PREPAR3D GUIDE
LEONARDO SOFTHOUSE
MCDONNELL DOUGLAS MD-82 "MADDOG"

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

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PLATFORM: PREPAR3D V 4.1

The **McDonnell Douglas MD-80 ”Maddog”** is a series of twin-engine, short- to medium-range, single-aisle commercial jet airliners. It was lengthened and updated from the DC-9. This series can seat from 130 to 172 passengers depending on variant and seating configuration. The MD-80 series was introduced into commercial service on October 10, 1980 by Swissair. The series includes the MD-81, MD-82, MD-83, MD-87, and MD-88. These all have the same fuselage length except the shortened MD-87. The series was followed into service in modified form by the MD-90 in 1995 and the Boeing 717 (originally MD-95) in 1999.

The development of MD-80 series began in the 1970s as a lengthened, growth version of the DC-9-50, with a higher maximum take-off weight and a higher fuel capacity. Availability of newer versions of the Pratt & Whitney JT8D engine with higher bypass ratios drove early studies including designs known as Series 55, Series 50 (refanned Super Stretch), and Series 60. The design effort focused on the Series 55 in August 1977. With the projected entry into service in 1980, the design was marketed as the "DC-9 Series 80".

The MD-82 was intended for operation from 'hot and high' airports but also offered greater payload/range when in use at 'standard' airfields. American Airlines is the world's largest operator of the MD-82, with at one point over 300 MD-82s in the fleet. Originally certified with 20,000 lbf (89 kN) thrust JT8D-217s, a -217A-powered MD-82 was certified in mid-1982 and became available that year. The new version featured a higher MTOW (149,500 lb (67,800 kg)), while the JT8D-217As had a guaranteed take-off thrust at temperature of up to 29 degrees C or 5,000 ft (1,500 m) altitude.

Due to the use of the aging JT8D engines, the MD-80 is not fuel efficient compared to the A320 or newer 737 models; it burns 1,050 US gal (4,000 l) of jet fuel per hour on a typical flight, while the larger Boeing 737-800 burns 850 US gal (3,200 l) per hour (19% reduction). Starting in the 2000s, many airlines began to retire the type. Alaska Airlines' tipping point in using the 737-800 was the $4 per gallon price of jet fuel the airline was paying by the summer of 2008; the airline stated that a typical Los Angeles-Seattle flight would cost $2,000 less, using a Boeing 737-800, than the same flight using a MD-80. That being said, the Maddog is truly a pilot’s aircraft: with a relatively quiet cabin, it has superb acceleration and climb capabilities and can come screaming into an airport and slow down quite rapidly. Of course, a passenger sitting right next to the powerful and noisy JT8D engines may think otherwise.

Leonardo SoftHouse simulated the MD-82 variant. This simulation goes far beyond what I expected. Pilots were very much involved in the development process and it shows. Plenty of small details bring this old school aircraft back to life in full HD glory. Circuit breakers are functional, failures are simulated, ACARS is simulated, and the aircraft systems are deep and intricate… All sorts of little quirks of the aircraft are scattered here and there and beg to be discovered.

Alitalia MD-82
(Photo by Pavel Koběrský)

The Maddog is either loved or hated. The much maligned MD-80 (or DC-9 Super 80, to be exact) is a good aircraft, but is more difficult to fly since the control surfaces are not operated hydraulically, but are flown with cable actuated trim tabs. As a result, yoke inputs have a delayed reaction, and overcontrolling is likely. The rudder, however, is hydraulically powered. This makes flying an approach in unstable air is much more challenging in the MD than in a Boeing.

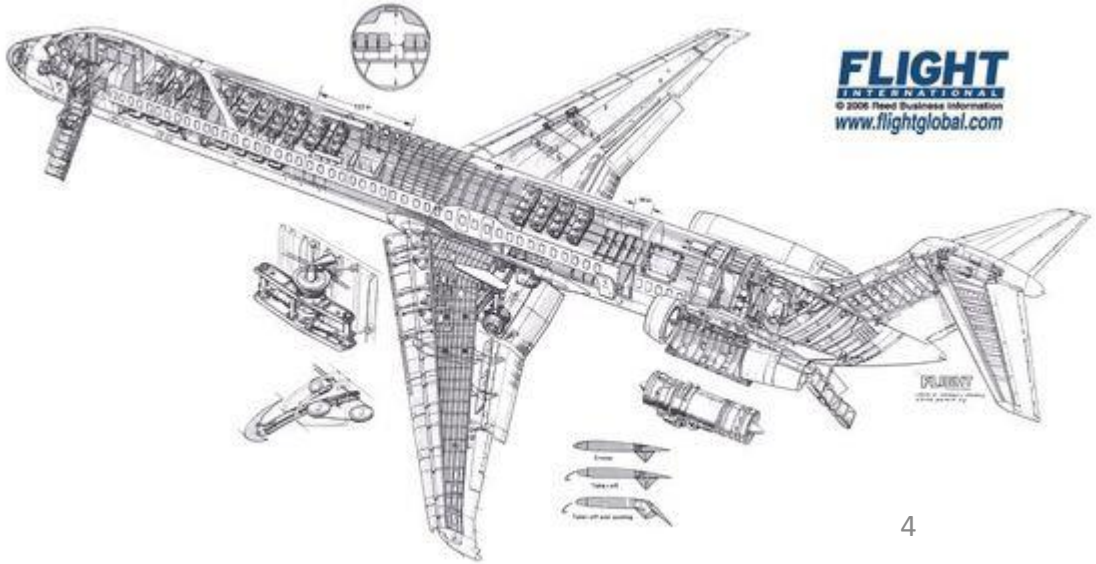
However, one has to remember that the MD80's design was a product of its time, and its design made sense within the context of the late 1970's. In 1980, when the first MD-80 was introduced into service, the A320 was still a pipe dream, and Airbus was not quite the major player it is today. The new 737 NG with CFM engines was still in development, so current buyers were still getting Pratt & Whitney powerplants similar to the DC-9/MD-80. The JT8D engines, after all, were fitted on the 737-200 and the 727 as well. The MD series was improved version of the already popular DC-9 platform (by Douglas Aircraft Company), which proved such a dependable workhorse for many airlines around the world.

It was a no-brainer for the airlines that owned DC-9's to move to the more advanced MD80. It was advanced, highly capable, and extremely sturdy and reliable. It was designed to be much more economical than the Boeing 727 it was meant to replace. McDonnell Douglas had a stellar reputation at that time; the three biggest US commercial aviation companies were Boeing, McDonnell Douglas and Lockheed Martin. However, the landscape of the aerospace industry changed with the rise of Airbus in the 1980's and the development of newer, more efficient engines like the GE CFM-56 and the IAE (Rolls-Royce / Pratt & Whitney) V2500, which McDonnell Douglas incorporated too late in their MD-90. The mighty "McDac" was eventually merged with Boeing and Lockheed Martin abandoned commercial aviation altogether with the failure of both the MD-11 and the L-1011 TriStar.

Pratt & Whitney JT8D Engine

McDonnell Douglas DC-9

DC-9 Super 80



TUTORIAL STRUCTURE

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

The flight tutorial is structured as follows:

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

BEST RESOURCES

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

Leonardo Softhouse Downloads Section
http://www.flythemaddogx.com/en/media.html

Continental Airlines MD-80 Flight Manual
http://www.anythingaboutaviation.com/wp-content/uploads/2013/01/MD80-Flight-Manual-Continental-Airlines.pdf

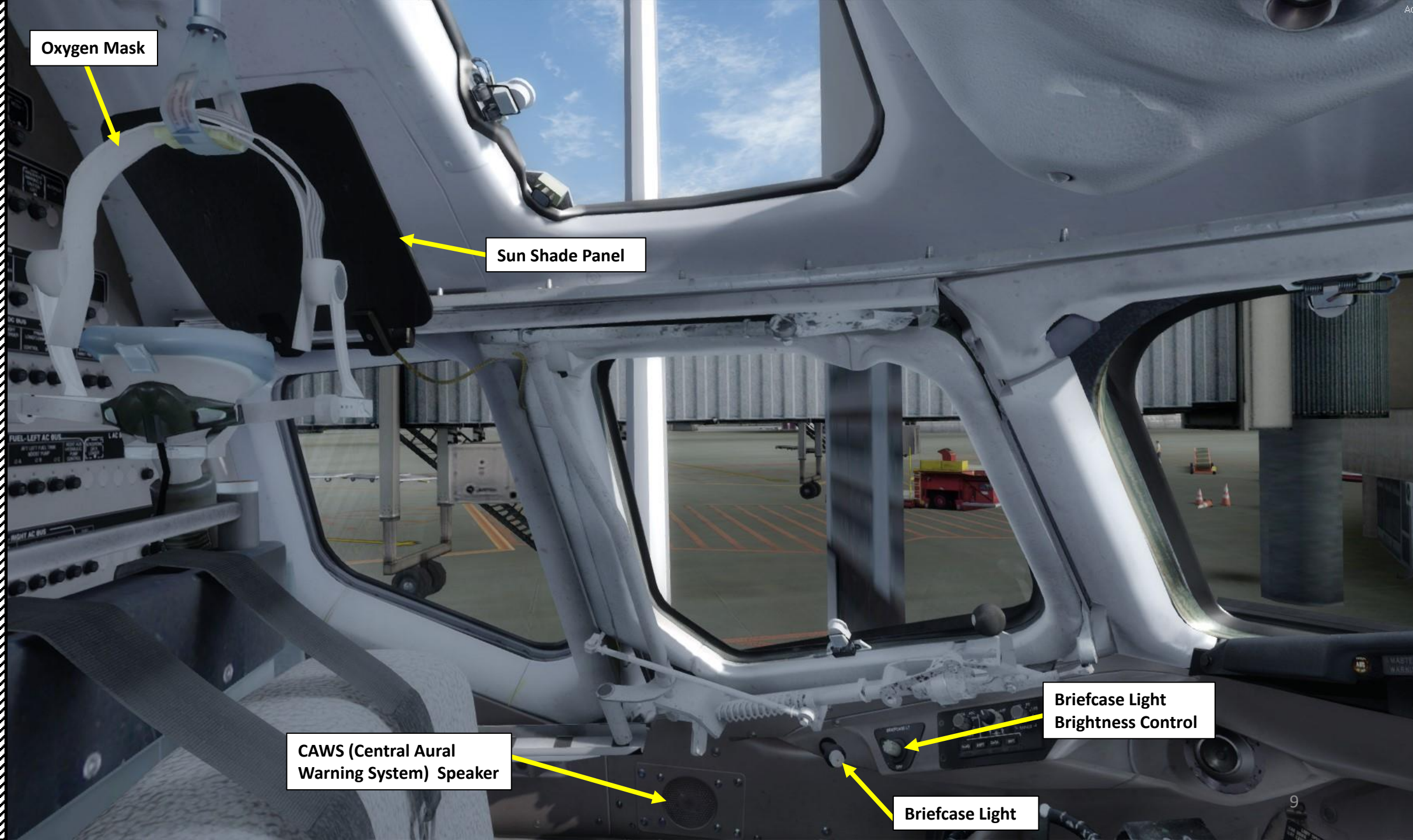
McDonnell Douglas MD-80 CBT (Computer Based Training)
https://www.youtube.com/playlist?list=PLpNS2WzxM5y21lzChvpMWvl7WeUnb1Syk

