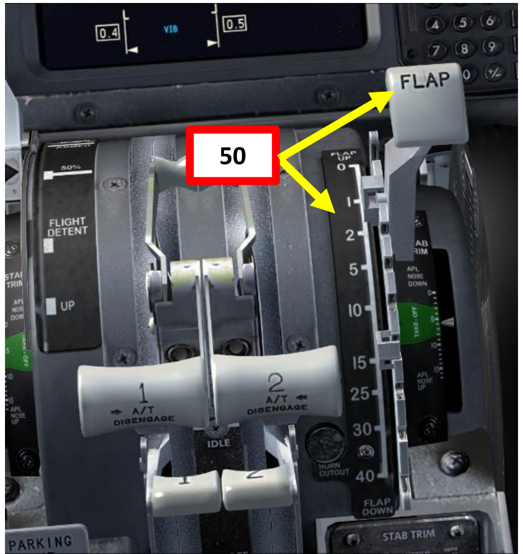






COMPLETE PRE-FLIGHT

45. In real life, you would set PACK 1 and PACK 2 switches to OFF to ensure maximal engine performance during takeoff and prolong engine life, but we don't need to in this tutorial.
46. Set throttle to IDLE and arm A/T (Autothrottle) switch on the MCP – UP POSITION
47. Set Autobrake selector to RTO (Rejected Takeoff)
48. Set FASTEN BELTS light to AUTO and NO SMOKING (CHIME) light to ON
49. Make sure Speed Brake is OFF (NOT ARMED) by checking that lever position is down and forward and that the SPEED BRAKE ARMED caution is extinguished.
50. Set Flaps lever to 1 as specified in the FMC

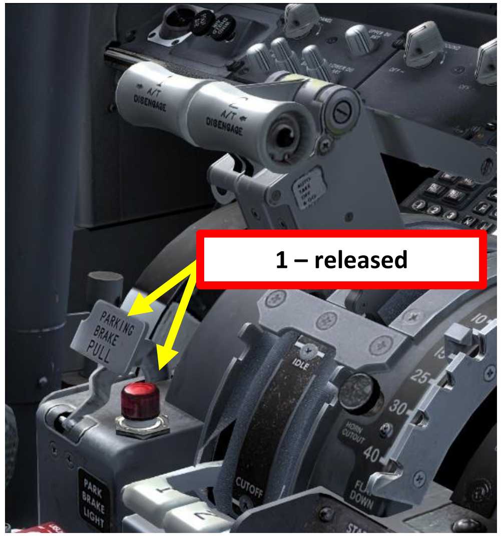


737-800 NG

PART 5 – TAXI

PUSHBACK

1. Release parking brake
2. Begin Pushback via the CDU
    - FS ACTIONS -> PUSHBACK
    - Set STRAIGHT LENGTH to 350 ft by typing 350 on the keypad and clicking on the LSK next to STRAIGHT LENGTH
    - Set TURN NOSE to RIGHT (does not matter in our case since we will pushback in a straight line at 0 degree)
    - Set DEGREES to 0 degrees
    - Click on START

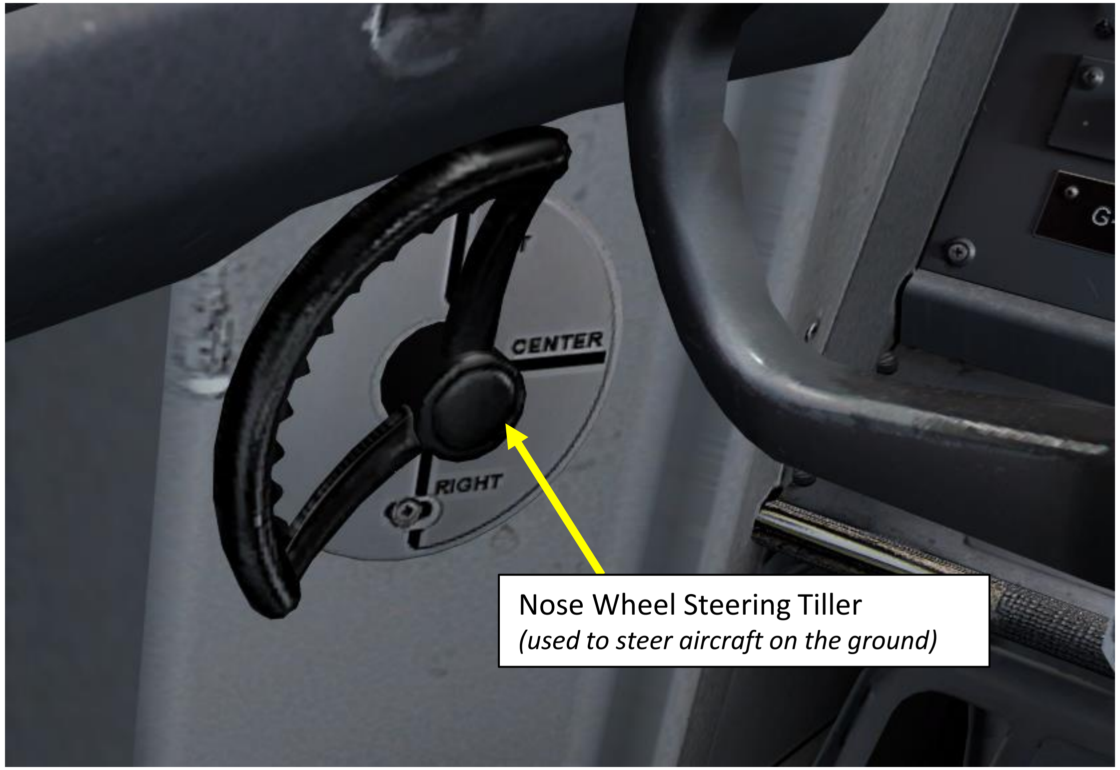


PUSHBACK

TAXI

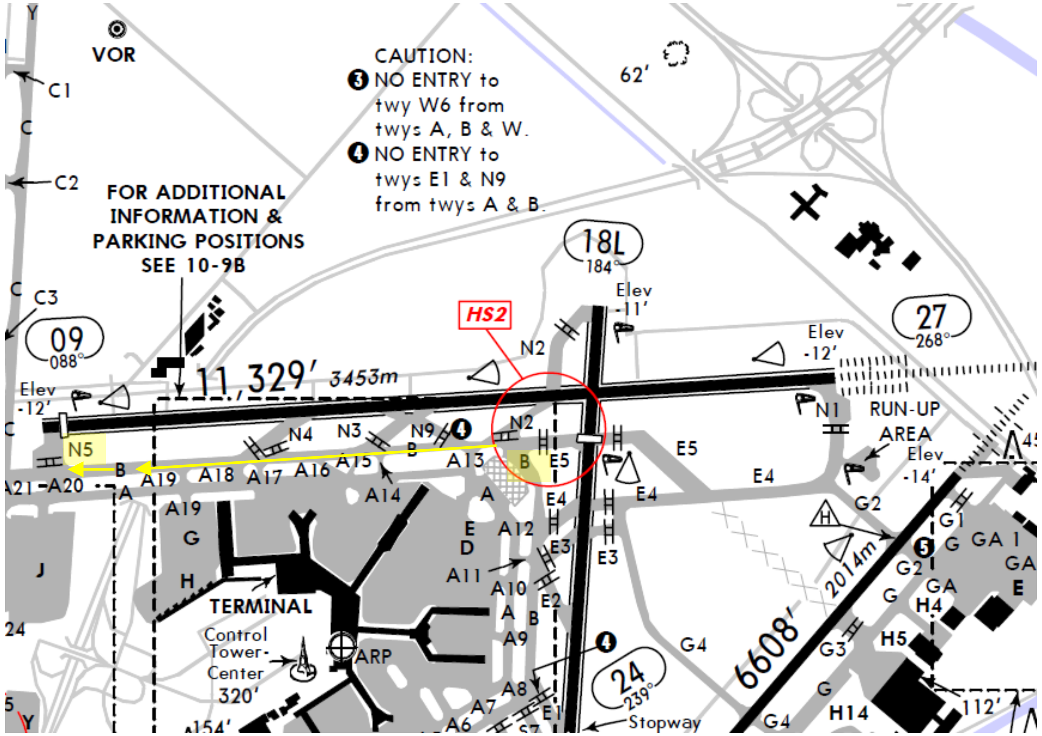
The 737 is steered on the ground by using a tiller.

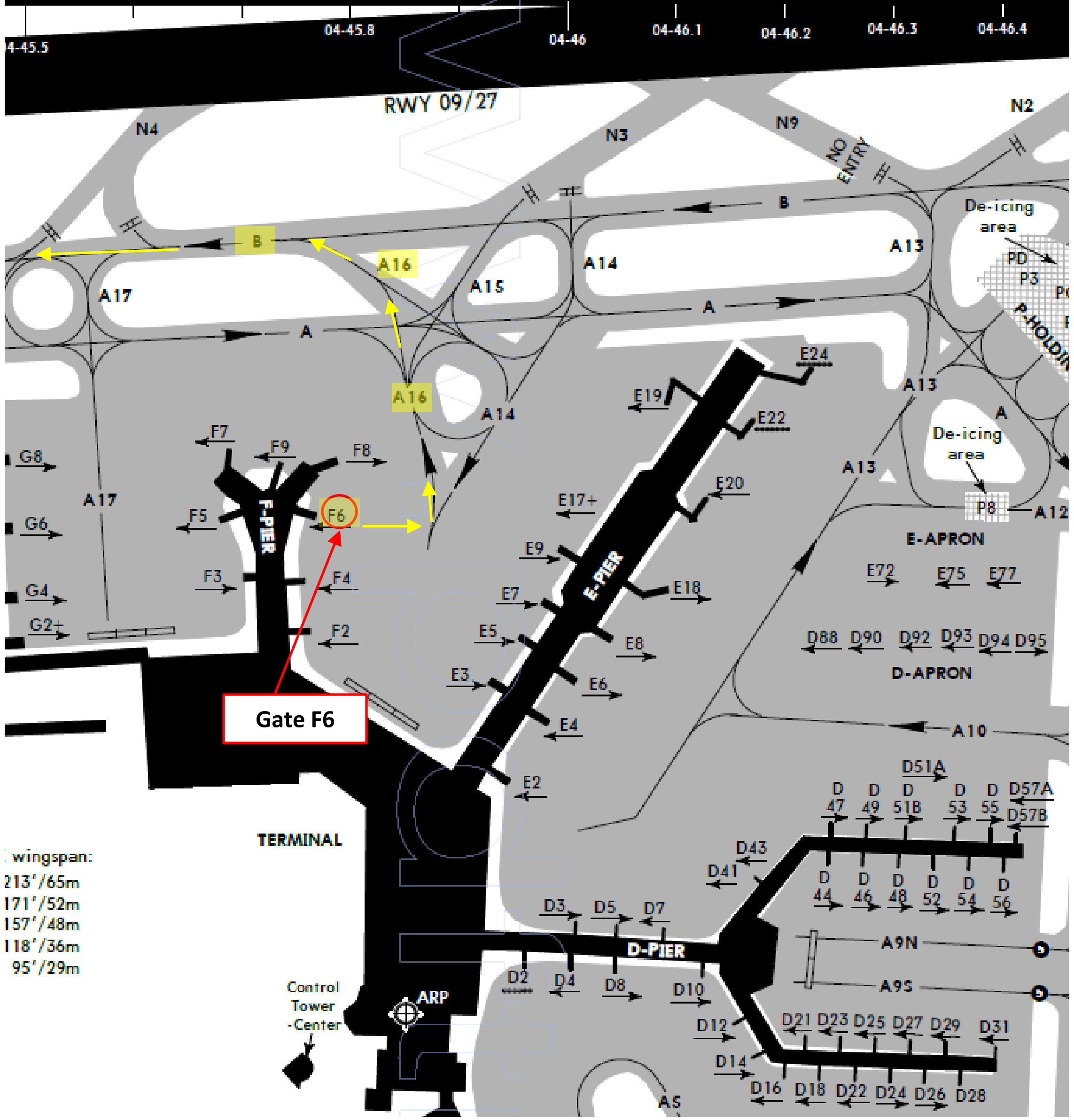
However, in FSX you cannot map a joystick axis to your nosewheel steering tiller: it's a limitation of the sim itself. In order to steer the aircraft, PMDG mapped the tiller axis directly on the rudder axis. If you move your rudder pedals while on the ground, the aircraft will have its full steering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