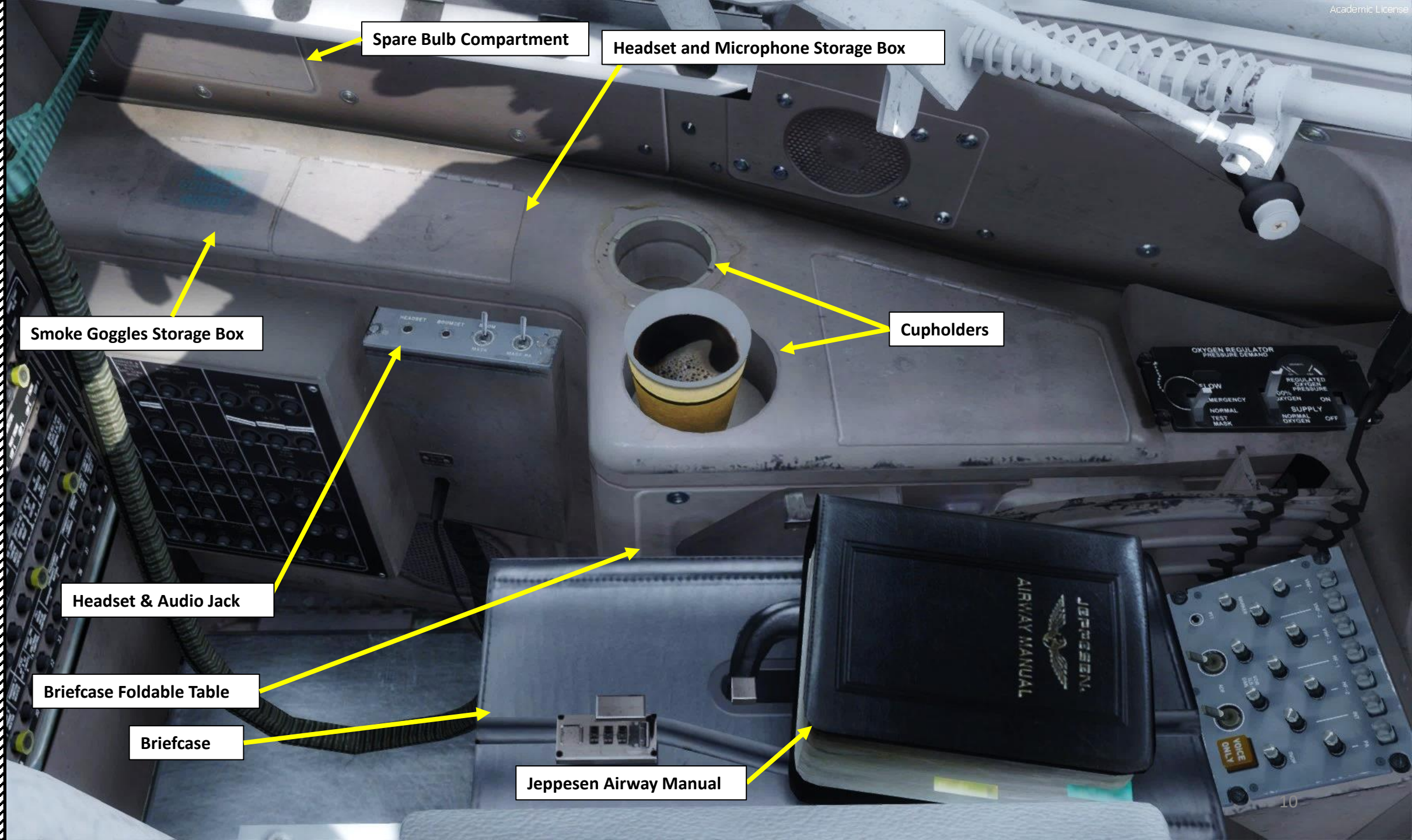
Froogle Sims MD-82 Fully Loaded (Three Parts) (Youtube)
Part 1: https://www.youtube.com/watch?v=WPqCJeb3UYE
Part 2: https://www.youtube.com/watch?v=NHGDNjIjTrk
Part 3: https://www.youtube.com/watch?v=v7V3SarAVl0

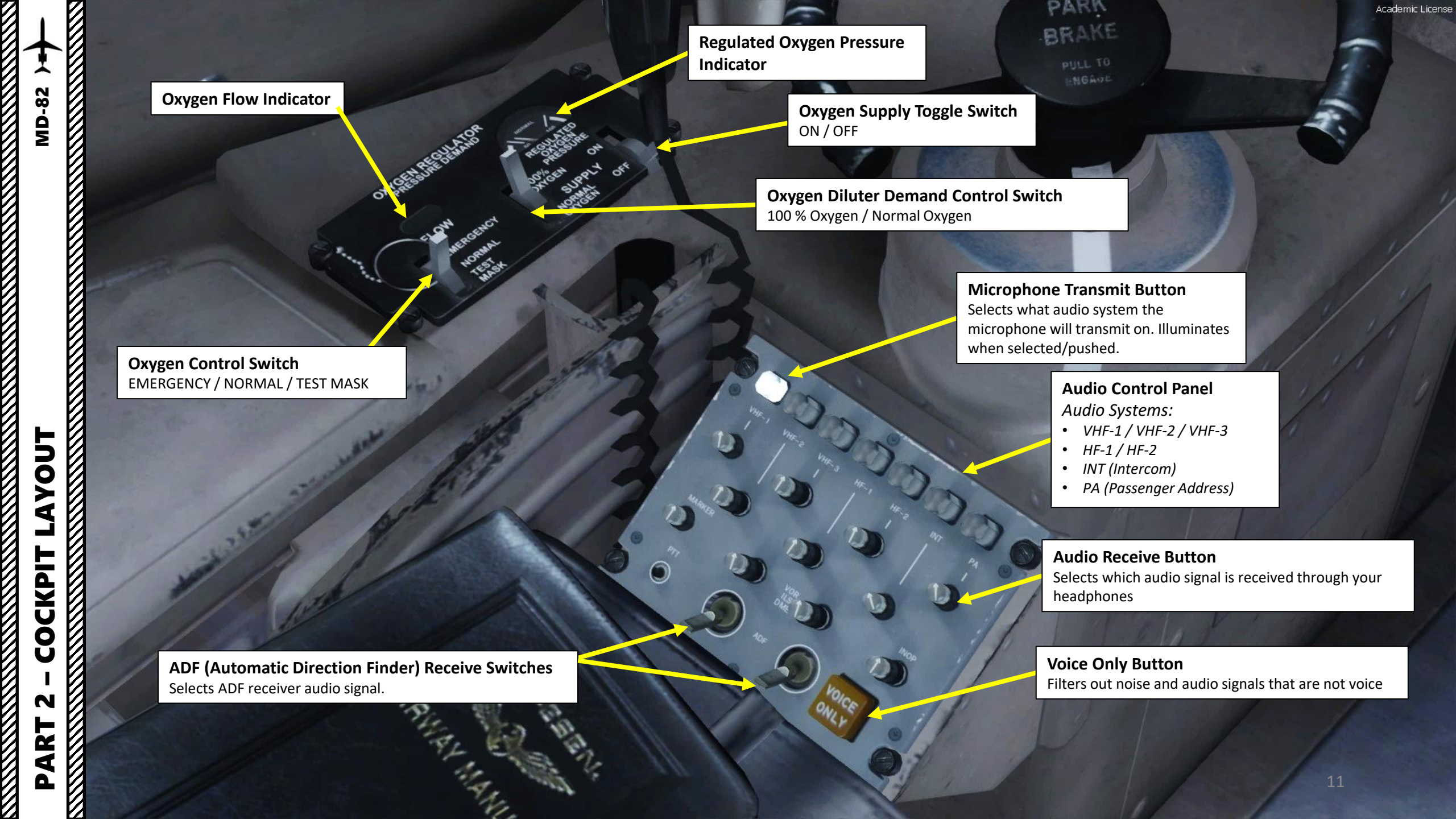
Kent Wien: Cockpit Chronicles: Why I've fallen for the MD-80 (Youtube)
https://youtu.be/7R0CViDUBFs

Hilmerby MD-80 Cockpit
http://www.hilmerby.com/md80/md_cockpit.html

PART 2 – COCKPIT LAYOUT


Oxygen Mask
Sun Shade Panel
Briefcase Light Brightness Control
CAWS (Central Aural Warning System) Speaker
Briefcase Light





Regulated Oxygen Pressure Indicator

Oxygen Flow Indicator

Oxygen Supply Toggle Switch
ON / OFF

Oxygen Diluter Demand Control Switch
100 % Oxygen / Normal Oxygen

Microphone Transmit Button
Selects what audio system the microphone will transmit on. Illuminates when selected/pushed.

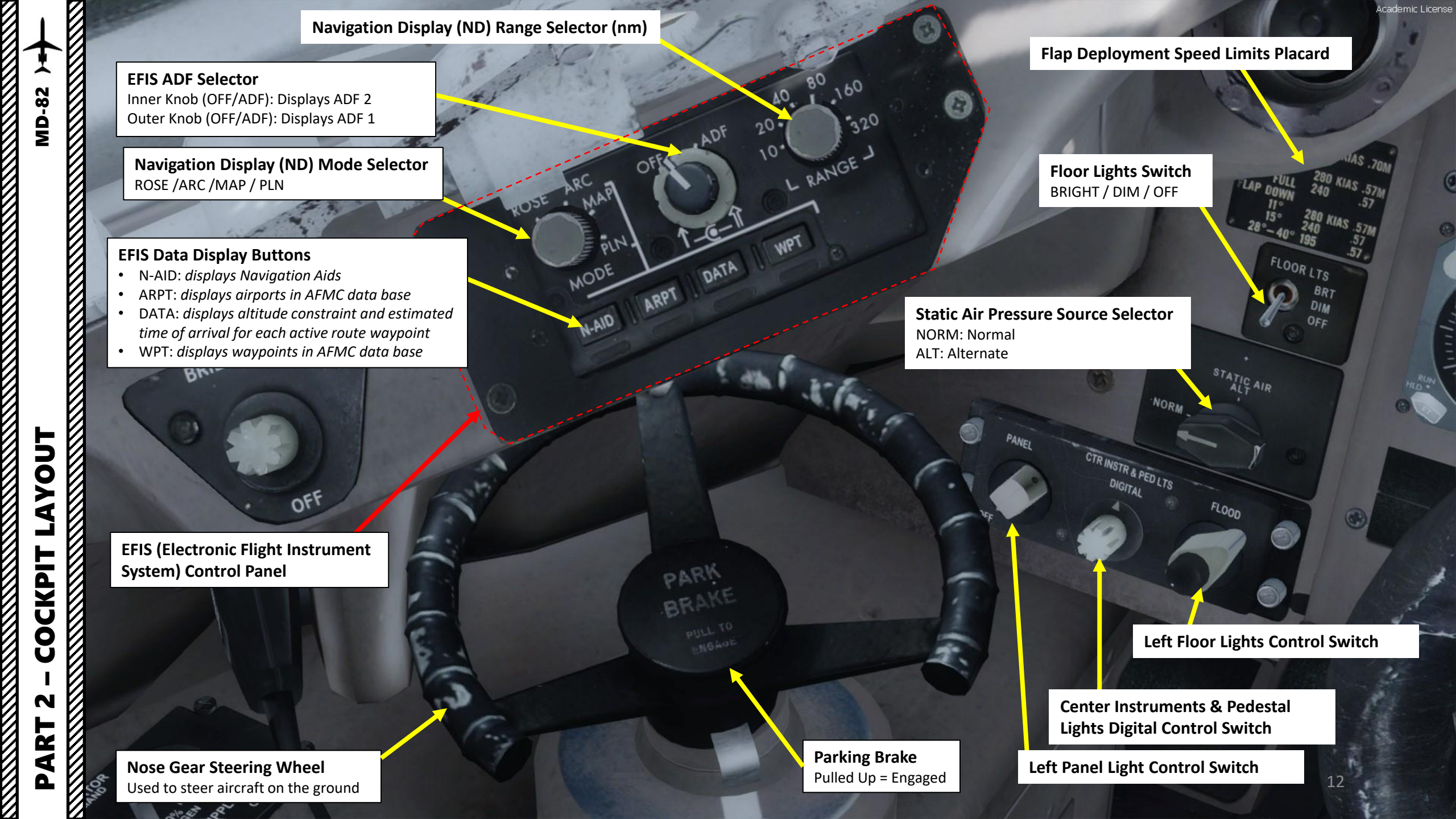
Oxygen Control Switch
EMERGENCY / NORMAL / TEST MASK

Audio Control Panel
Audio Systems:
- *VHF-1 / VHF-2 / VHF-3*
- *HF-1 / HF-2*
- *INT (Intercom)*
- *PA (Passenger Address)*

Audio Receive Button
Selects which audio signal is received through your headphones

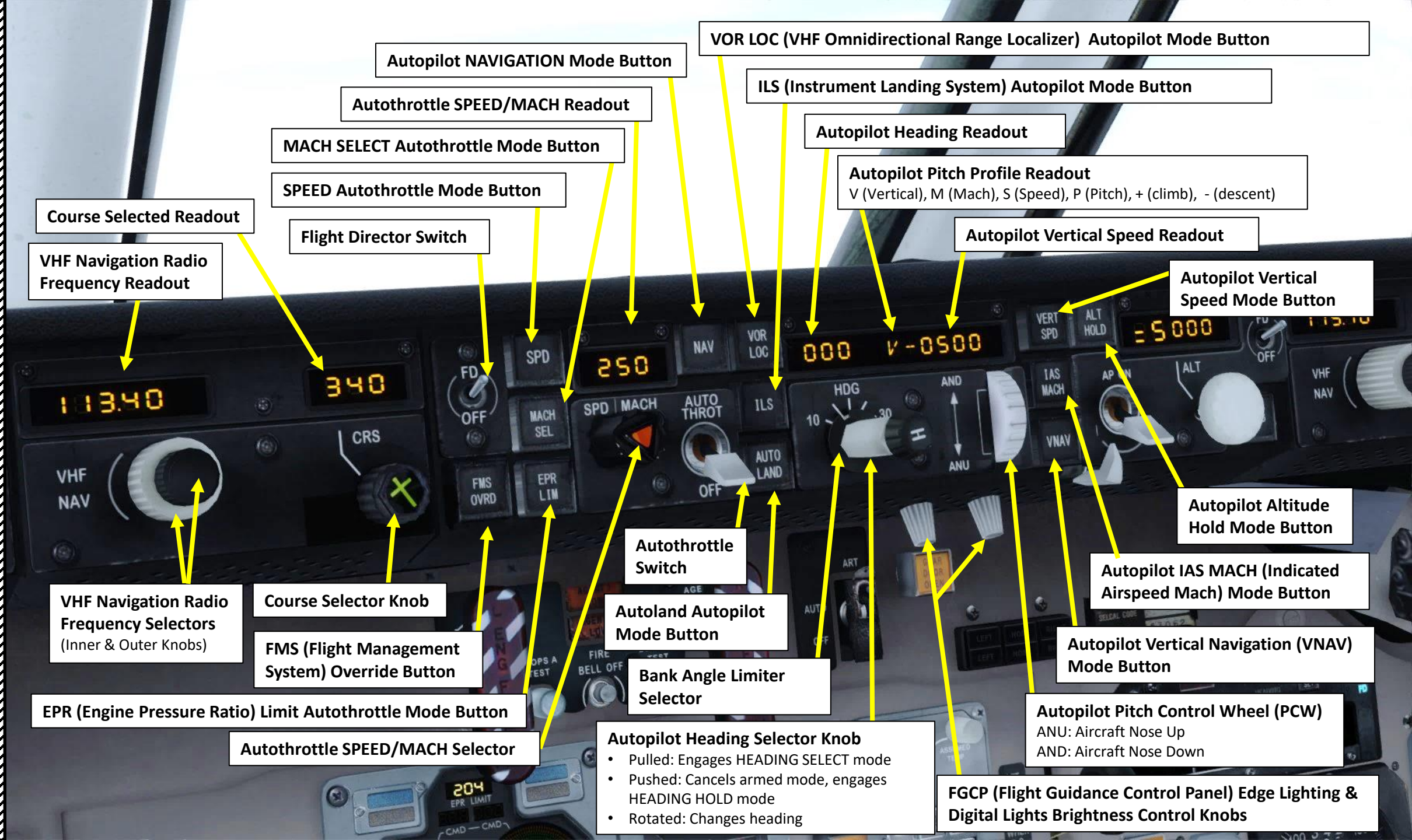
ADF (Automatic Direction Finder) Receive Switches
Selects ADF receiver audio signal.

Voice Only Button
Filters out noise and audio signals that are not voice


Navigation Display (ND) Range Selector (nm)
EFIS ADF Selector
Inner Knob (OFF/ADF): Displays ADF 2
Outer Knob (OFF/ADF): Displays ADF 1
Navigation Display (ND) Mode Selector
ROSE /ARC /MAP / PLN
EFIS Data Display Buttons
• N-AID: displays Navigation Aids
• ARPT: displays airports in AFMC data base
• DATA: displays altitude constraint and estimated time of arrival for each active route waypoint
• WPT: displays waypoints in AFMC data base
EFIS (Electronic Flight Instrument System) Control Panel
Nose Gear Steering Wheel
Used to steer aircraft on the ground
Parking Brake
Pulled Up = Engaged
Flap Deployment Speed Limits Placard
Floor Lights Switch
BRIGHT / DIM / OFF
Static Air Pressure Source Selector
NORM: Normal
ALT: Alternate
Left Floor Lights Control Switch
Center Instruments & Pedestal Lights Digital Control Switch
Left Panel Light Control Switch
ROSE
ARC
MAP
PLN
MODE
OFF
ADF
L RANGE
WPT
DATA
ARPT
N-AID
FLOOR LTS
BRT
DIM
OFF
STATIC AIR ALT
NORM
PANEL
CTR INSTR & PED LTS
DIGITAL
FLOOD
PARK BRAKE
PULL TO ENGAGE

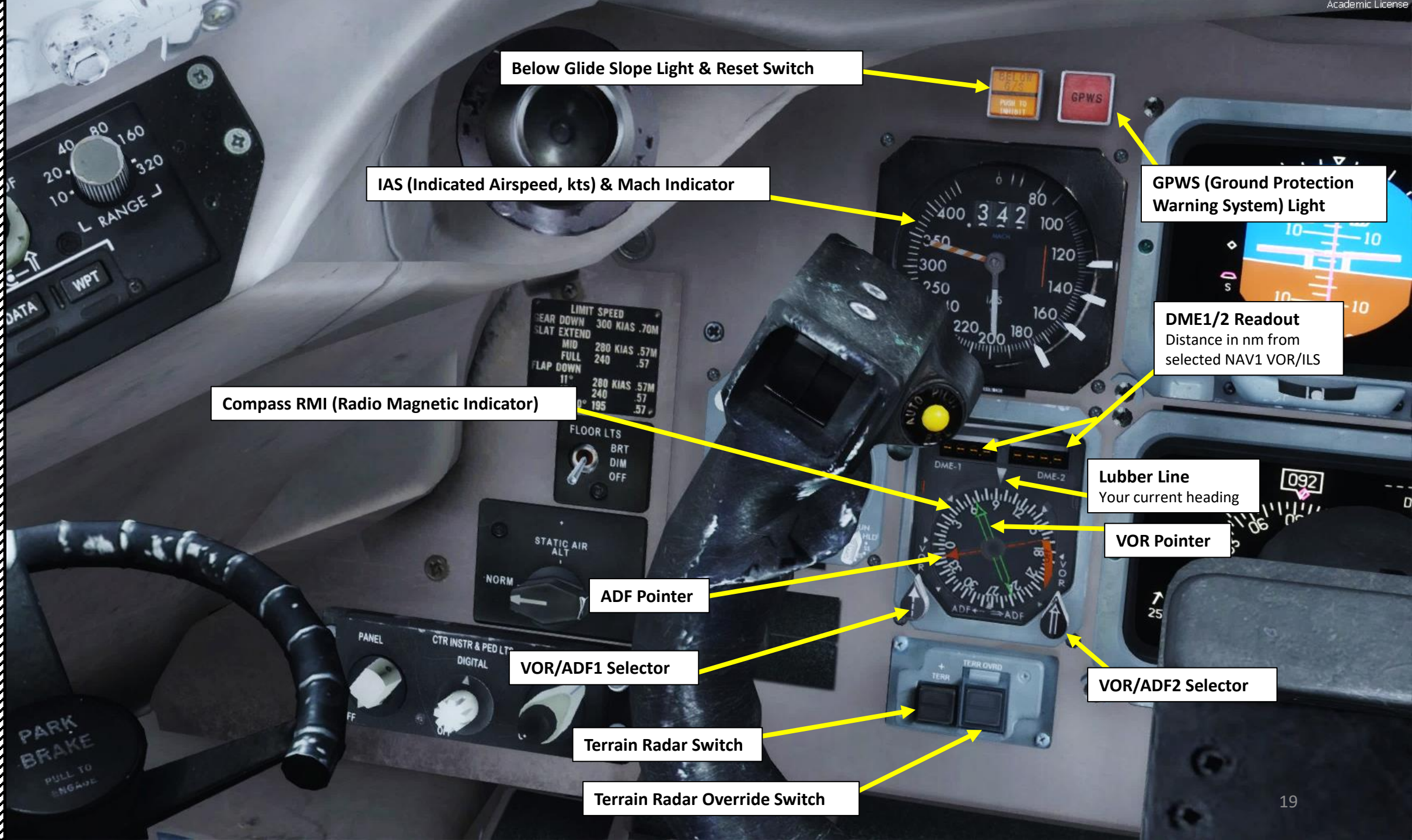

FGCP (Flight Guidance Control Panel)
Section of glareshield used for autopilot & autothrottle systems.

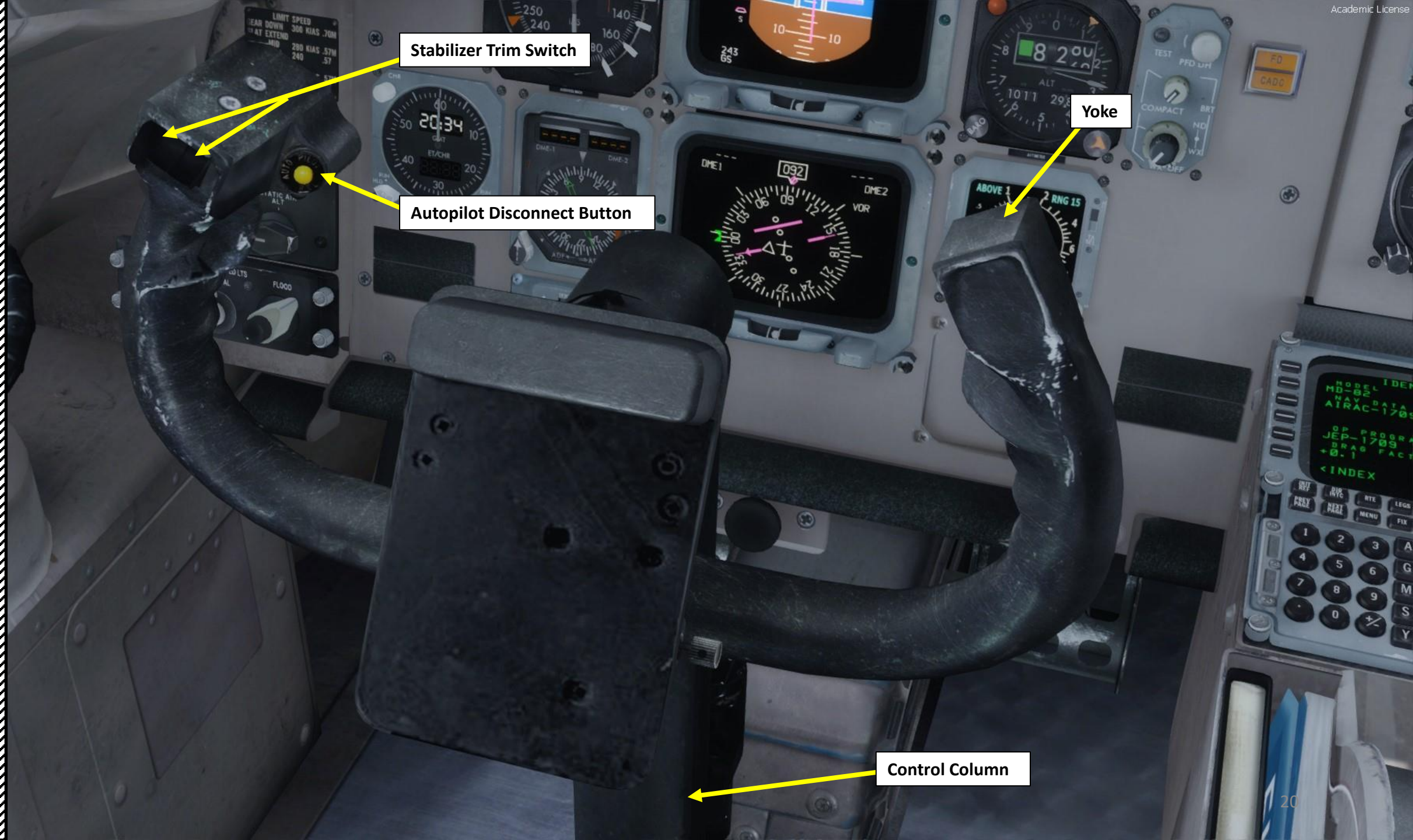

MASTER WARNING Light
MASTER CAUTION Light
Windshear Warning Light
Stall Warning Light
Stick Pusher Inhibit Button
Nose Landing Gear Lights Switch
OFF / Dimmed / Bright
Wing Landing Lights Switches
Retracted / Extended OFF / Extended ON
Brake Pressure Indicator (x1000 psi)
ABS (Anti-Lock Braking System) Light
Illuminated when ABS is automatically disarmed or when automatic braking is selected and the AUTOBRAKE ARM/DISARM switch (Aft of pedestal) is in OFF position.
MASTER WARNING
MASTER CAUTION
STALL
STICK PUSHER
PUSH TO INHIBIT
ABS
WING LDG LTS
RET
EXT
OFF
NOSE LTS
OFF
DIM
VHF
NAV
CRS
FD
OFF
FMS OVRD
BRAKE PRESS.
HDG HLD
ALT HLD