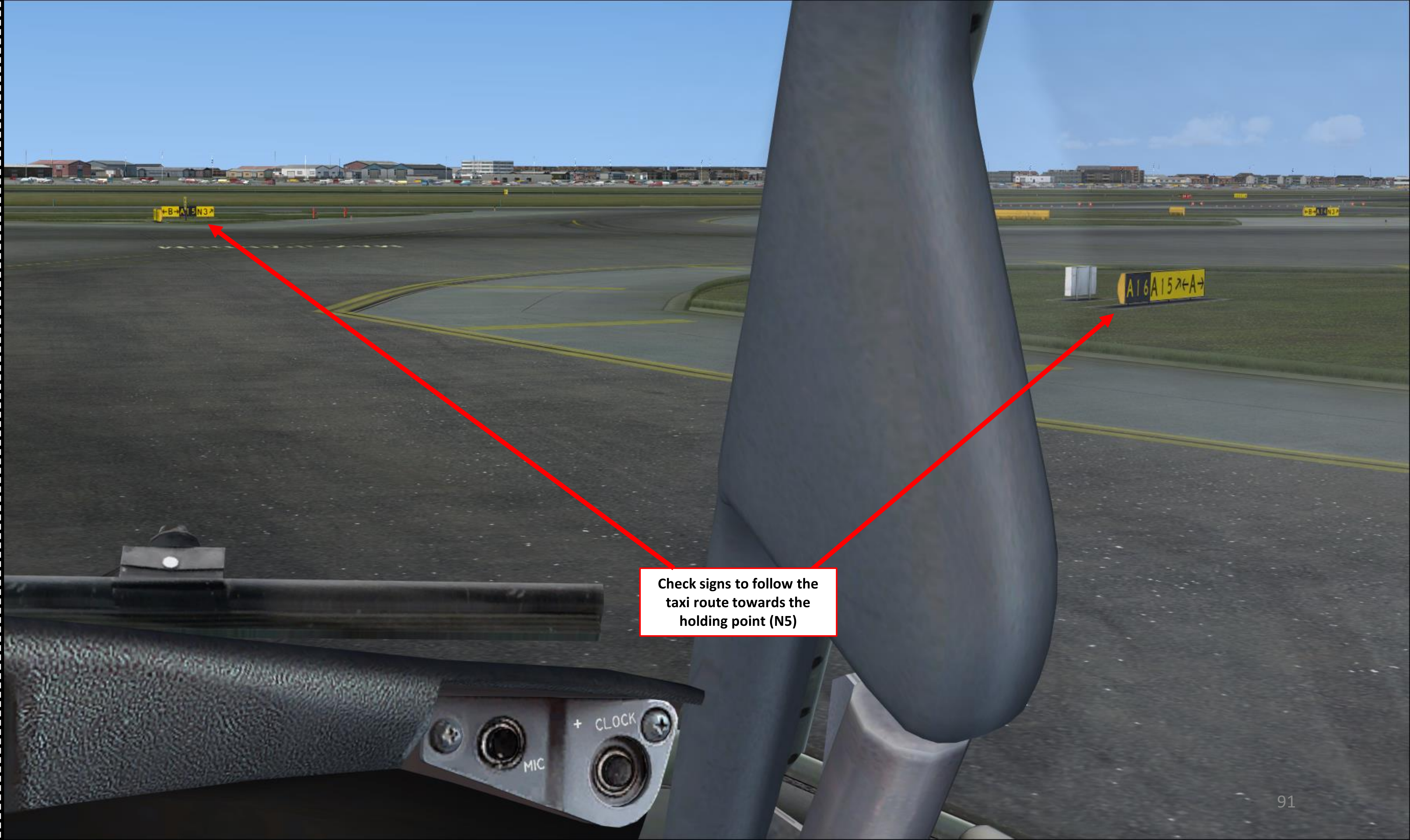


TAXI

- Our Flight Number is BAW106 and we spawned at gate F6.
- After we performed pushback from Gate F6, we would typically contact the tower for guidance by saying “BAW106, requesting taxi.”
- The tower would then grant you taxi clearance by saying “BAW106, taxi to holding position N5 Runway 09 via taxiways Alpha 16 (A16), Bravo (B).
- This means that we will follow the A16 line, then go to B, then turn right to N5 and 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.



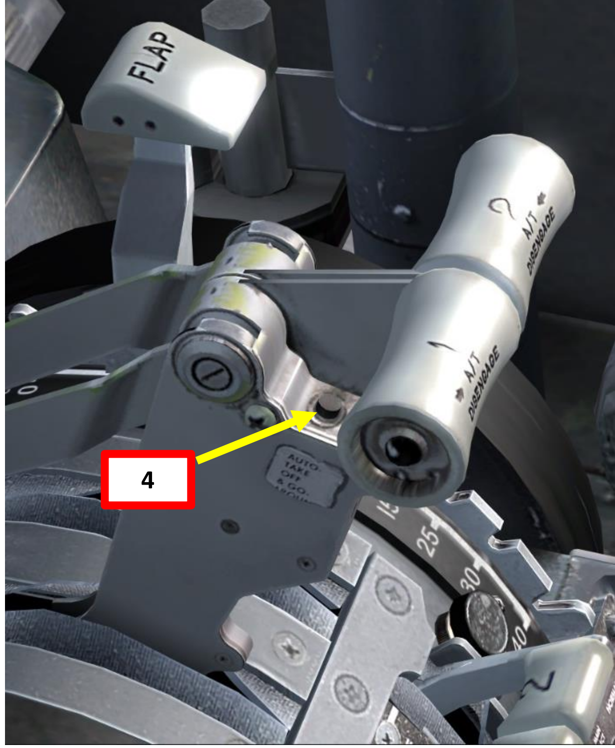


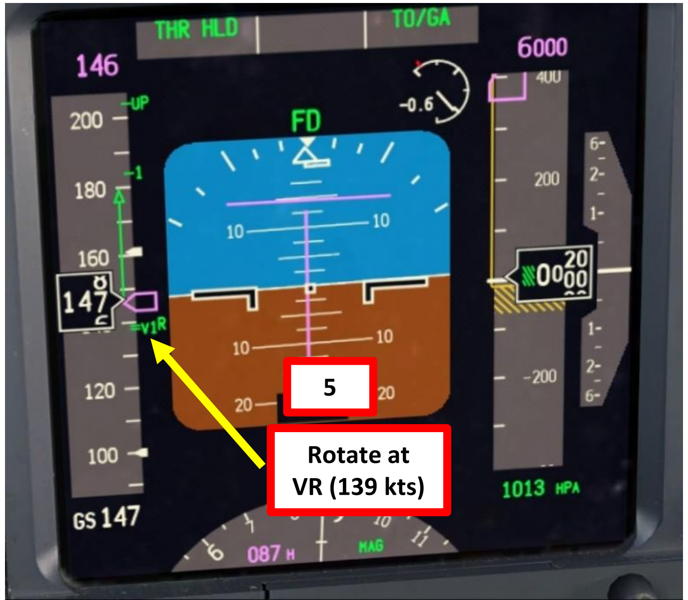

Check signs to follow the taxi route towards the holding point (N5)
CLOCK
MIC

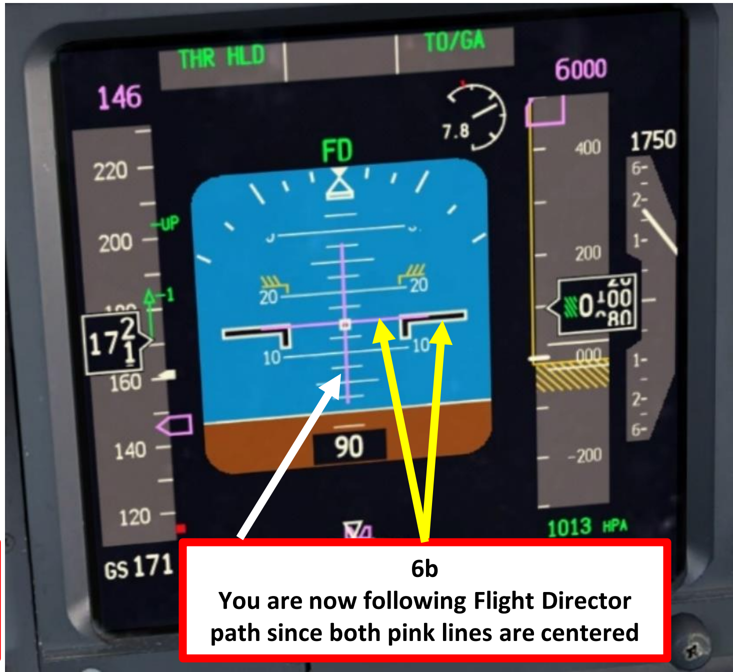

36C
09 N5
FIRE WARN
MAIN PANEL DUs
LOWER DU
MIC
QUALIFIED FOR EXT.
OVERWATER OPERATIONS

TAKEOFF

1. Line up on the runway and make sure parking brake is disengaged
2. Press and hold pedal brakes
3. Throttle up until engines reach 40 % N1 and stabilize, then throttle up to 70 % N1
4. Press the TO/GA button on the throttle to engage autothrottle and release brakes (alternatively, you can just throttle to max power)
5. Rotate smoothly and continuously when reaching VR (139 kts) until reaching 15 degrees of pitch angle
6. Follow the Flight Director (15 deg pitch)
7. Raise landing gear (right click) by setting landing gear lever to UP (up position)
8. Once landing gear has been fully retracted, set landing gear lever to OFF (middle position) by left-clicking
9. Autobrake switch – OFF







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Landing Gear in Transition

Landing Gear UP

Landing Gear OFF

CLIMB

1. When reaching an altitude of 400 ft, engage autopilot by pressing the “CMD A” button on the MCP. Your aircraft will now follow the “magenta line” on your navigation display automatically.
2. Press on the VNAV (Vertical Navigation) and LNAV (Lateral Navigation) autopilot mode buttons on the MCP (Main Control Panel) to engage VNAV and LNAV autopilot modes
3. Always synchronize your heading using the HEADING knob on the MCP. This will not steer the aircraft, but it is good practice in case you need to engage other autopilot modes quickly.