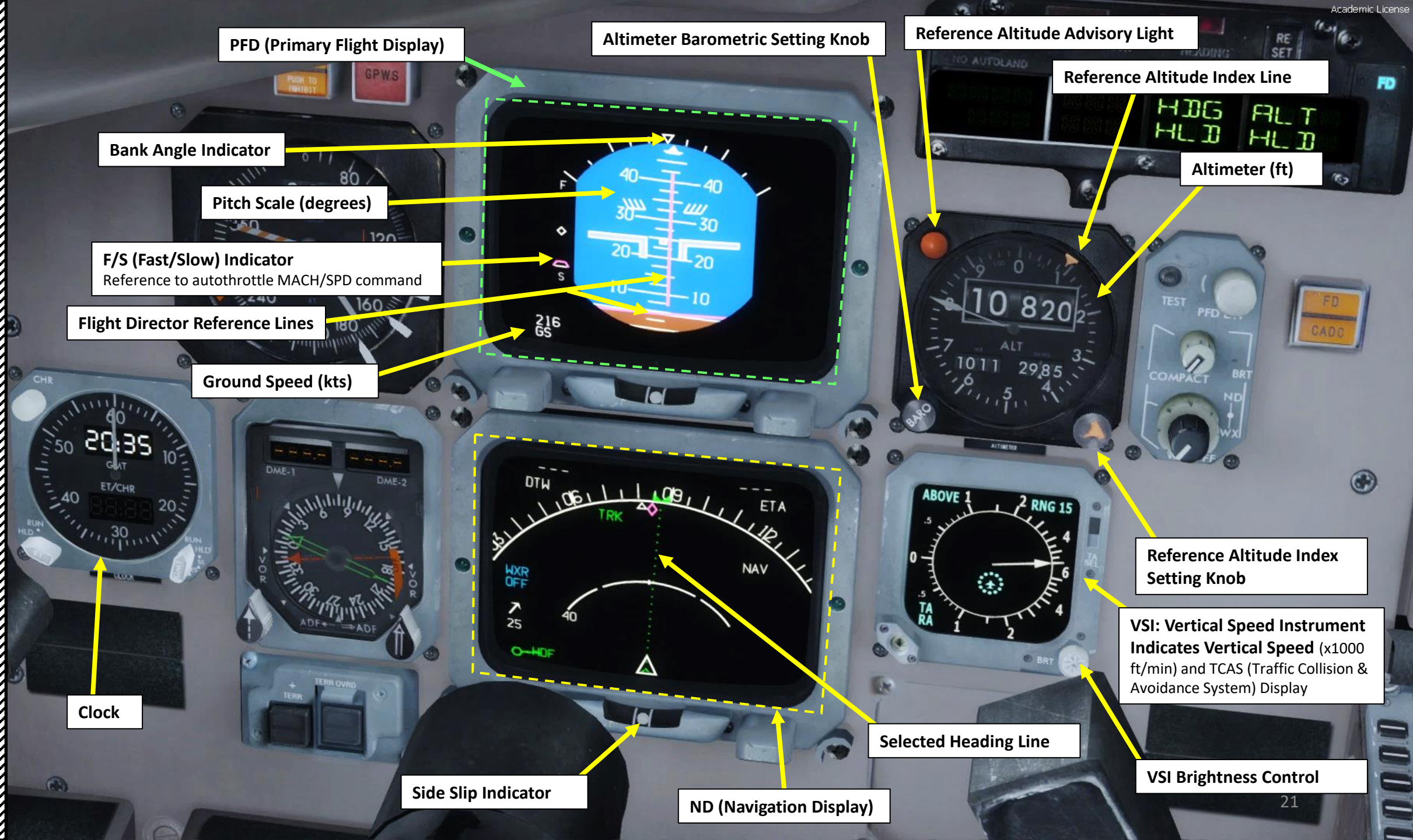

VOR LOC (VHF Omnidirectional Range Localizer) Autopilot Mode Button
Autopilot NAVIGATION Mode Button
ILS (Instrument Landing System) Autopilot Mode Button
Autothrottle SPEED/MACH Readout
Autopilot Heading Readout
MACH SELECT Autothrottle Mode Button
Autopilot Pitch Profile Readout
V (Vertical), M (Mach), S (Speed), P (Pitch), + (climb), - (descent)
SPEED Autothrottle Mode Button
Course Selected Readout
Autopilot Vertical Speed Readout
Flight Director Switch
VHF Navigation Radio Frequency Readout
Autopilot Vertical Speed Mode Button
Autopilot Altitude Hold Mode Button
Autothrottle Switch
Autopilot IAS MACH (Indicated Airspeed Mach) Mode Button
VHF Navigation Radio Frequency Selectors
(Inner & Outer Knobs)
Course Selector Knob
Autoland Autopilot Mode Button
FMS (Flight Management System) Override Button
Autopilot Vertical Navigation (VNAV) Mode Button
Bank Angle Limiter Selector
EPR (Engine Pressure Ratio) Limit Autothrottle Mode Button
Autopilot Pitch Control Wheel (PCW)
ANU: Aircraft Nose Up
AND: Aircraft Nose Down
Autothrottle SPEED/MACH Selector
Autopilot Heading Selector Knob
• Pulled: Engages HEADING SELECT mode
• Pushed: Cancels armed mode, engages HEADING HOLD mode
• Rotated: Changes heading
FGCP (Flight Guidance Control Panel) Edge Lighting & Digital Lights Brightness Control Knobs
113.40
340
CRS
VHF NAV
FD
OFF
SPD
MACH SEL
FMS OVRD
EPR LIM
250
SPD | MACH
AUTO THROT
OFF
NAV
VOR LOC
ILS
AUTO LAND
000
V-0500
HDG
10
30
AND
ANU
VERT SPD
ALT HOLD
=5000
IAS MACH
VNAV
ALT
OFF
VHF NAV
204
EPR LIMIT
CMD — CMD


Autopilot Altitude Readout
Autopilot ON Switch
Autopilot Altitude Selector Knob
VERT SPD
ALT HOLD
IAS MACH
VNAV
AP ON
ALT
FD
OFF
VHF NAV
CRS
FLOOD LTS
GRD
ANTI COLLISION
POS/ STROBE
WING/NACELLE
STICK PUSHER
PUSH TO INHIBIT
AND
ANU

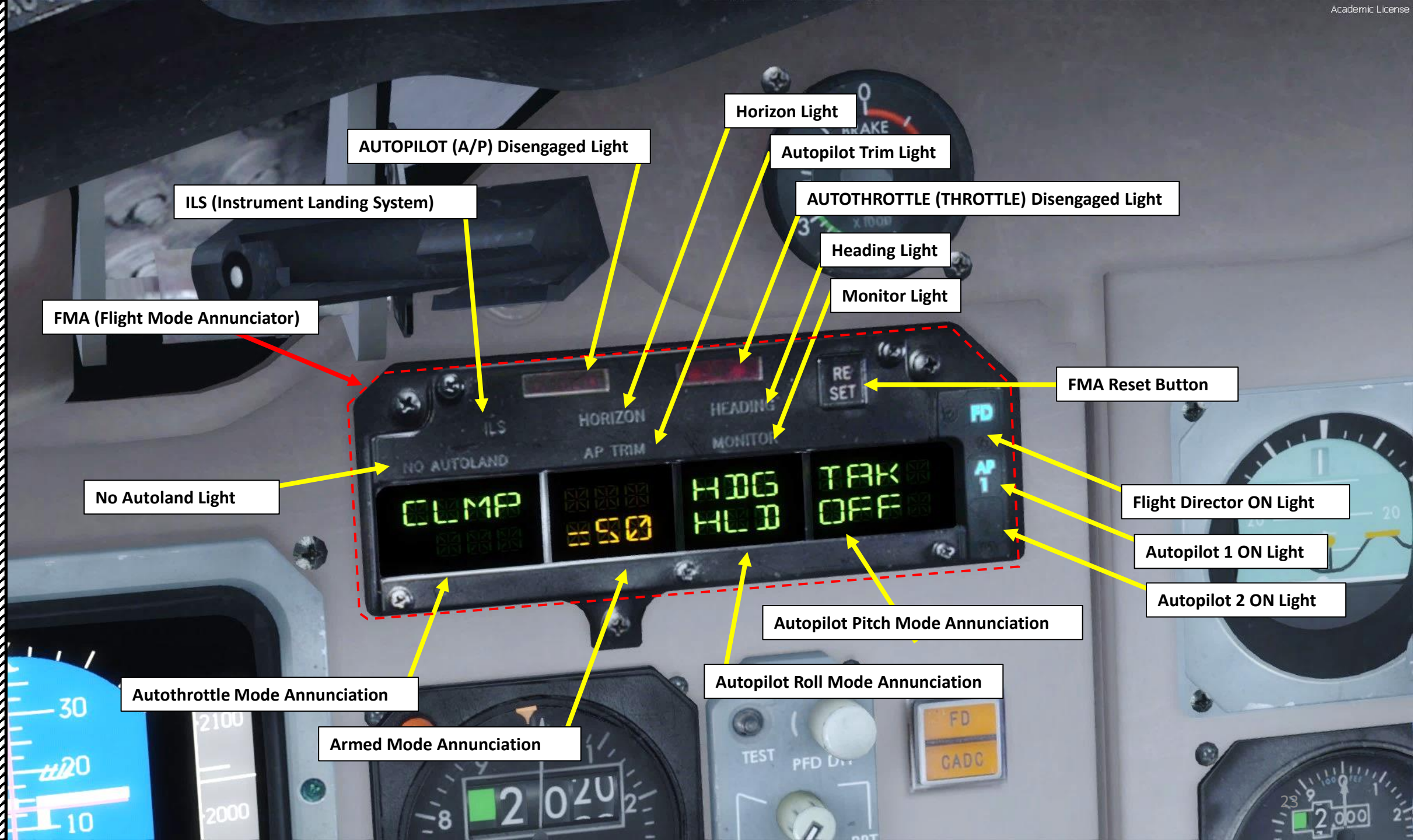

Right Ground Flood Light Switch
Left Ground Flood Light Switch
Anti-Collision Lights Switch
Wing/Engine Nacelle Lights Switch
• OFF: All lights OFF
• ON: All lights ON
• R ONLY: Right wing leading edge and right engine nacelle floodlights are on. May be used to light up the right side during loading of cargo if no other lights are available.
Position/Strobe Lights Switch
• OFF: All lights OFF
• POS: Position Lights only are ON
• BOTH: Position Lights and strobe are ON
FLOOD LT
GRD
WING/NACELLE
ANTI COLLISION
POS/ STROBE
STICK PUSHER
PUSH TO INHIBIT
MASTER CAUTION
MASTER WARNING
FUEL QTY
L MAIN
R MAIN
Academic License

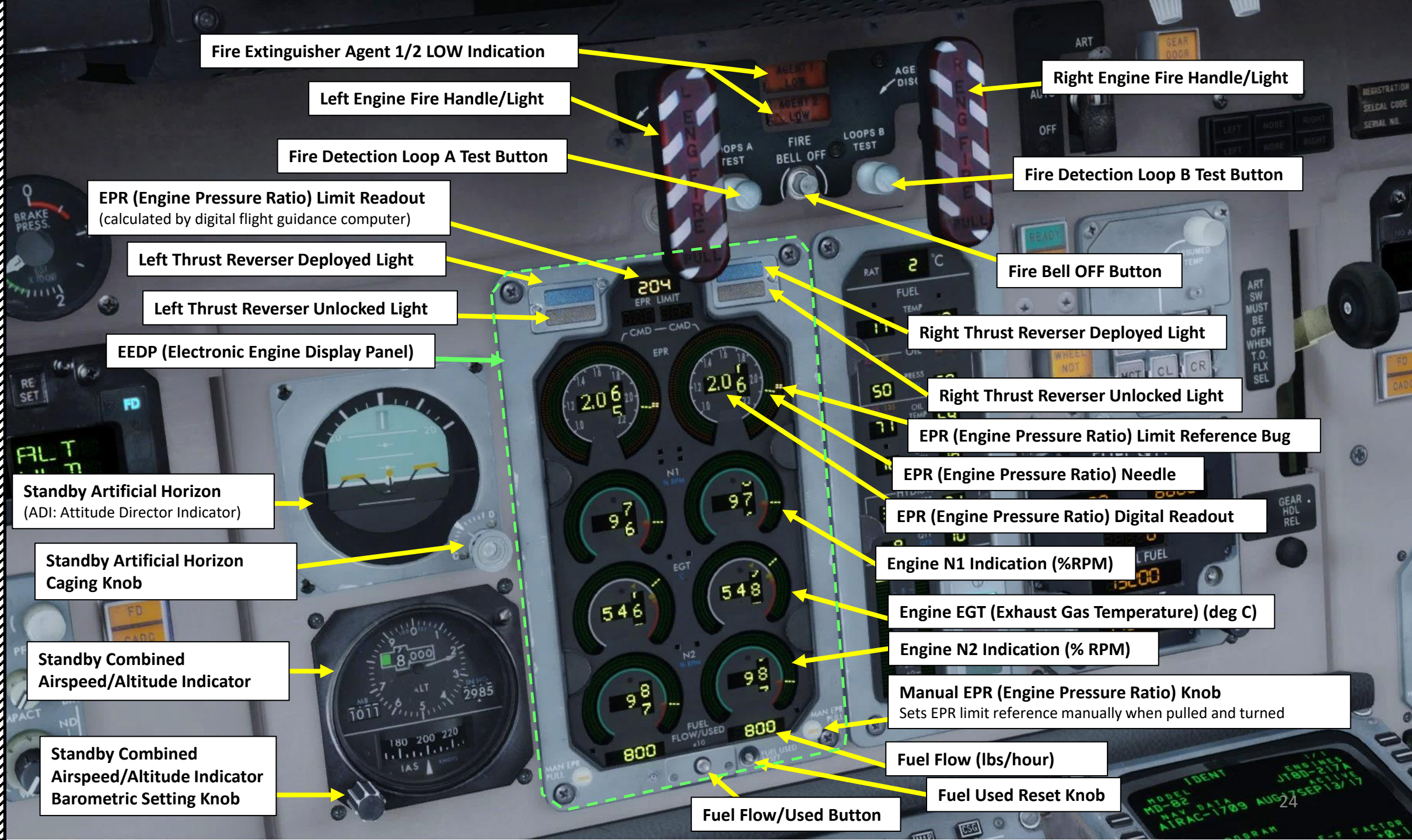

Below Glide Slope Light & Reset Switch
GPWS (Ground Protection Warning System) Light
IAS (Indicated Airspeed, kts) & Mach Indicator
DME1/2 Readout
Distance in nm from selected NAV1 VOR/ILS
Compass RMI (Radio Magnetic Indicator)
Lubber Line
Your current heading
VOR Pointer
ADF Pointer
VOR/ADF1 Selector
VOR/ADF2 Selector
Terrain Radar Switch
Terrain Radar Override Switch
GPWS
DME-1
DME-2
FLOOR LTS
BRT
DIM
OFF
STATIC AIR ALT
NORM
PANEL
CTR INSTR & PED LTS
DIGITAL
PARK BRAKE
PULL TO ENGAGE
L RANGE J
WPT
LIMIT SPEED
GEAR DOWN 300 KIAS .70M
FLAP EXTEND
MID 280 KIAS .57M
FULL 240 .57
FLAP DOWN
11° 280 KIAS .57M
240 .57
195 .57

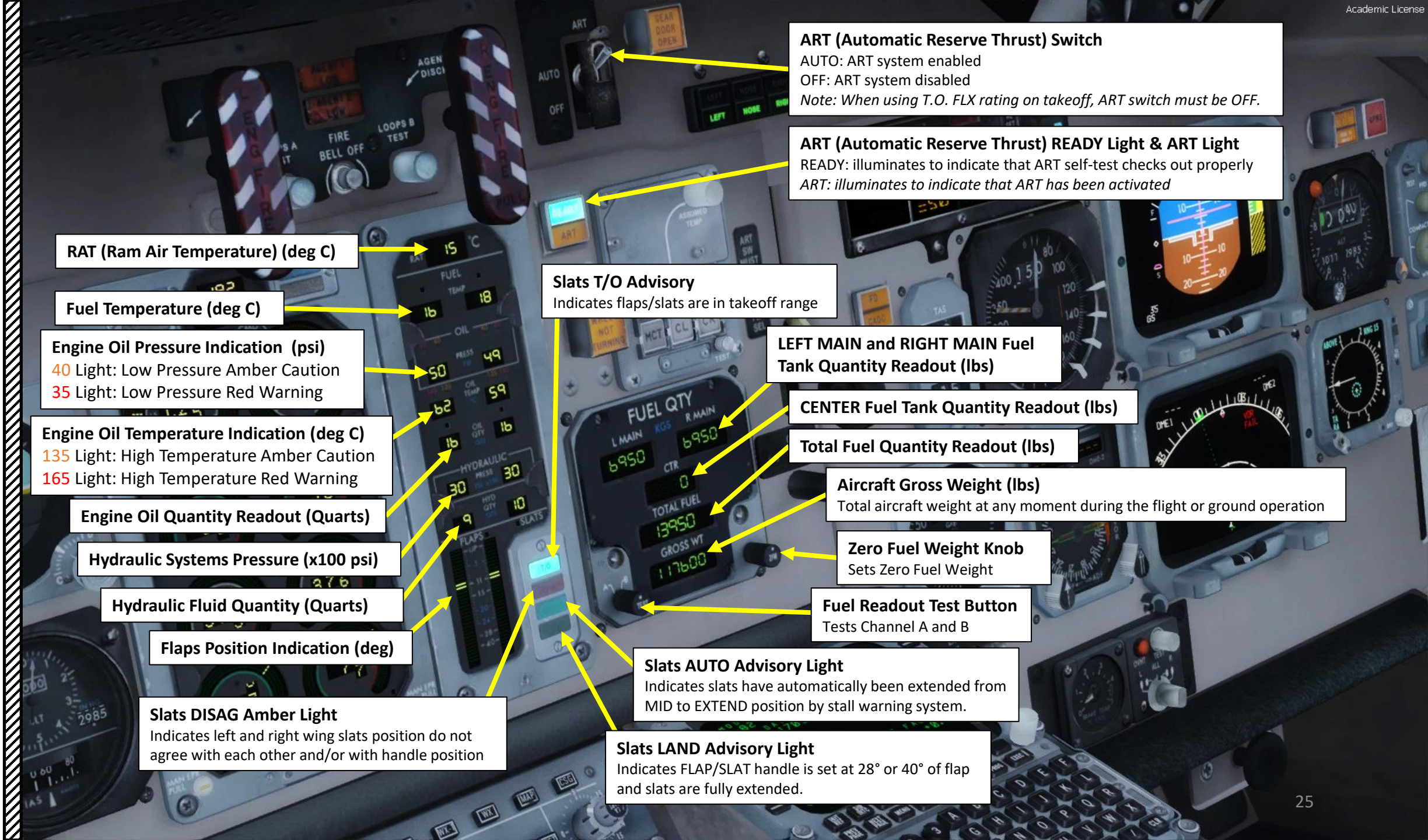



PFD (Primary Flight Display)
Altimeter Barometric Setting Knob
Reference Altitude Advisory Light
Reference Altitude Index Line
Bank Angle Indicator
Pitch Scale (degrees)
Altimeter (ft)
F/S (Fast/Slow) Indicator
Reference to autothrottle MACH/SPD command
Flight Director Reference Lines
Ground Speed (kts)
Reference Altitude Index Setting Knob
VSI: Vertical Speed Instrument Indicates Vertical Speed (x1000 ft/min) and TCAS (Traffic Collision & Avoidance System) Display
Clock
Selected Heading Line
VSI Brightness Control
Side Slip Indicator
ND (Navigation Display)


EFIS Test Button
PFD (Primary Flight Display) Brightness Control Knob
WX (Weather Radar) Brightness Control (Inner Knob)
ND (Navigation Display) Brightness Control (Outer Knob)
DH (Decision Height) Setting Knob
FD CADC (Flight Director Central Air Data Computer) Light


AUTOPILOT (A/P) Disengaged Light
Horizon Light
Autopilot Trim Light
AUTOTHROTTLE (THROTTLE) Disengaged Light
ILS (Instrument Landing System)
Heading Light
Monitor Light
FMA (Flight Mode Annunciator)
FMA Reset Button
No Autoland Light
Flight Director ON Light
Autopilot 1 ON Light
Autopilot 2 ON Light
Autopilot Pitch Mode Annunciation
Autopilot Roll Mode Annunciation
Autothrottle Mode Annunciation
Armed Mode Annunciation
ILS
HORIZON
HEADING
NO AUTOLAND
AP TRIM
MONITOR
RE SET
FD
AP 1
CLMP
HDG HLD
TAK OFF
TEST
FD
CADC


Fire Extinguisher Agent 1/2 LOW Indication
Left Engine Fire Handle/Light
Fire Detection Loop A Test Button
EPR (Engine Pressure Ratio) Limit Readout
(calculated by digital flight guidance computer)
Left Thrust Reverser Deployed Light
Left Thrust Reverser Unlocked Light
EEDP (Electronic Engine Display Panel)
Standby Artificial Horizon
(ADI: Attitude Director Indicator)
Standby Artificial Horizon
Caging Knob
Standby Combined
Airspeed/Altitude Indicator
Standby Combined
Airspeed/Altitude Indicator
Barometric Setting Knob
Right Engine Fire Handle/Light
Fire Detection Loop B Test Button
Fire Bell OFF Button
Right Thrust Reverser Deployed Light
Right Thrust Reverser Unlocked Light
EPR (Engine Pressure Ratio) Limit Reference Bug
EPR (Engine Pressure Ratio) Needle
EPR (Engine Pressure Ratio) Digital Readout
Engine N1 Indication (%RPM)
Engine EGT (Exhaust Gas Temperature) (deg C)
Engine N2 Indication (% RPM)
Manual EPR (Engine Pressure Ratio) Knob
Sets EPR limit reference manually when pulled and turned
Fuel Flow (lbs/hour)
Fuel Used Reset Knob
Fuel Flow/Used Button



ART (Automatic Reserve Thrust) Switch
AUTO: ART system enabled
OFF: ART system disabled
Note: When using T.O. FLX rating on takeoff, ART switch must be OFF.

ART (Automatic Reserve Thrust) READY Light & ART Light
READY: illuminates to indicate that ART self-test checks out properly
ART: illuminates to indicate that ART has been activated

RAT (Ram Air Temperature) (deg C)

Fuel Temperature (deg C)

Engine Oil Pressure Indication (psi)
40 Light: Low Pressure Amber Caution
35 Light: Low Pressure Red Warning

Engine Oil Temperature Indication (deg C)
135 Light: High Temperature Amber Caution
165 Light: High Temperature Red Warning

Engine Oil Quantity Readout (Quarts)

Hydraulic Systems Pressure (x100 psi)

Hydraulic Fluid Quantity (Quarts)

Flaps Position Indication (deg)

Slats DISAG Amber Light
Indicates left and right wing slats position do not agree with each other and/or with handle position

Slats T/O Advisory
Indicates flaps/slats are in takeoff range

LEFT MAIN and RIGHT MAIN Fuel Tank Quantity Readout (lbs)

CENTER Fuel Tank Quantity Readout (lbs)

Total Fuel Quantity Readout (lbs)

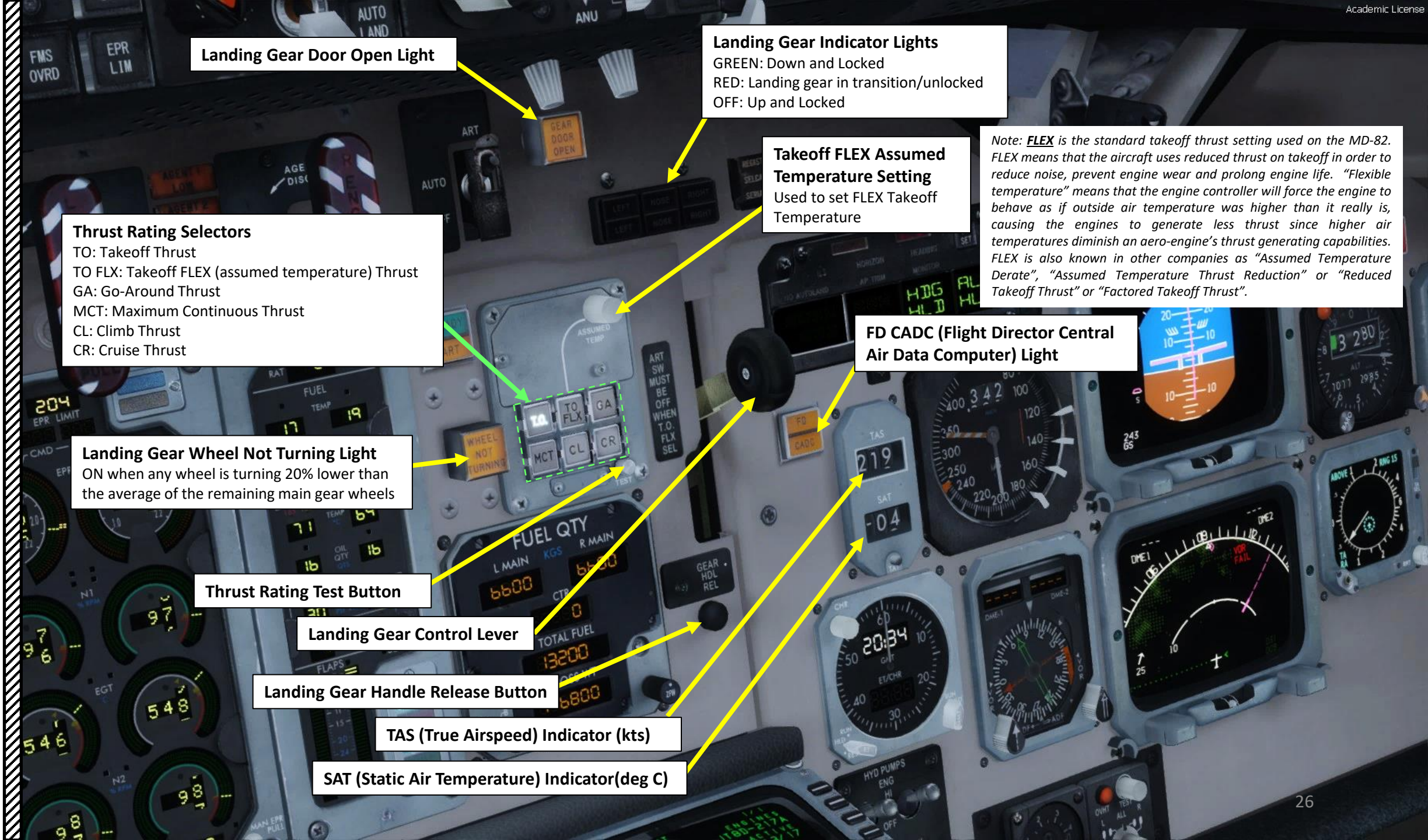
Aircraft Gross Weight (lbs)
Total aircraft weight at any moment during the flight or ground operation