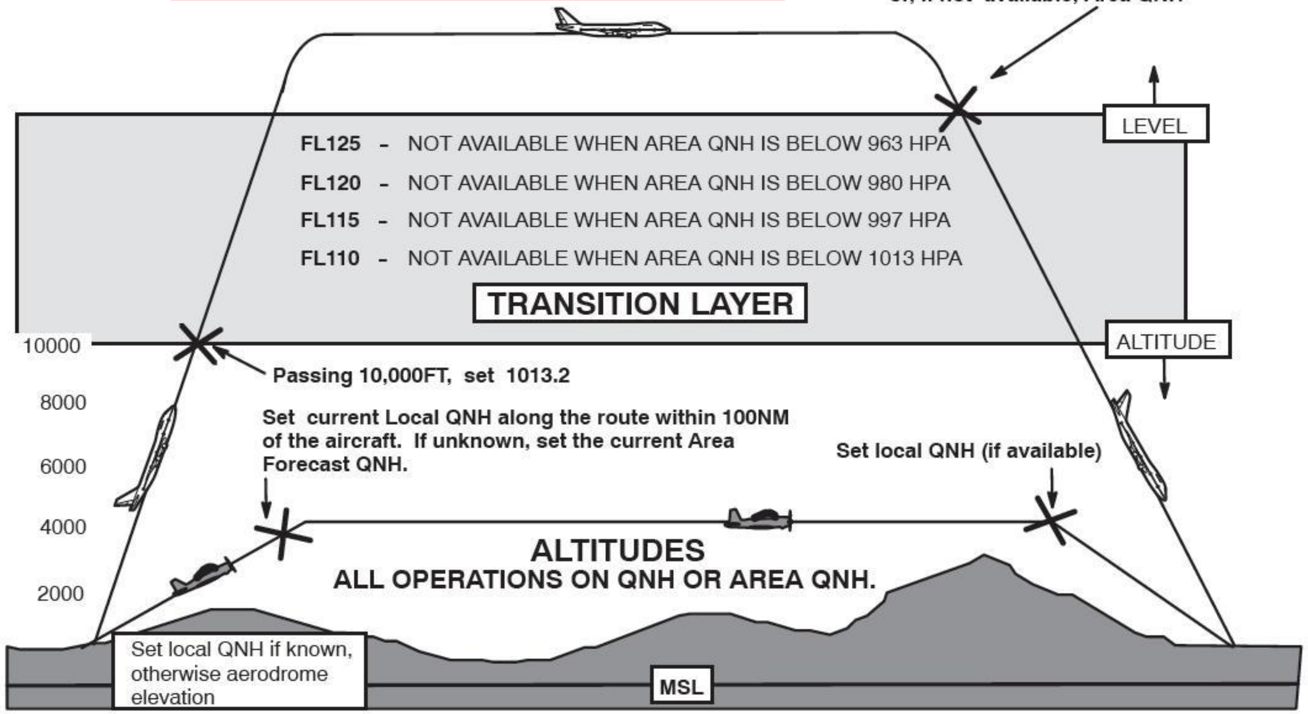
Autopilot HEADING not aligned with actual flight path

Autopilot HEADING aligned with actual flight path

CLIMB

4. Once you pass transition altitude (3000 ft in Europe, 18000 ft in the US), click on the SET SPD knob to switch barometric pressure to STANDARD pressure in order to use flight levels as a reference. This means you will be using a standard barometric pressure of 1013.2, 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. FL250 would be 25000 ft).

Transition Altitude (U.S. system)



4a

Amber indication means that you need to change barometric reference

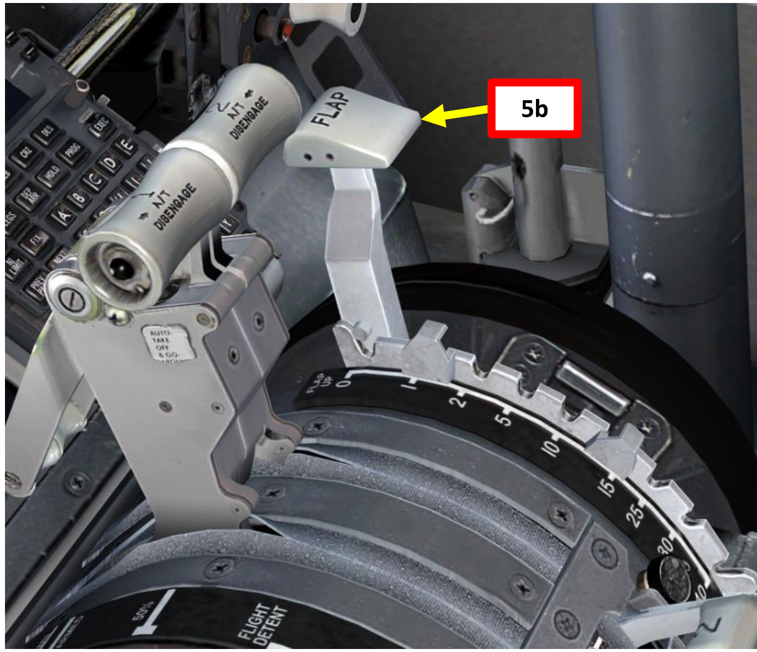
4b

4c

STD means that you are using standard barometric reference

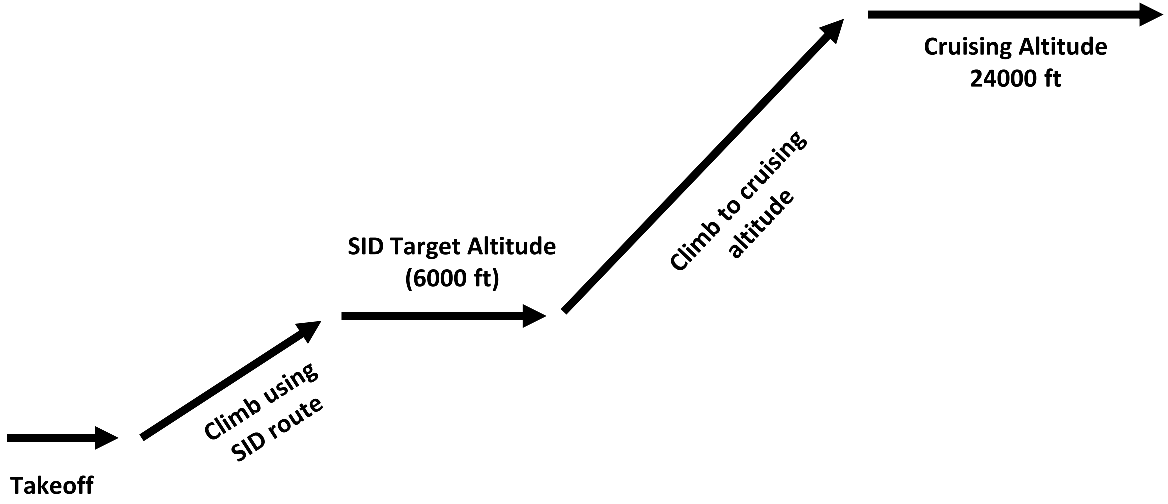
CLIMB

5. Once you have sufficient airspeed, set flaps to UP (right-click)
6. Engine Start switches – OFF
7. Landing Lights switch – OFF
8. Runway Turnoff Lights switches – OFF
9. Taxi Light switch – OFF
10. Position Lights switch – STROBE & STEADY
11. Anti-Collision Lights switch – ON
12. Seat Belt Lights – AUTO
13. You will reach your “TOP OF CLIMB” point at “T/C” on your navigation display for your SID target altitude (6000 ft)



CLIMB

14. We will now begin our climb to our cruising altitude of 24000 ft. Set the ALTITUDE knob on the MCP (Main Control Panel) to 24000.
15. Press the « ALT INTV » (Altitude Intervention) button on the MCP to set new altitude target to the autopilot. Autopilot will now climb to selected altitude.
16. You will reach your “TOP OF CLIMB” point at “T/C” on your navigation display for your cruising altitude (24000 ft)



Introduction to Autopilot

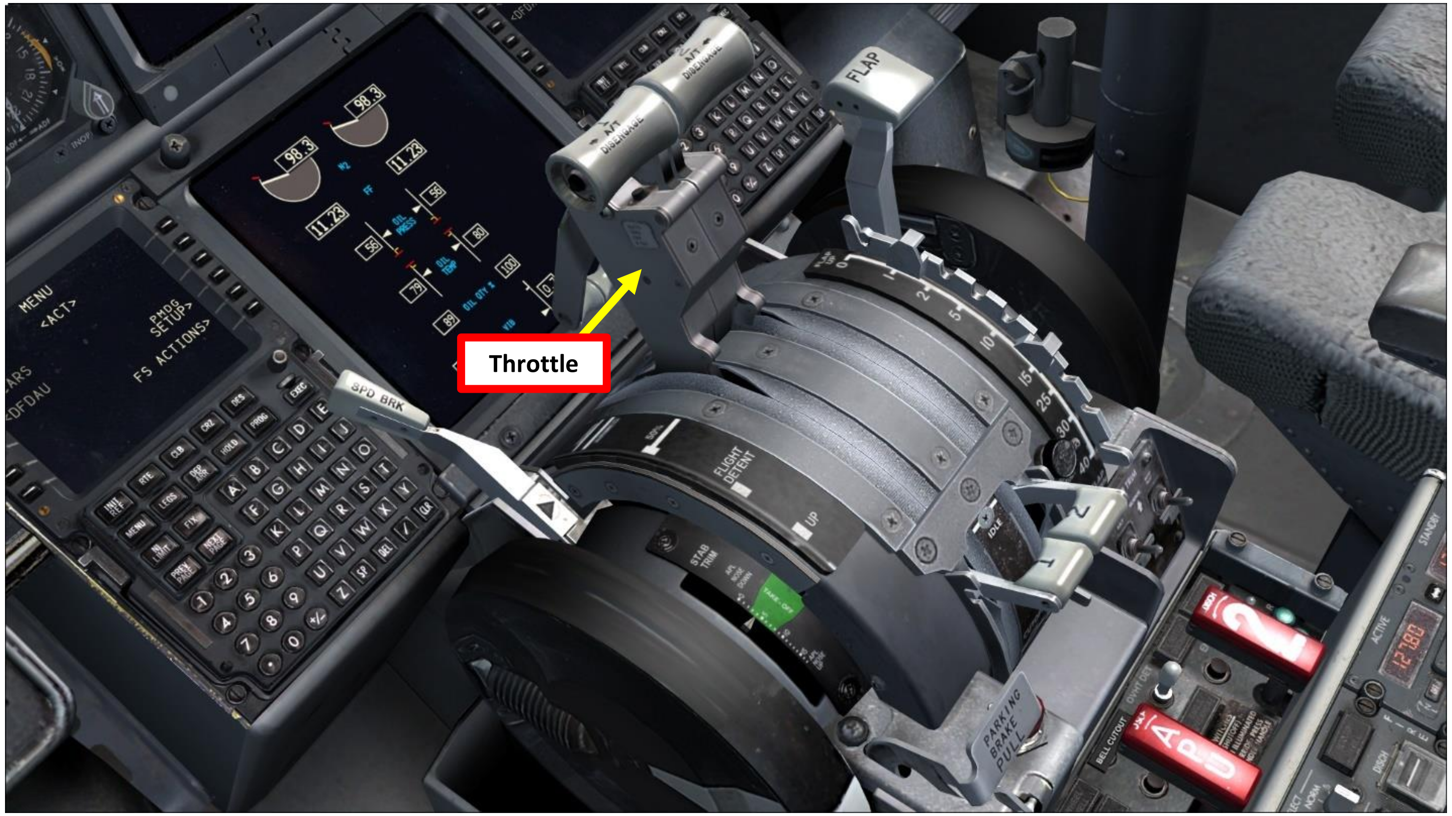
Many newcomers in the flight simulation world have this idea that on the 737, the autopilot is the answer to EVERYTHING. And I mean: e-v-e-r-y-t-h-i-n-g. Spoiler alert: it's not. The autopilot is a tool to help you fly to reduce your workload, not a tool to replace the pilot.