Zero Fuel Weight Knob
Sets Zero Fuel Weight

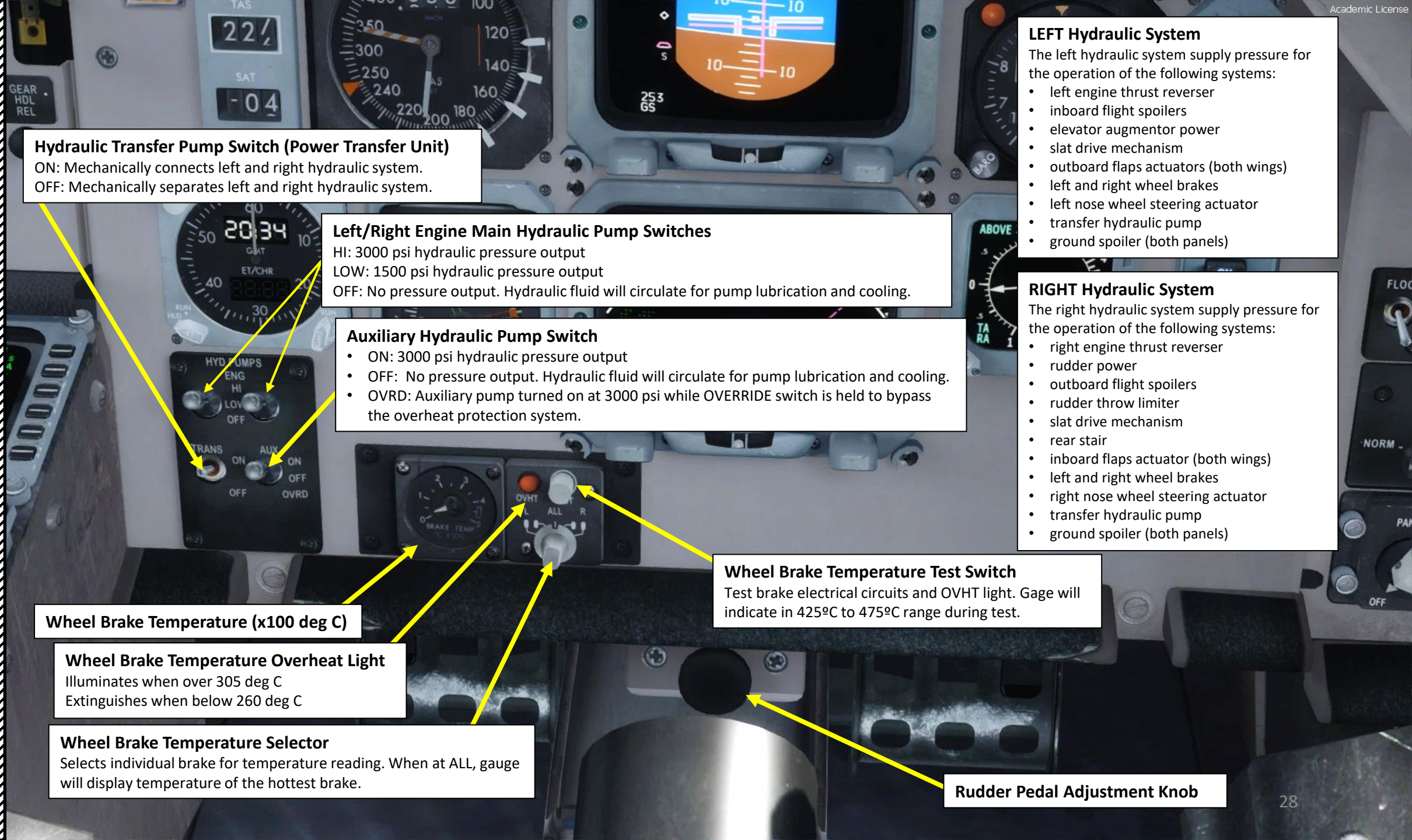
Fuel Readout Test Button
Tests Channel A and B

Slats AUTO Advisory Light
Indicates slats have automatically been extended from MID to EXTEND position by stall warning system.

Slats LAND Advisory Light
Indicates FLAP/SLAT handle is set at 28° or 40° of flap and slats are fully extended.



PART 2 – COCKPIT LAYOUT



Hydraulic Transfer Pump Switch (Power Transfer Unit)
ON: Mechanically connects left and right hydraulic system.
OFF: Mechanically separates left and right hydraulic system.

Left/Right Engine Main Hydraulic Pump Switches
HI: 3000 psi hydraulic pressure output
LOW: 1500 psi hydraulic pressure output
OFF: No pressure output. Hydraulic fluid will circulate for pump lubrication and cooling.

Auxiliary Hydraulic Pump Switch
- ON: 3000 psi hydraulic pressure output
- OFF: No pressure output. Hydraulic fluid will circulate for pump lubrication and cooling.
- OVRD: Auxiliary pump turned on at 3000 psi while OVERRIDE switch is held to bypass the overheat protection system.

LEFT Hydraulic System
The left hydraulic system supply pressure for the operation of the following systems:
- left engine thrust reverser
- inboard flight spoilers
- elevator augmentor power
- slat drive mechanism
- outboard flaps actuators (both wings)
- left and right wheel brakes
- left nose wheel steering actuator
- transfer hydraulic pump
- ground spoiler (both panels)

RIGHT Hydraulic System
The right hydraulic system supply pressure for the operation of the following systems:
- right engine thrust reverser
- rudder power
- outboard flight spoilers
- rudder throw limiter
- slat drive mechanism
- rear stair
- inboard flaps actuator (both wings)
- left and right wheel brakes
- right nose wheel steering actuator
- transfer hydraulic pump
- ground spoiler (both panels)

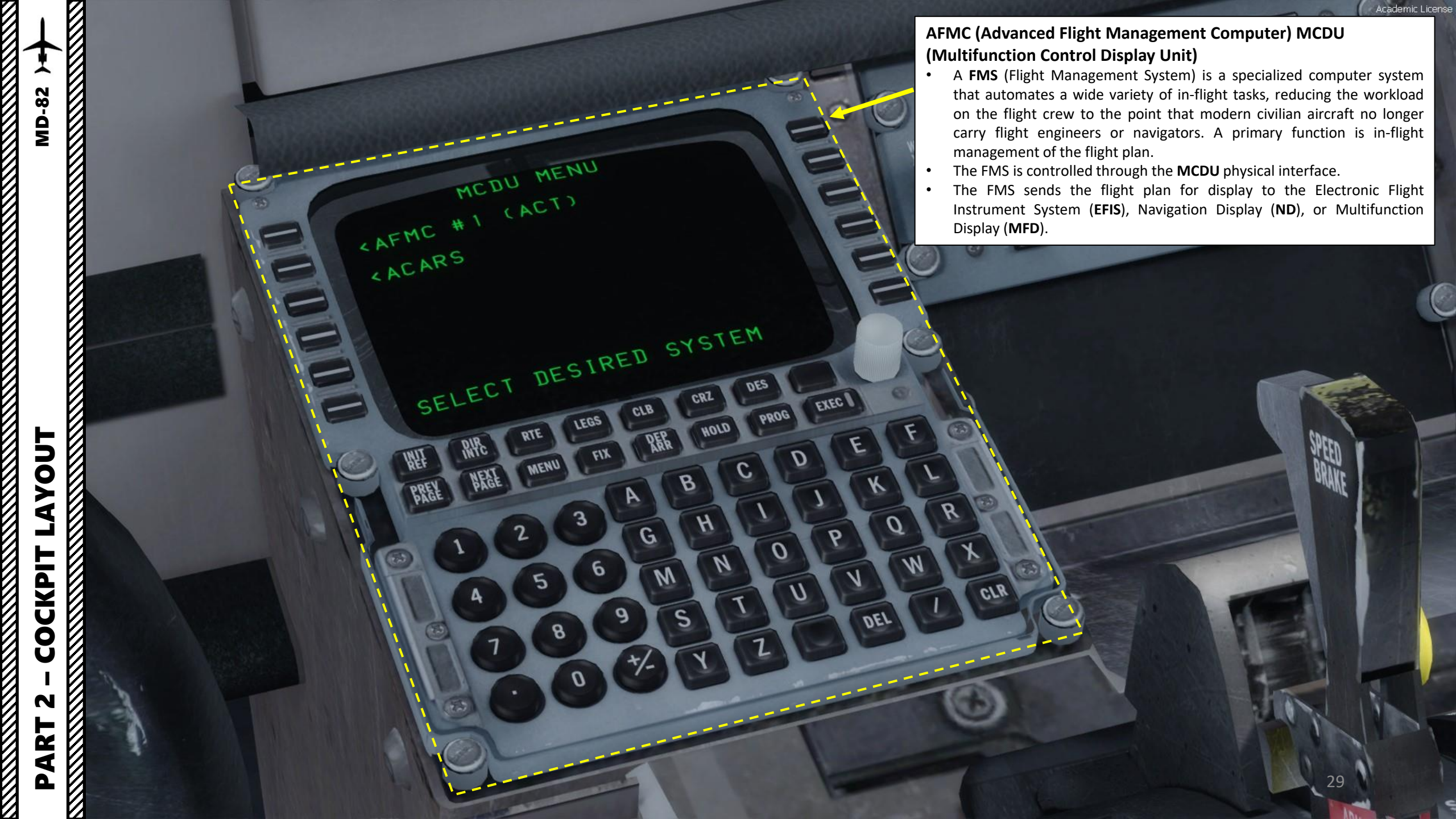
Wheel Brake Temperature Test Switch
Test brake electrical circuits and OVHT light. Gage will indicate in 425ºC to 475ºC range during test.

Wheel Brake Temperature (x100 deg C)

Wheel Brake Temperature Overheat Light
Illuminates when over 305 deg C
Extinguishes when below 260 deg C

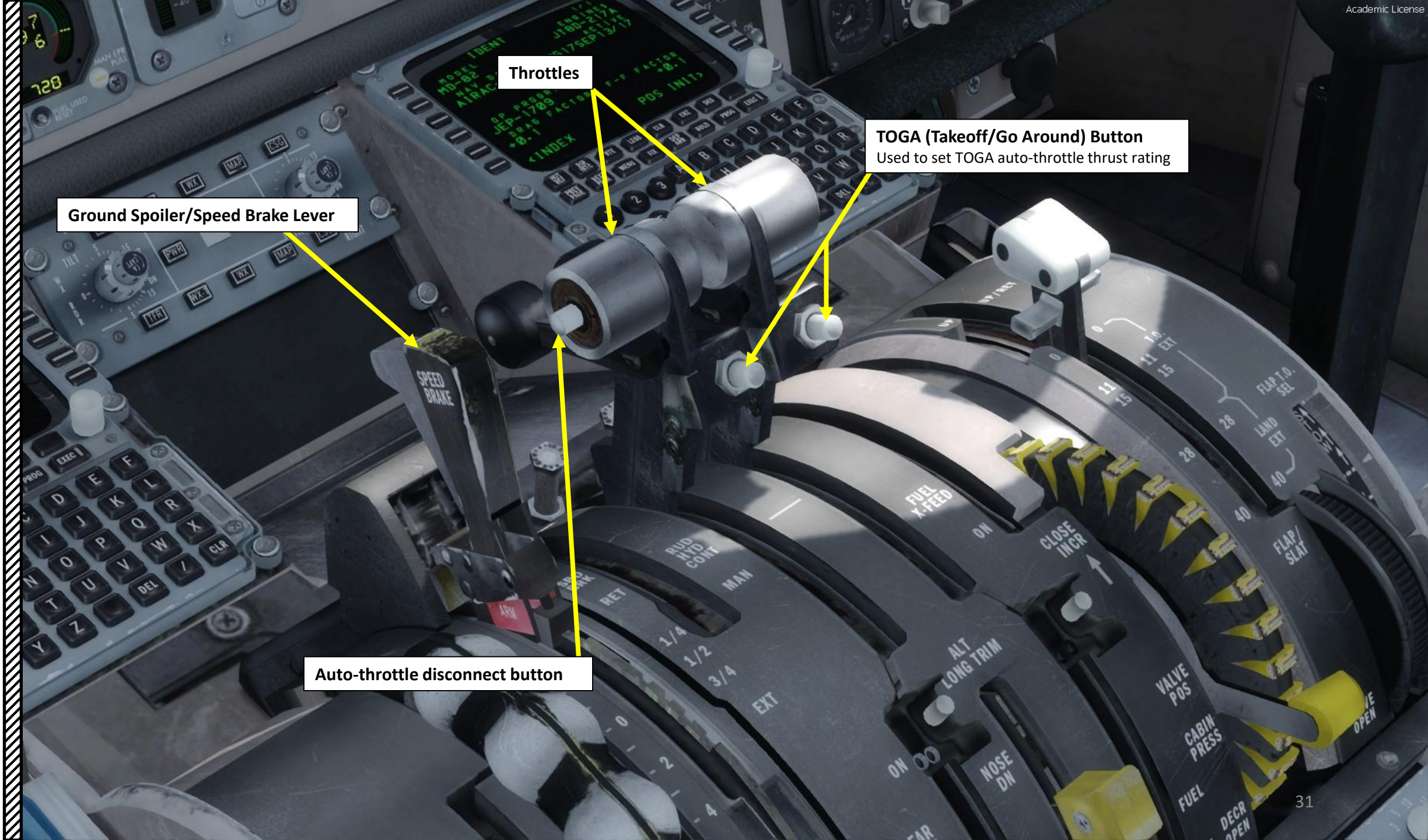
Wheel Brake Temperature Selector
Selects individual brake for temperature reading. When at ALL, gauge will display temperature of the hottest brake.