Now, why am I saying this? Because *some* people's knowledge of the autopilot system is summed up in "hit LNAV and VNAV, then go watch an episode of Mayday while the aircraft does all the work". However, there are times where the autopilot can disconnect by itself (i.e. during major turbulence, or when the autopilot is trying to follow a flight profile (SID or STAR) that exceeds safety limitations like bank or pitch angles). The autopilot isn't smart: it will put you in dangerous situations if you ask him to. It will "blindly" follow whatever is set in the FMC. If there are conflicts or errors in the FMC's flight plan, the AP will gladly follow them even if they don't make sense. This is why you need to constantly be able to fly the aircraft manually if need be. 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.

Autopilot and Auto-Throttle

The autopilot is separated in three main components: the flight director, the autopilot itself and the auto-thrust system. Aircraft pitch and attitude will help maintain the aircraft on a certain flight path. The throttle will help maintain the aircraft on a certain speed. Depending on the phase of flight (takeoff, climb, cruise, descent, final approach, etc.), the autopilot will react differently. During a climb, the AP will want to maintain the best, most fuel-efficient climb to save fuel. During a descent, the AP will want to slow down in order to approach the runway in a low-speed high-lift configuration. The Auto-Thrust system will control the engines for you: when AT is engaged, you will see the throttle physically move by itself.

The AP has two channels: A and B. The only time the two autopilot channels will engage simultaneously is at G/S (glide slope) intercept.



Autopilot Parameter Selectors

- Course Selector: Sets course in COURSE display for related VHF NAV receiver.
- IAS MACH Selector: Sets speed input to aircraft autopilot.
- C/O: Change over airspeed unit (IAS (indicated airspeed) vs Mach), usually used above FL260, or 26000 ft
- Heading Selector: Sets heading input to aircraft autopilot.
- Altitude Selector: Sets altitude input to aircraft autopilot.
- Vertical Speed Selector: Sets vertical speed input to aircraft autopilot.

Autopilot, Flight Director & Autothrottle Selectors

- Auto-throttle (A/T) ARM Switch : Arms A/T for engagement. Auto-throttle engages automatically when LVL CHG, V/S, VNAV, ALT HOLD modes are used.
- Flight Director (F/D) Switch: Arms flight director
- CMD A/B: Engages autopilot in selected mode.
- CWS A/B: Control Wheel Steering. Used as an “attitude hold” (CWS R = Roll Angle Maintained, CWS P = Pitch Angle Maintained)
- DISENGAGE Bar: Disengages autopilot.

Autoflight – Thrust/Speed Modes

- N1: Engages auto-throttle in N1 mode maintains thrust at N1 limit selected from FMC (or manually set via the N1 Set knob). Automatically engages in certain conditions.
- SPD: Engages auto-throttle in SPEED mode (maintains IAS/MACH value in display).

Autoflight – Vertical Modes

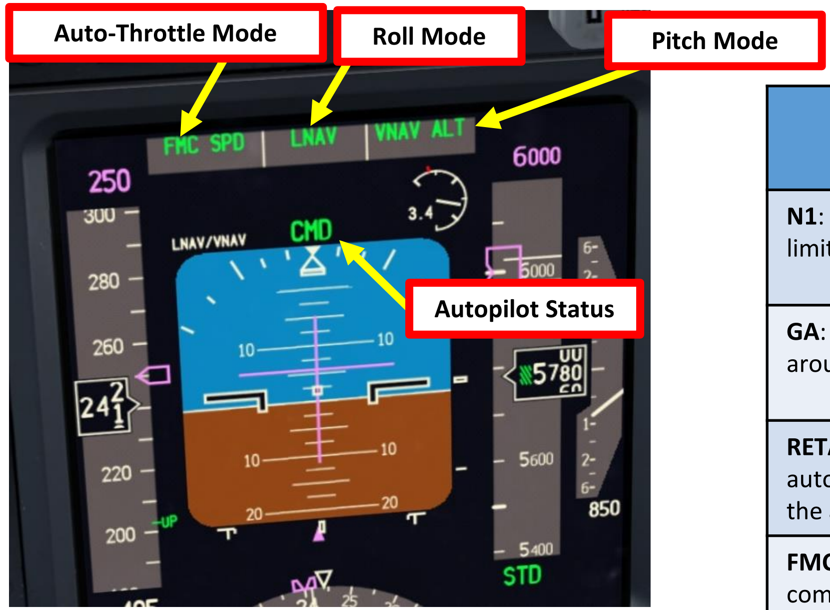
- VNAV: Vertical Navigation mode will follow the vertical components and restrictions of the flight plan entered in the FMC.
- LVL CHG (Level Change): Aircraft climbs or descends to selected ALTITUDE at selected IAS/MACH
- SPD INTV: Speed Intervention, aircraft limits its speed to selected IAS/MACH. Used while in VNAV mode. Used for speeds not set in FMC flight plan restrictions.
- ALT HLD: Aircraft levels off and holds its current altitude.
- V/S: Sets Vertical Speed to selected VERT SPEED.
- ALT INTV: Altitude Intervention, aircraft will climb or descend to selected ALTITUDE. Used for altitudes not set in FMC flight plan restrictions.

Autoflight – Lateral Modes

- LNAV: Lateral Navigation mode will follow the lateral components and restrictions of the flight plan entered in the FMC.
- HDG SEL: Heading and Bank Angle selector. Aircraft will roll towards the selected HEADING.
- VOR LOC: Tracks VHF Ominidirectional Range (VOR) localizer. Aircraft will only be controlled laterally.

Autoflight – Vertical + Lateral Mode

- APP: Tracks localizer and glideslope during approach. Aircraft will be controlled laterally and vertically.



FMA (Flight Mode Annunciator)

The FMA displays the status of the auto-throttle, roll, pitch, and autopilot systems.

Green annunciation is when a mode is ENGAGED. White annunciation is when a mode is ARMED.

Auto-Throttle	Roll	Pitch	Autopilot
N1: Maintains thrust at selected N1 limit	**HDG SEL**: Heading Selected Mode	**TO/GA**: Takeoff-Go Around Mode (when TOGA switch is pressed on throttle)	**CMD**: Autopilot Command Engaged
GA: Maintains thrust at reduced go-around setting	**VOR/LOC**: VHF Ominidirectional Range/Localizer Mode	**V/S**: Vertical Speed Mode	**FD**: Flight Director Engaged (no autopilot)
RETARD: Displayed when autothrottle moves lthrust levers to the aft stop.	**LNAV**: Lateral Navigation Mode	**MCP SPD**: Maintains speed as set on MCP IAS/MACH display	**CWS R**: Control Wheel Steering Roll Engaged
FMC SPD: Maintains speed commanded by the FMC.		**ALT/ACQ**: transition maneuver entered automatically from a V/S, LVL CHG, or VNAV climb to selected MCP altitude	**CWS P**: Control Wheel Steering Pitch Engaged
MCP SPD: Maintains speed as set on MCP IAS/MACH display		**ALT HOLD**: commands pitch to hold MCP selected altitude at which ALT HOLD switch was pushed	
THR HLD: Thrust lever autothrottle servos are inhibited; pilot can set thrust levers manually		**G/S**: Autopilot follows the ILS (Instrumented Landing System) glideslope	
ARM: No autothrottle mode engaged		**FLARE**: displayed during a dual A/P ILS approach after LOC and G/S capture and below 1500 ft AGL	
		VNAV SPD: maintains FMC vertical speed restrictions	
		VNAV PTH: maintains FMC altitude or descent path	
		VNAV ALT: maintains altitude when conflict occurs between VNAV profile and MCP altitude	

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.

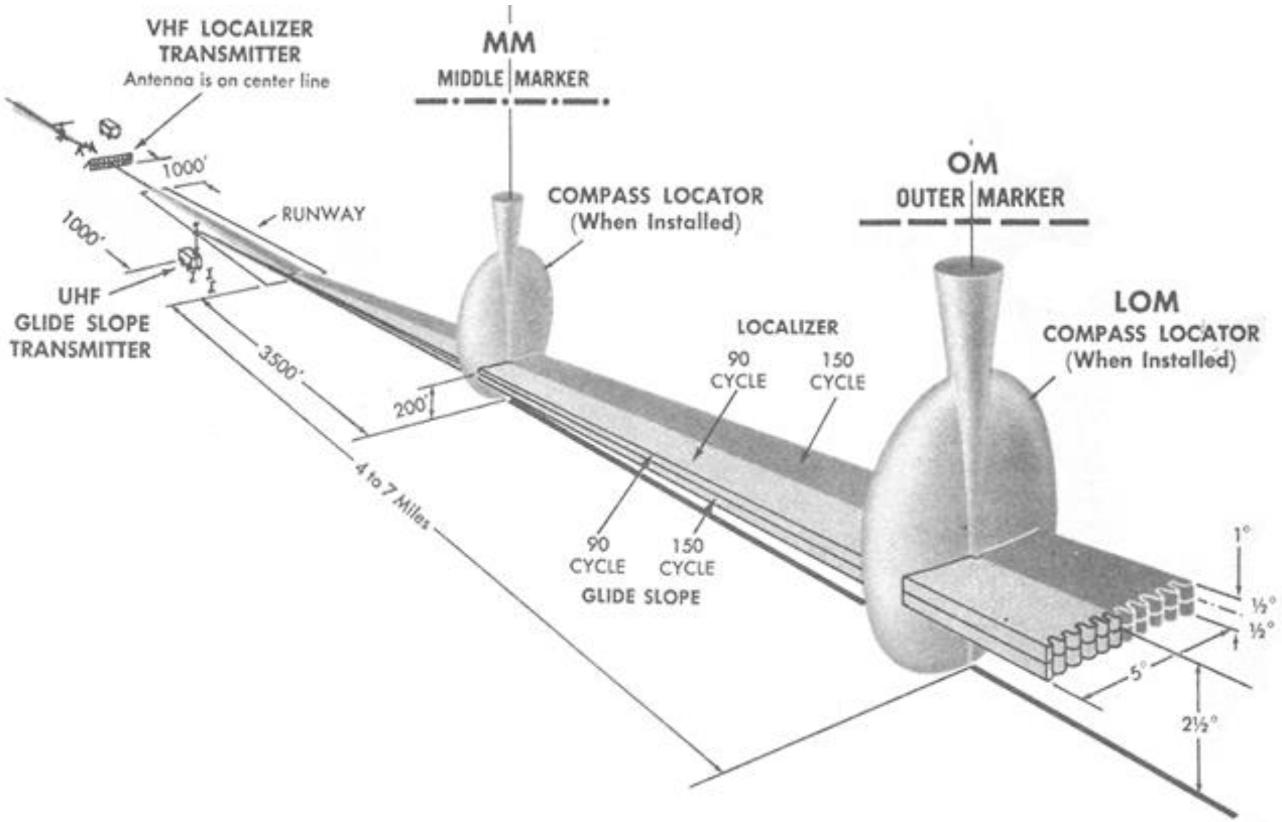
First, let's introduce you to the ILS (Instrument Landing System). This system exists to guide you during your approach.