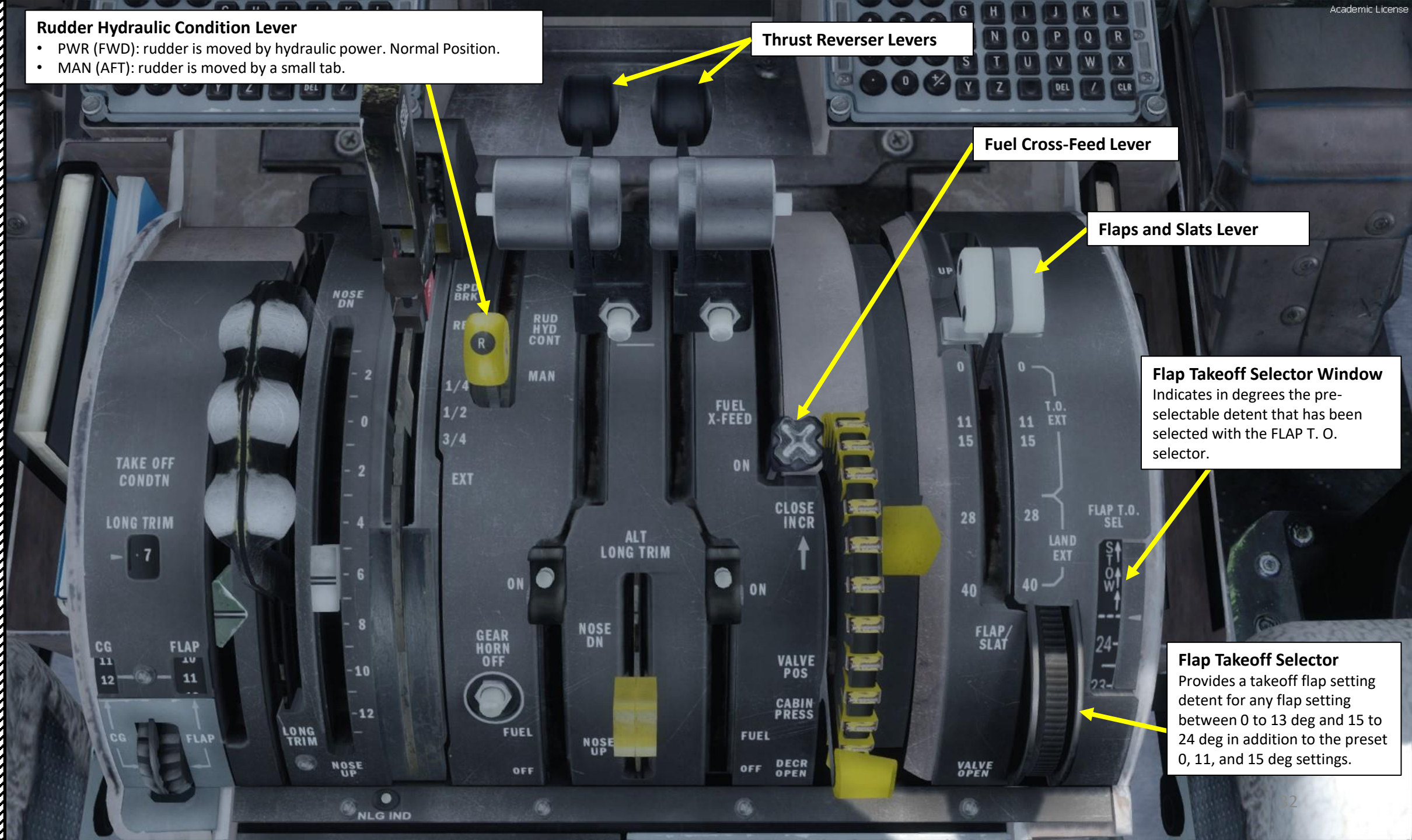
Rudder Pedal Adjustment Knob

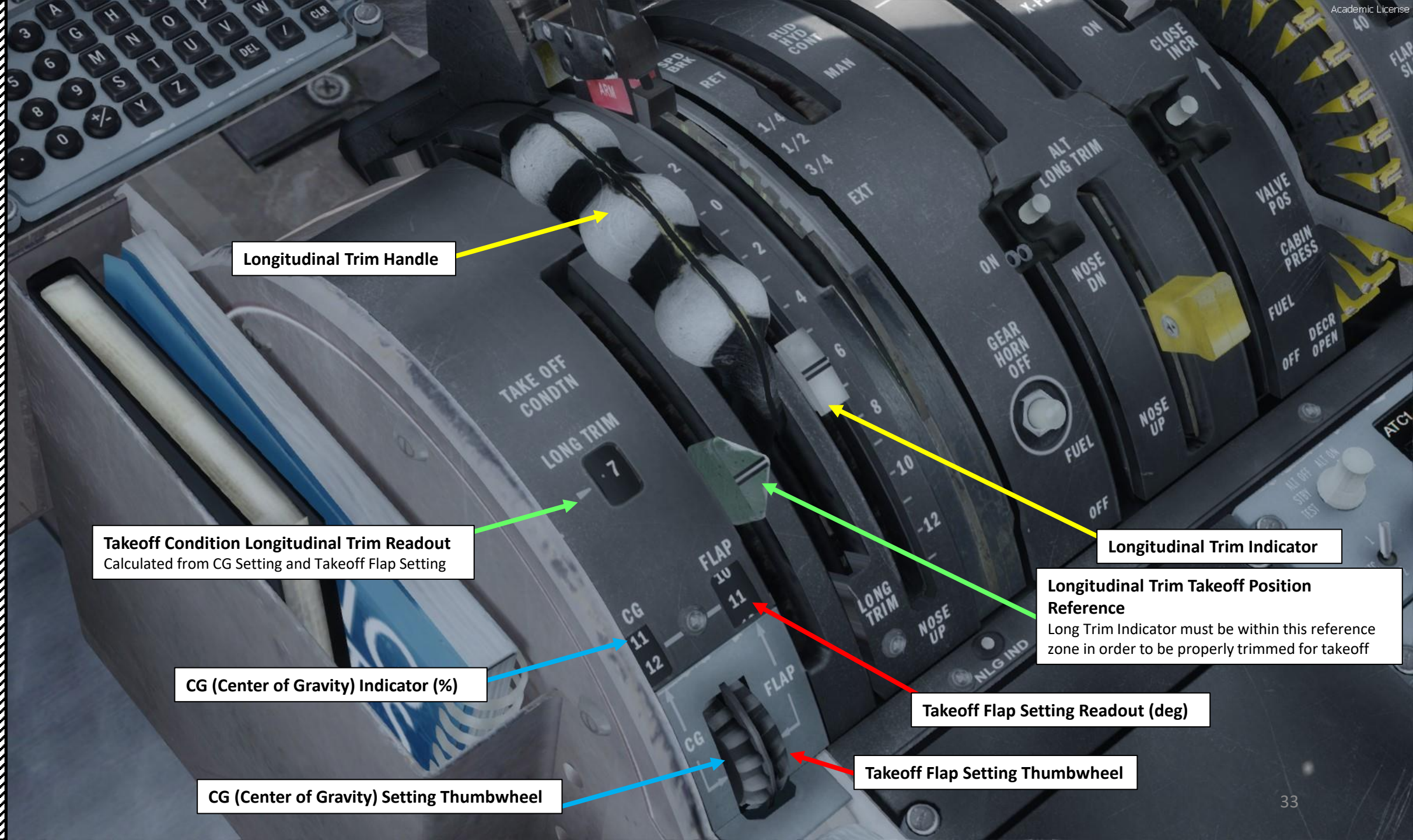


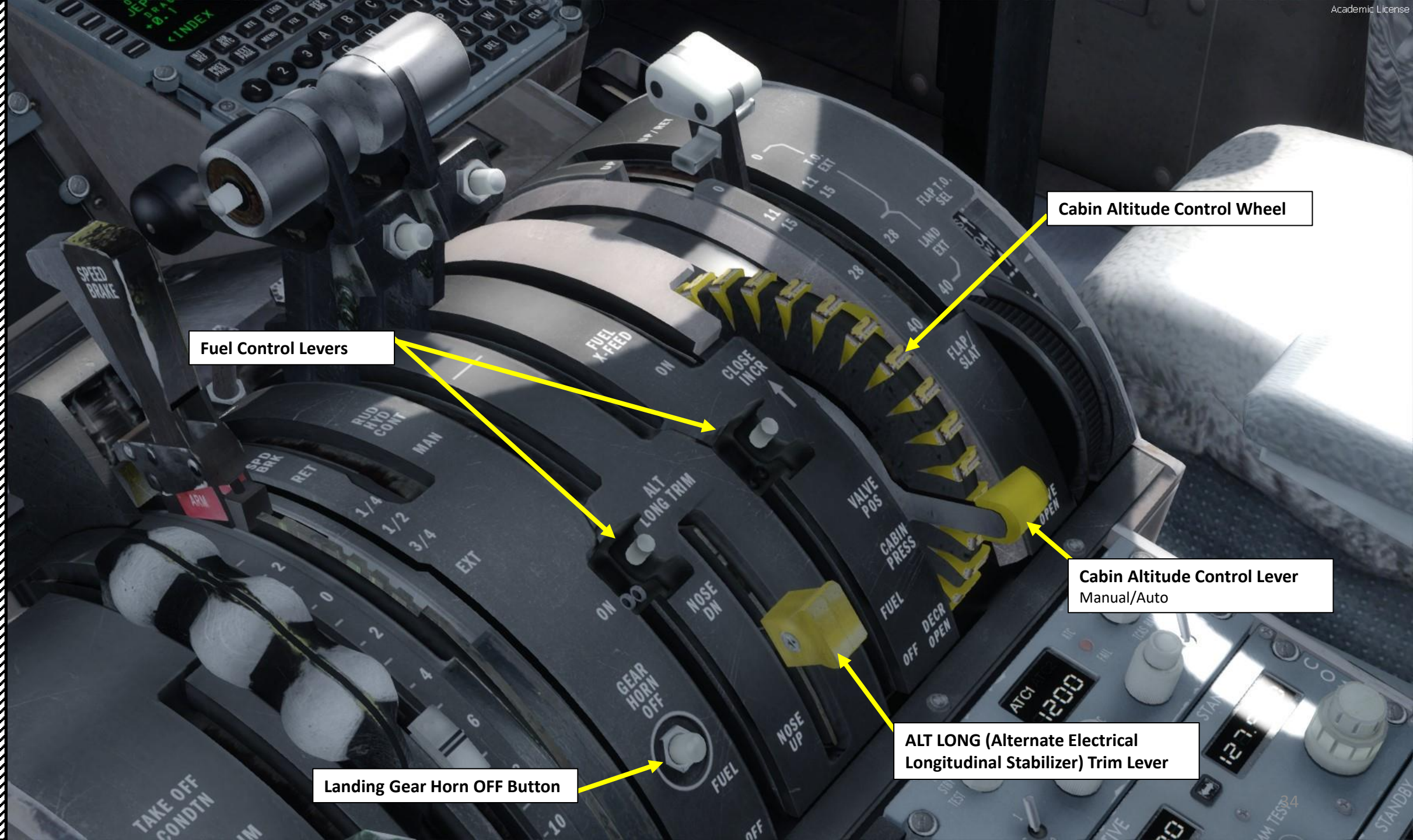
AFMC (Advanced Flight Management Computer) MCDU (Multifunction Control Display Unit)