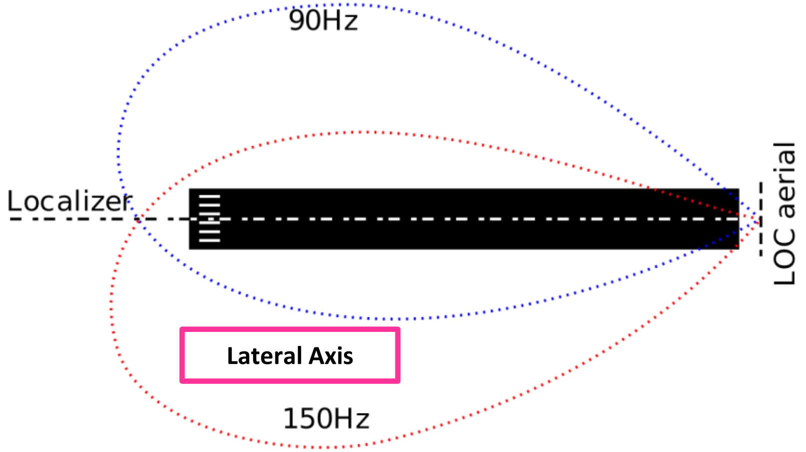
- The Localizer is generally an array of antennas that will give you a lateral reference to the center of the runway.
- The Glide Slope station will help you determine the descent speed you need in order to not smack the runway in a smoldering ball of fire.


Localizer Array Station at Hannover

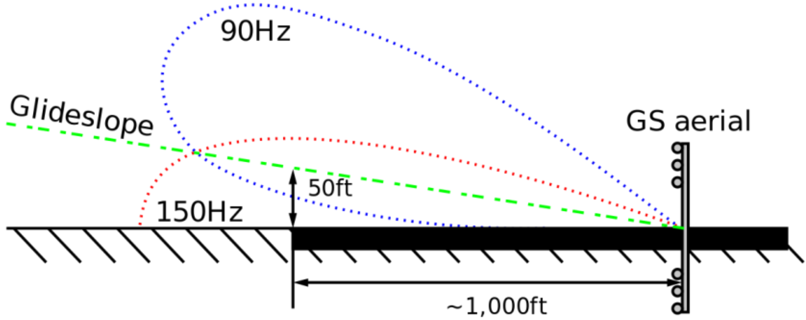

Glide Slope Station at Hannover

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





Lateral Axis

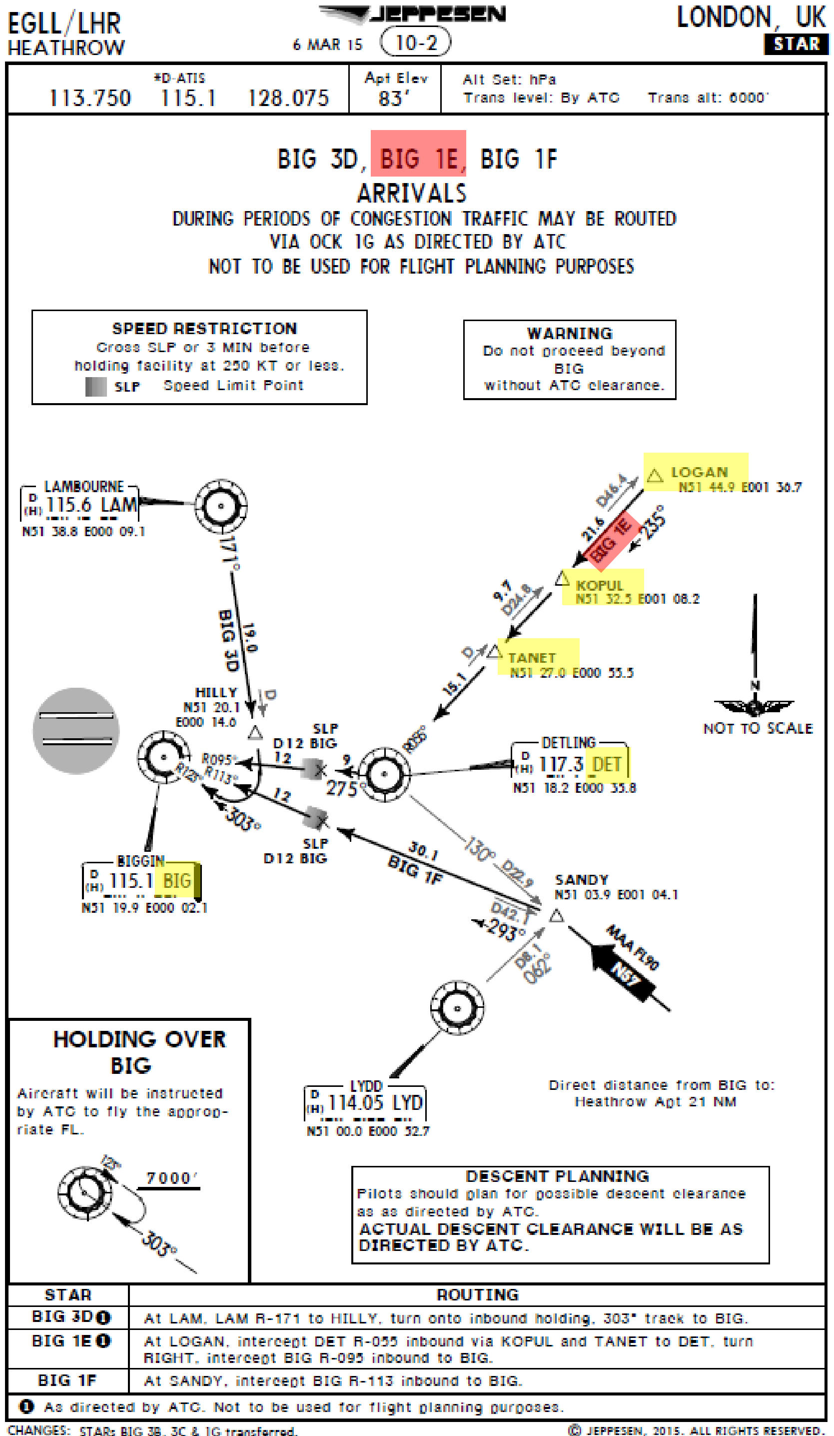


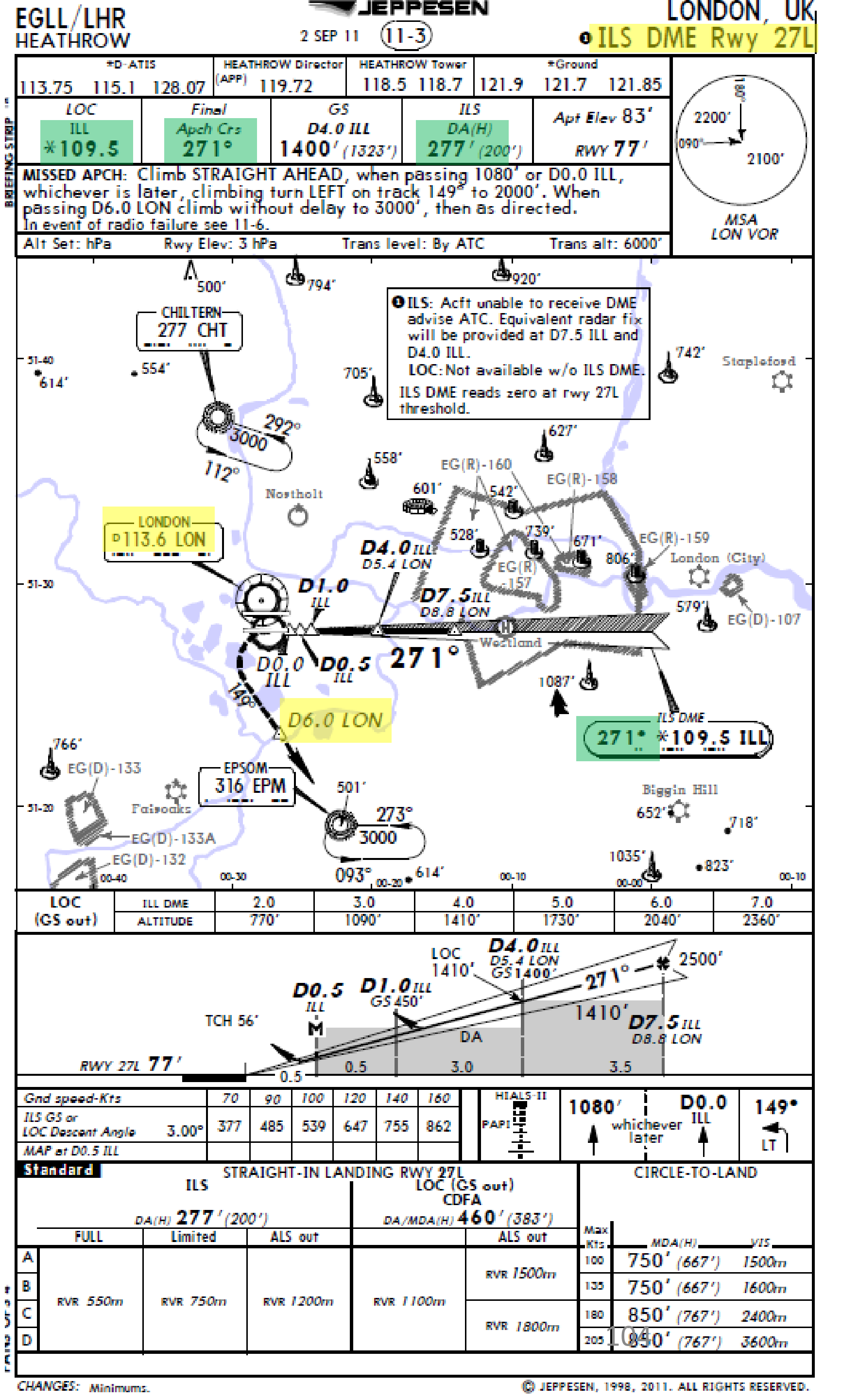
Vertical Axis

PLANNING DESCENT

These charts are for the STAR (Standard Terminal Arrival Route) from LOGAN to EGLL. We intend to:

1. Come from LOGAN waypoint
2. Fly from LOGAN towards the BIG1E arrival route.
3. Follow the STAR (BIG1E -> KOPUL -> TANET -> DET -> BIG)
4. Select an AIF (Approach Initial Fix) from the FMC database (in our case CI27L) and follow the approach towards the runway, guided by the EGLL airport's ILS (Instrument Landing System).
5. Land at Heathrow (EGLL) on **runway 27L** (orientation: 270 Left)





PLANNING DESCENT

Final Approach Course: 271
This is the heading you will take when approaching for final landing.

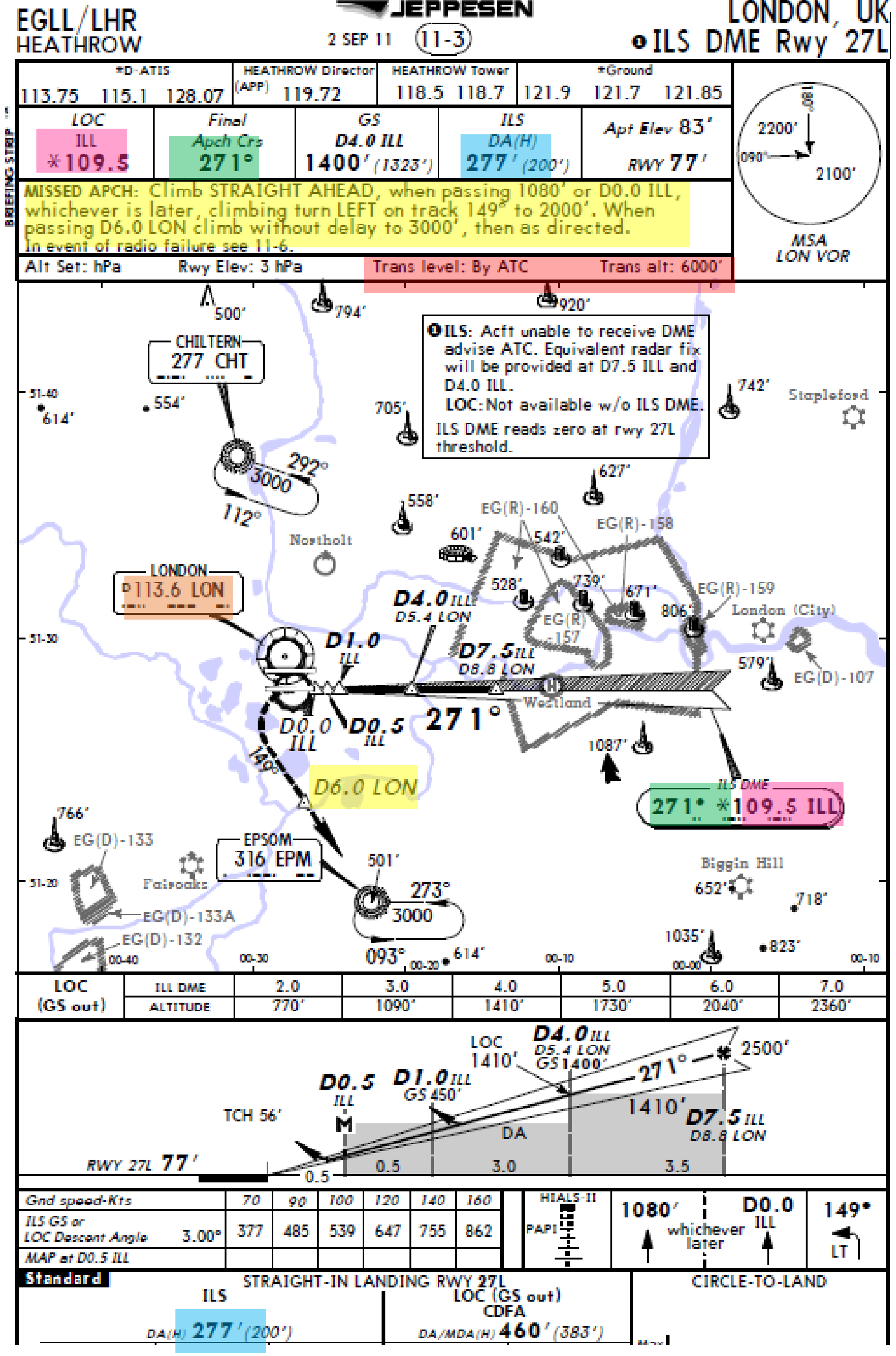
Minimums in BARO: 277
This is the minimum "decision altitude" (DA) during landing. If you go lower than 277 ft, you are committed to land no matter what happens. Above 277 ft, you can still miss your approach and go around.

ILS Frequency: 109.50 MHz
This is the ILS system frequency you will track to guide your aircraft for landing.

Missed Approach Standby Frequency: 113.60 MHz
VOR "LONDON" (LON) 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 1080 ft, we climb LEFT on heading 149 to 2000 ft. When passing VOR beacon D6.0 LON, we must climb to 3000 ft and wait for instructions from the tower.

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 (6000 ft on chart). The transition level is the lowest flight level available for use above the transition altitude. Our transition level is defined "by ATC" (Air Traffic Controller). In that case, a rule of thumb is to add 1000 ft to the transition altitude which give us FL070, or 7000 ft.

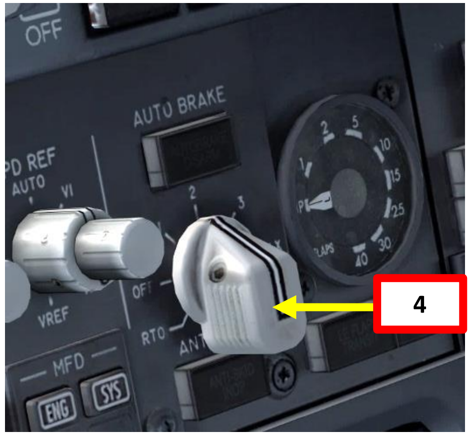


Here is a great link to know how to read these charts properly:

https://community.infinite-flight.com/t/how-to-read-an-approach-chart/8952

PLANNING DESCENT

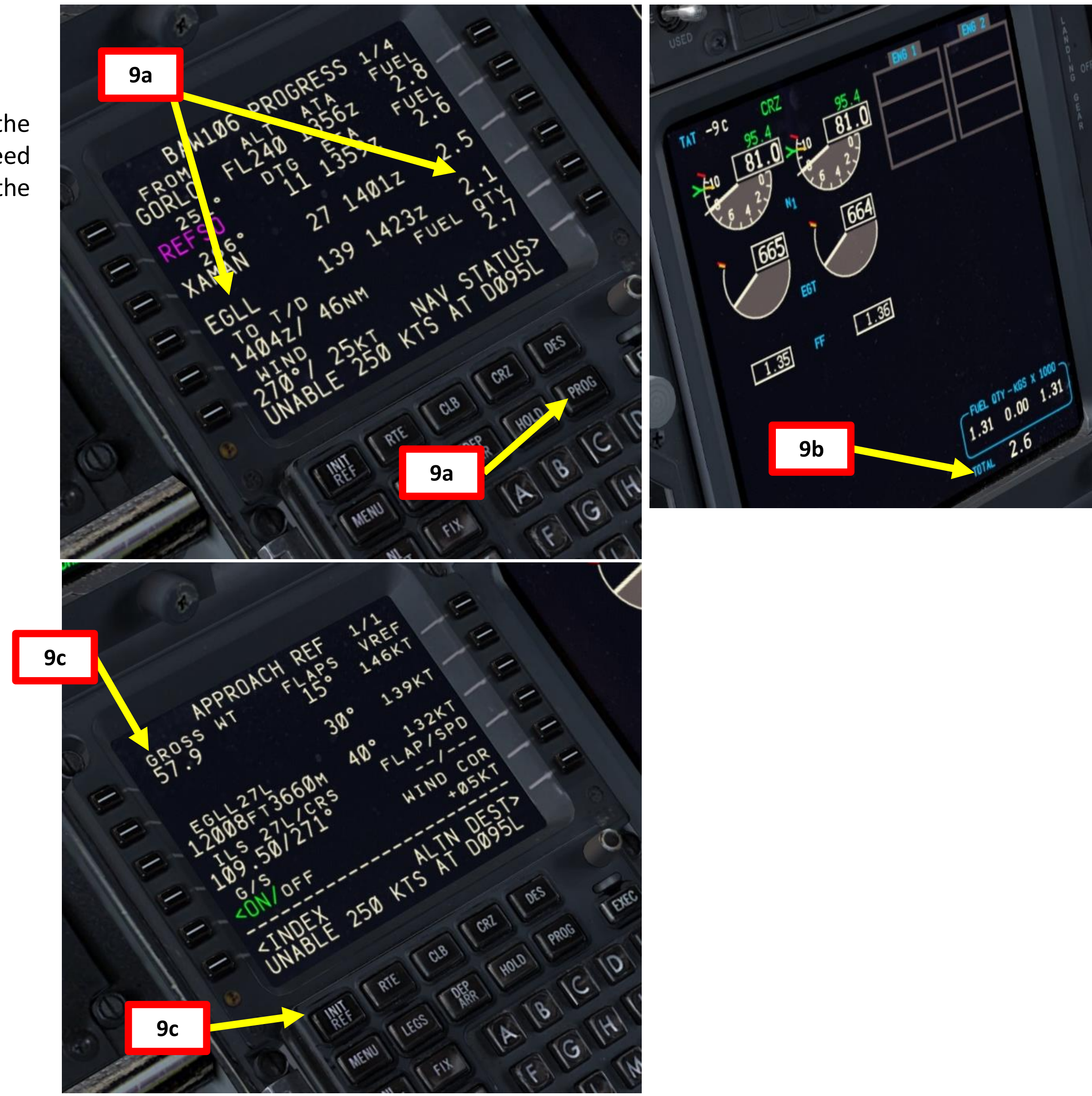
1. We have already selected in our FMC our Arrival runway as ILS27L and our arrival STAR “BIG1E” and our Initial Approach Fix “CI27L” at the beginning. Normally, we do this before we begin our approach. See the “FMC SETUP – WAYPOINTS” section.
2. On MCP, set COURSES to Final Approach Course for runway 27L (271).
3. Set MINIMUMS on BARO to 277
4. Set AUTOBRAKE to 2
5. Set Standby Attitude Indicator to APP (approach) mode
6. Set NAV ACTIVE frequency to ILS frequency (109.50). Set frequency in NAV STANDBY window and click the TFR button to move it to the NAV ACTIVE window.
7. Set NAV STANDBY frequency to VOR “LONDON” (LON) for Missed Approach (113.60 MHz)

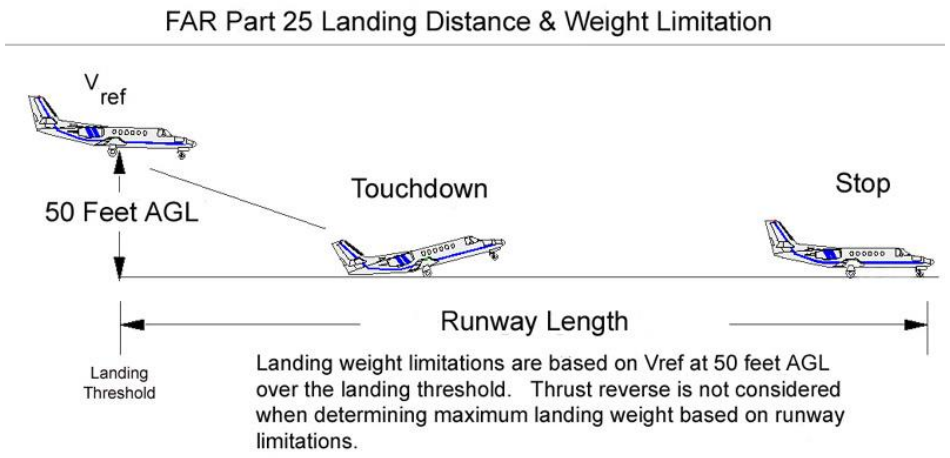


PLANNING DESCENT

8. We must now define VREF for our desired flap setting (reference landing speed over the runway threshold). Luckily, the FMC (Flight Management Computer) can calculate this speed for us. The only input we need is the aircraft's Gross Weight (Sum of the weights of the aircraft, fuel, crew, passengers, and cargo) when reaching EGLL (Heathrow).
9. We will use the following formula to calculate Gross Weight @ Landing:

GW @ Landing = (Current GW) – (Current Fuel – Arrival Fuel) = <u>57.4 tons</u>
Arrival Fuel @ EGLL = 2.1 tons *(see FMC "PROGRESS" page at "EGLL - FUEL QTY")*
Current Fuel = 2.6 tons *(see TOTAL FUEL QTY indication on EICAS ENG page)*
***Current Gross Weight* = 57.9 tons** *(see FMC "INIT/APPROACH REF" page at "GROSS WT")*





PLANNING DESCENT

10. On the CDU keypad, enter the predicted gross weight at landing “57.4” and select the LSK next to “GROSS WT” to update the VREF values. You should see them change to lower reference airspeed values.
11. Click on the LSK next to “30° – 139KT” to copy the VREF speed for a Flaps 30 degrees landing configuration.
12. Click on the LSK next to FLAP/SPD to paste the calculated VREF value.
13. Enter 05 on the CDU keypad and click on the LSK next to “WIND COR” to set a minimum wind correction of 5 kts.

PLANNING DESCENT

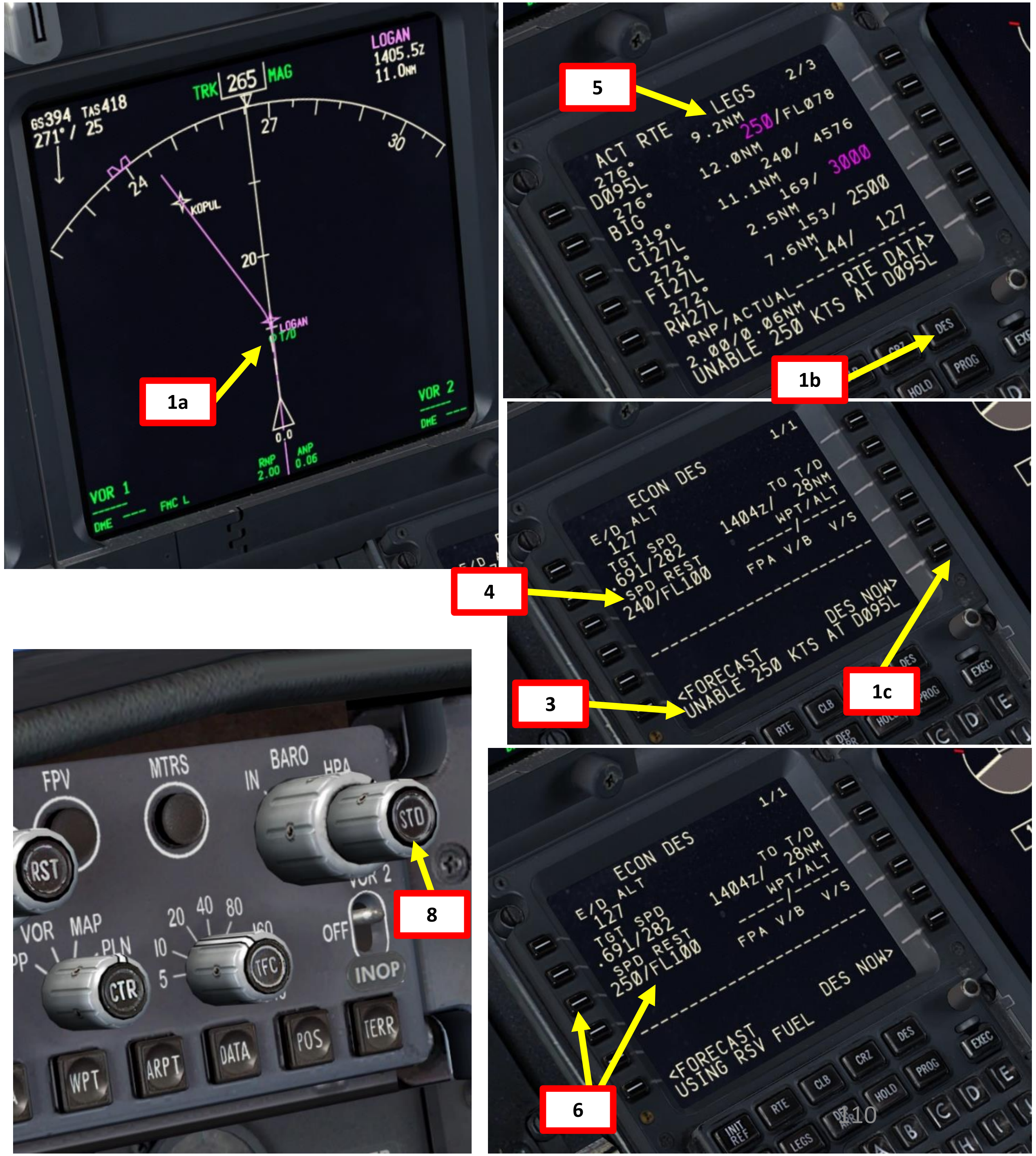
14. We must now set our transition level in the FMC
15. Click on the “DESCENT” FMC page on the CDU and select LSK next to the “FORECAST” menu.
16. Type “70” for FL070 (7000 ft) on the CDU keypad and click on the LSK next to “TRANS LVL”.
17. On MCP (Main Control Panel), set Final Descent Altitude to 2000 ft. The aircraft will not start descending yet because it hasn’t reached the T/D (Top of Descent) point.
18. Go in the LEGS page of the FMC and make sure that you have enough distance to perform your approach at a 3 deg glide slope. You can use the following rule of thumb:
    <u>Required Descent Distance = (Altitude x 3)/1000 + (10 nm for deceleration)</u>
    = (24000 x 3)/1000 + 10 = 72 + 10 = 82 nm

DESCENT & APPROACH

1. You will automatically start descending when reaching the T/D point.

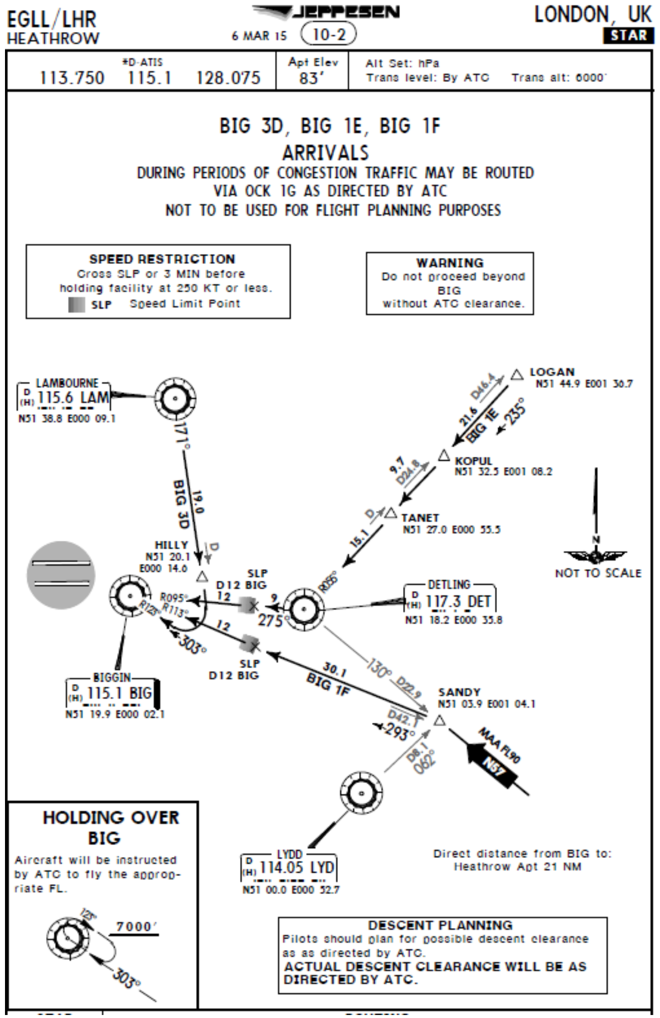
   NOTE: Alternatively, you can also start your descent a bit earlier in order to do a smoother descent that will be more comfortable for passengers by using the "DES NOW" mode. This DES NOW mode starts the plane down at a shallow 1000 FPM (feet per minute) until it intercepts the VNAV path. Going from 0 to 1000 FPM is far less noticeable to the passengers than quickly going from 0 to 3000 FPM is. DES NOW is also what you would press if ATC gave you a descent clearance prior to your T/D.

   ALTERNATIVE PROCEDURE: When you are about 5-10 nm from the Top of Descent point (T/D), click on the "DESCENT" FMC page on the CDU, select LSK next to "DES NOW" and click on the EXEC button on the CDU.
2. The FMC will display a "DRAG REQUIRED" message. Don't worry about it, it's a miscalculation of the descent path that is there in the real FMC as well.
3. Once our descent profile is initiated, a speed restriction is calculated. This can sometimes create conflicts between the calculated speed restriction to achieve our descent and the speed restrictions already set in place at certain waypoints. As an example, we have a conflict in the FMC displayed by the message "UNABLE 250 KTS AT D095L".
4. If we go in the FMC's "DESCENT" page, we will find that our descent profile has a restriction of "240/FL100", which means that we need to fly at 240 kts or below for an altitude of 10000 ft or below.
5. If we go in the FMC's "LEGS" page, we will find that the restriction "250/FL078" for waypoint D095L means that we need to fly at 250 kts or below for an altitude of 7800 ft or below.
6. Go back to the FMC's "DESCENT" page, enter "250/" on the CDU's keypad and click on the LSK next to "240/FL100". This will replace the restriction and get rid of the FMC conflict.
7. When reaching FL100, set FIXED LIGHTS to ON and SEAT BELTS light to ON.
8. When reaching the transition level of 7000 ft, click on the "STD" BARO button to set barometric pressure instead of standard pressure. In our case, we will assume the tower told us to leave the barometric pressure at 1030 hPa.



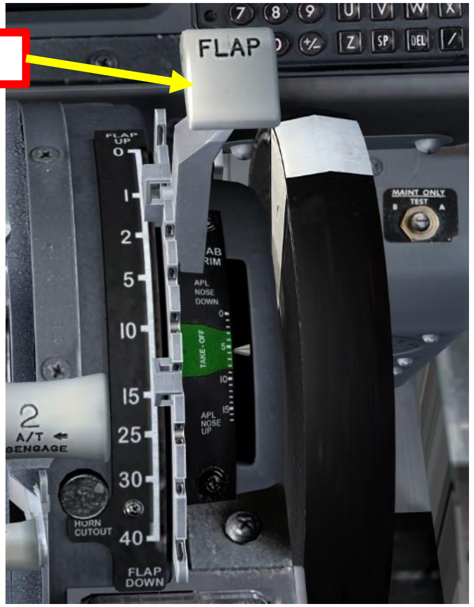
SECURING APPROACH

1. Before you reach the last waypoint of the STAR (BIG), the tower should be able to clear us for open descent to 2000 ft. Once you fly over the Deceleration Point (can be monitored on the Navigation Display), your aircraft will start losing speed and will begin your approach.
2. For this descent, we will use the LVL CHG autopilot mode, which requires a SPEED and an ALTITUDE input on the MCP.
3. Open up the LEGS page on your FMC and look for the speed restriction at BIG. It says that we cannot fly faster than 240 kts.
4. Press the LVL CHG button to engage the “Level Change” autopilot mode and set autopilot speed to 240 and the altitude to 2000.



SECURING APPROACH

5. Once you are approaching the Approach Fix CI27L, slow down to FLAPS UP speed of 202 kts (indicated on speed tape) by setting the autopilot SPEED to 202.
6. Set Flaps lever to 1
7. Arm VOR/LOC switch



SECURING APPROACH

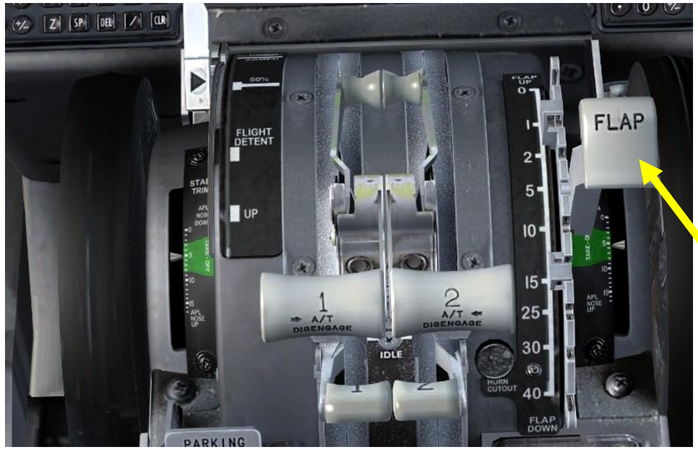
8. Once you are at least 25 nm from ILS approach (a bit before Approach Fix CI27L), press the “APP” autopilot mode to arm both VOR/LOC (Localizer) and G/S (Glide Slope) modes.
9. Press the “CMD B” button to arm the Autoland autopilot mode (this mode requires a second autopilot channel). Note: DO NOT ARM CMD B if you plan to do a manual landing.
10. Once you are at 3000 ft, slow down to FLAPS 1 speed of 181 kts (indicated on speed tape) by setting the autopilot SPEED to 181.
11. Set Flaps lever to 5 degrees
12. Set Navigation Display mode to ILS to check for localizer and glide slope.

10a

9

8

12



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10b

SECURING APPROACH

13. When VOR/LOC is captured, the PFD will indicate in green that the “VOR/LOC” autopilot mode is active.
14. Set Navigation Display mode back to MAP
15. Set HEADING knob to 271, which is the runway QDM (magnetic heading)
16. When lined up on approach, slow down to FLAPS 5 speed of 161 kts (indicated on speed tape) by setting the autopilot SPEED to 161.
17. When glide slope is captured,/the PFD will indicate in green that the “G/S” autopilot mode is active.
18. 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 .

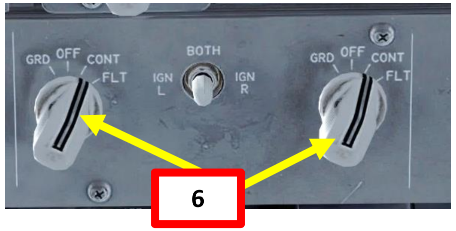
Glide Slope Captured (pink)

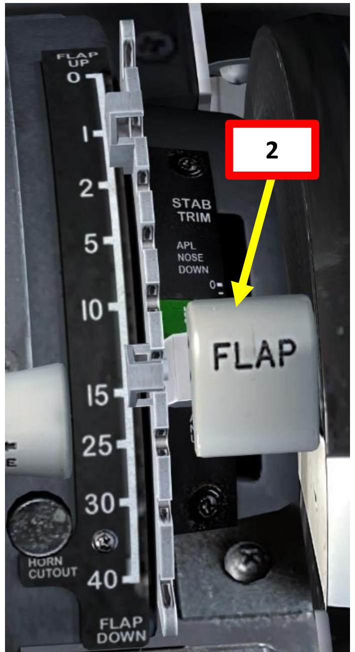
Localizer Captured (pink)

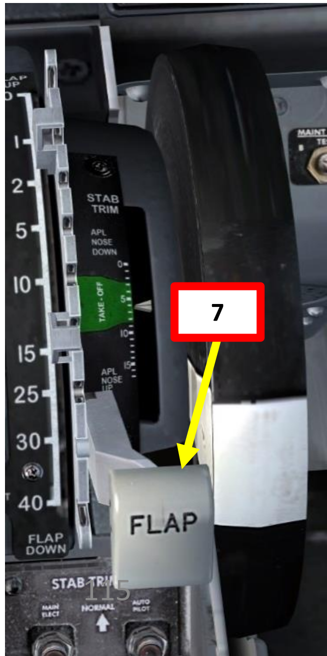
FINAL APPROACH

1. Once you are at 1500 ft on final approach, set landing gear down.
2. Set flaps to 15 deg.
3. Slow down to FLAPS 15 speed of 155 kts (indicated on speed tape) by setting the autopilot SPEED to 155.
4. Arm Speed Brake
5. Set all lights ON
6. On overhead panel, set engine start switches to CONT (Continuous Ignition)
7. Once you are at 1000 ft, set Flaps to 30 deg
8. Set speed bug just above VREF to slow down to final approach speed (VREF + wind correction of 5 kts)
9. This landing will be done with the Autoland.
    - When flying at 400 ft, the autopilot will switch to LAND mode in order to set the aircraft in a proper altitude and attitude to flare properly.
    - When flying at 50 ft, the autopilot will switch to FLARE mode in order to flare the aircraft to have a smooth touchdown.
    - On touchdown, the autopilot will switch to ROLLOUT mode. This mode will keep the aircraft on the runway centerline.

NOTE: If for some reason you decide to do a manual landing instead, a good procedure is to disconnect both Autopilot CMD switches and the Autothrottle switch and follow the flight director to the runway by flying manually. You will then land the aircraft visually. Don't follow the flight directors to touchdown: they're not designed to provide accurate design past this DH (decision height).





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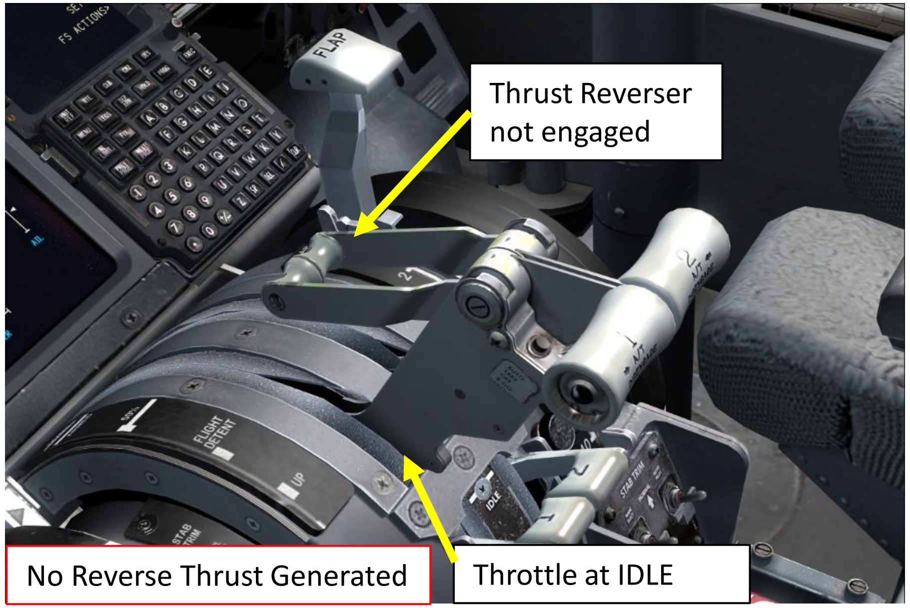
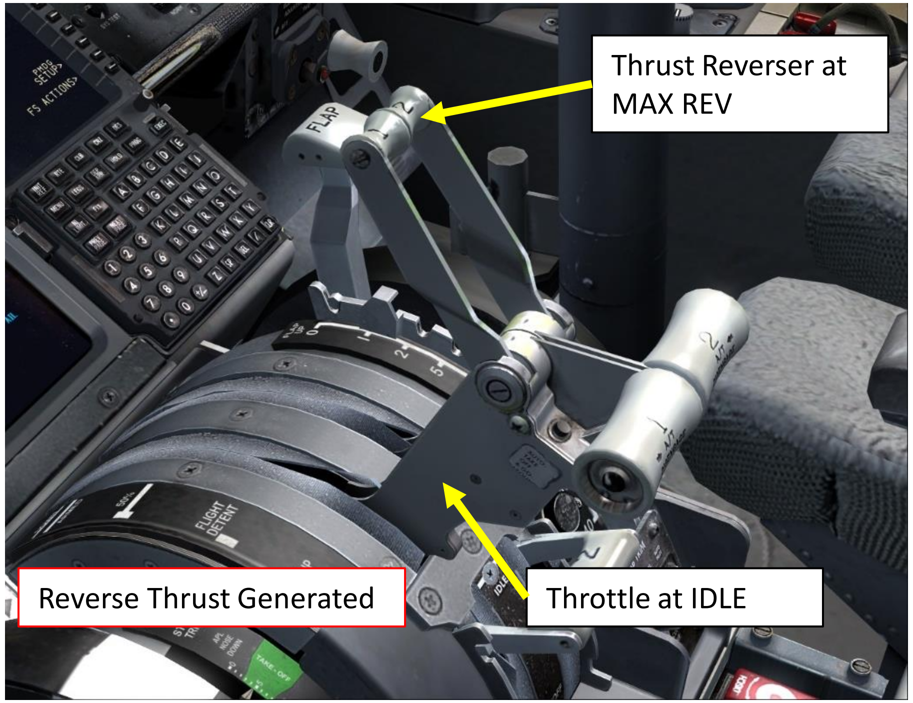
LANDING

1. When you hear an audio cue “MINIMUMS”, this means you have reached your minimal decision altitude. You are now committed to land.
2. At 20 ft, pull up slightly to reduce rate of descent
3. At 10 ft, throttle back to IDLE
4. On touchdown, push the nose into the ground to improve adherence with the runway and maximize braking (the Autobrake system will already brake for you)

LANDING

5. Press and hold “F2” (“Throttle decrease quickly” binding) to deploy thrust reversers until you slow down enough to vacate the runway safely.





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.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