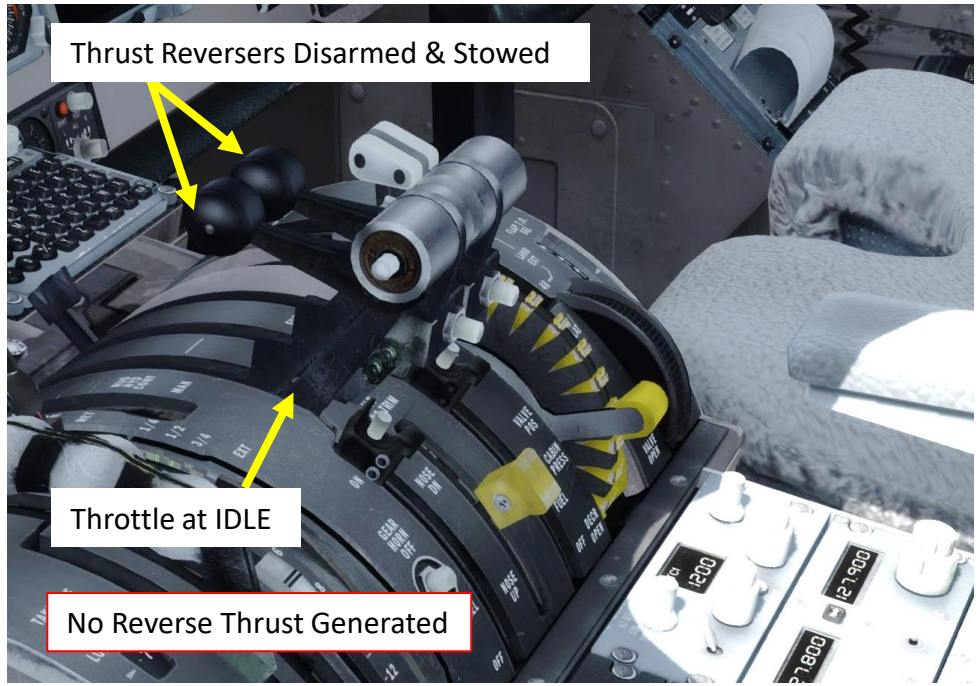
- A **FMS** (Flight Management System) is a specialized computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew to the point that modern civilian aircraft no longer carry flight engineers or navigators. A primary function is in-flight management of the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

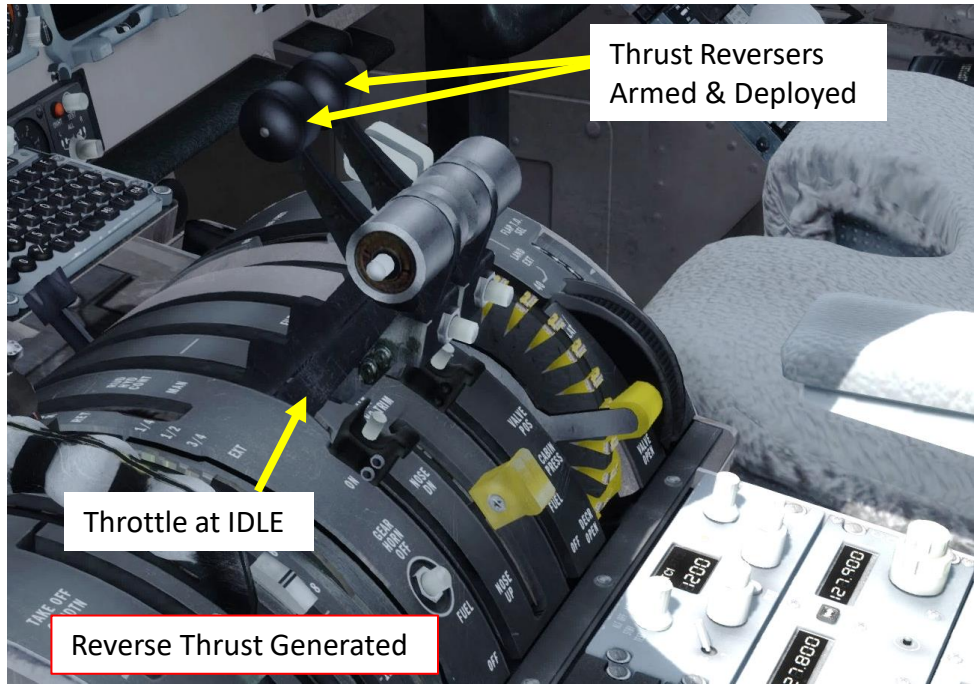

Throttles
TOGA (Takeoff/Go Around) Button
Used to set TOGA auto-throttle thrust rating
Ground Spoiler/Speed Brake Lever
Auto-throttle disconnect button
SPEED BRAKE
ARM
RET
1/4
1/2
3/4
EXT
RUD HYD CONT
MAN
FUEL X-FEED
ON
CLOSE
INCR
ALT LONG TRIM
NOSE DN
VALVE POS
CABIN PRESS
FUEL
FLAP/SLAT
FLAP T.O. SEL
LAND EXT
Academic License

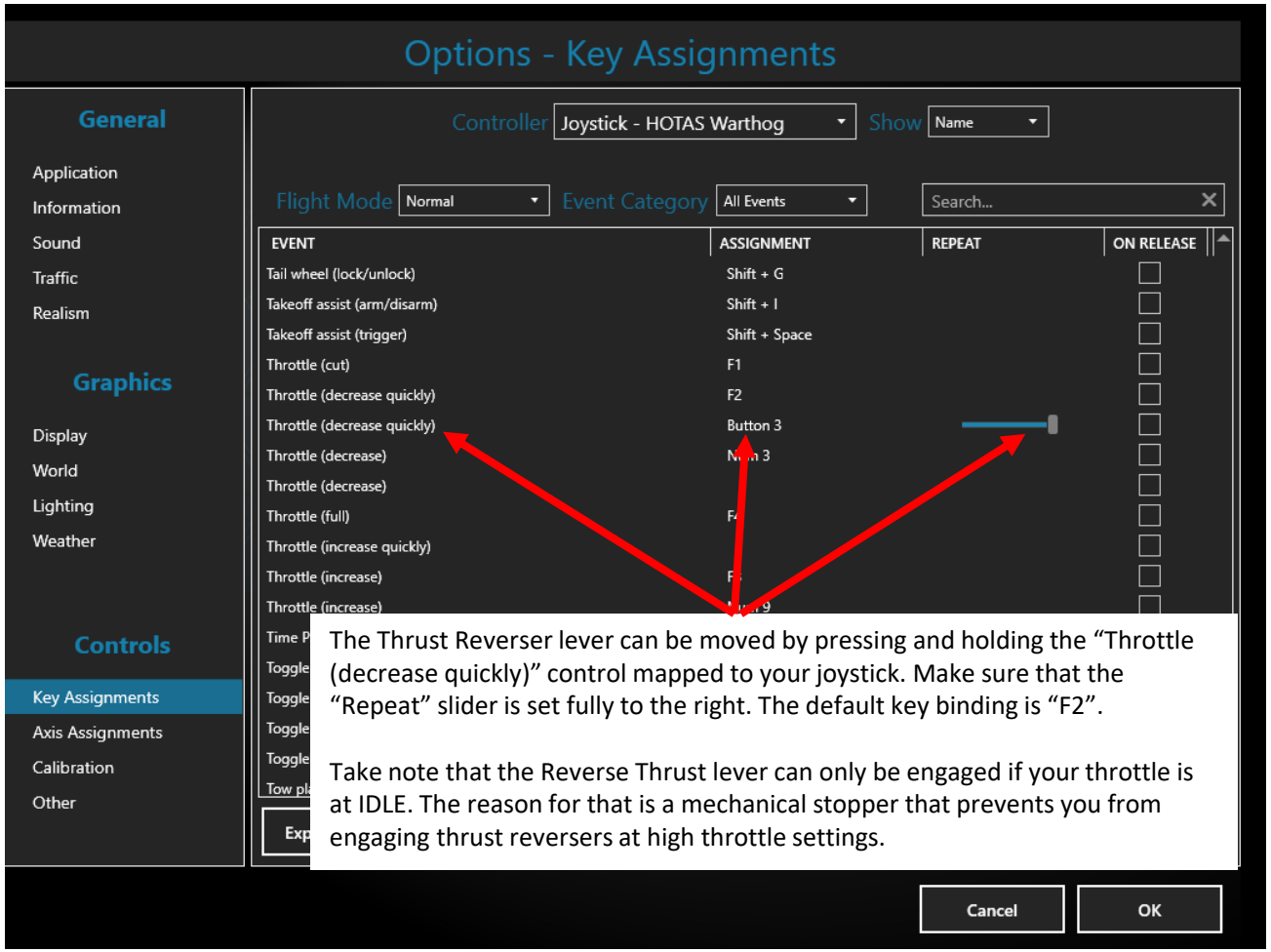

Rudder Hydraulic Condition Lever
• PWR (FWD): rudder is moved by hydraulic power. Normal Position.
• MAN (AFT): rudder is moved by a small tab.
Thrust Reverser Levers
Fuel Cross-Feed Lever
Flaps and Slats Lever
Flap Takeoff Selector Window
Indicates in degrees the pre-selectable detent that has been selected with the FLAP T. O. selector.
Flap Takeoff Selector
Provides a takeoff flap setting detent for any flap setting between 0 to 13 deg and 15 to 24 deg in addition to the preset 0, 11, and 15 deg settings.
RUD HYD CONT
MAN
EXT
FUEL X-FEED
ON
CLOSE INCR
ALT LONG TRIM
GEAR HORN OFF
FUEL
OFF
NOSE DN
NOSE UP
VALVE POS
CABIN PRESS
DECR OPEN
VALVE OPEN
TAKE OFF CONDTN
LONG TRIM
CG
FLAP
LONG TRIM
NOSE UP
NLG IND
FLAP/ SLAT
T.O. EXT
LAND EXT
FLAP T.O. SEL
Academic License


Longitudinal Trim Handle
Takeoff Condition Longitudinal Trim Readout
Calculated from CG Setting and Takeoff Flap Setting
Longitudinal Trim Indicator
Longitudinal Trim Takeoff Position Reference
Long Trim Indicator must be within this reference zone in order to be properly trimmed for takeoff
CG (Center of Gravity) Indicator (%)
Takeoff Flap Setting Readout (deg)
Takeoff Flap Setting Thumbwheel
CG (Center of Gravity) Setting Thumbwheel
TAKE OFF CONDTN
LONG TRIM
FLAP
CG
ALT LONG TRIM
GEAR HORN OFF
NOSE DN
NOSE UP
FUEL
VALVE POS
CABIN PRESS
CLOSE INCR
RUD HYD CONT
SPD BRK
EXT
RET
MAN
NLG IND


Cabin Altitude Control Wheel
Fuel Control Levers
Cabin Altitude Control Lever
Manual/Auto
ALT LONG (Alternate Electrical Longitudinal Stabilizer) Trim Lever
Landing Gear Horn OFF Button
SPEED BRAKE
FUEL X-FEED
ON
CLOSE
INCR
FLAP/ SLAT
RUD HYD CONT
MAN
SPD BRK
RET
ARM
1/4
1/2
3/4
EXT
ALT LONG TRIM
NOSE DN
NOSE UP
VALVE POS
CABIN PRESS
FUEL
OFF
DECR
OPEN
GEAR HORN OFF
TAKE OFF CONDTN
FLAP T.O. SEL
LAND EXT
ATC1
STANDBY

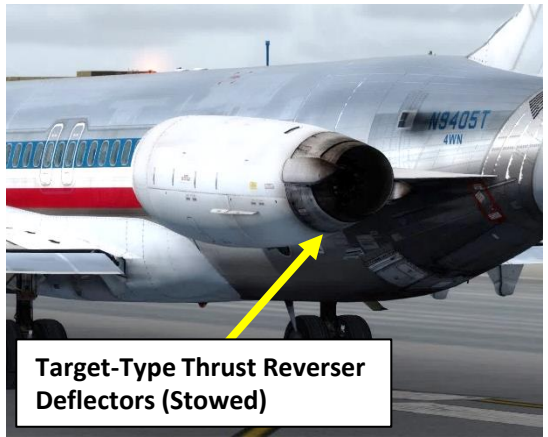


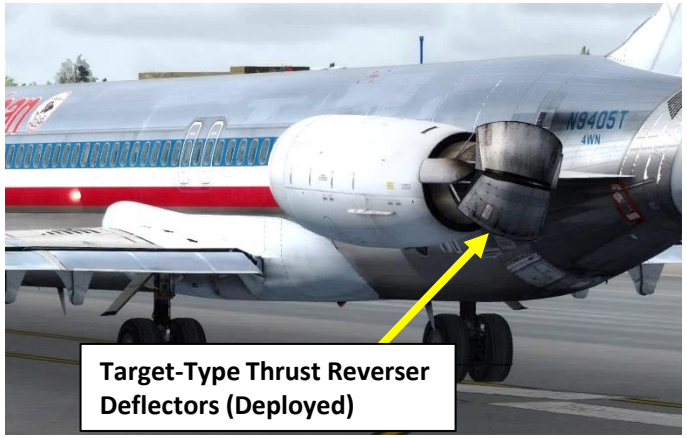


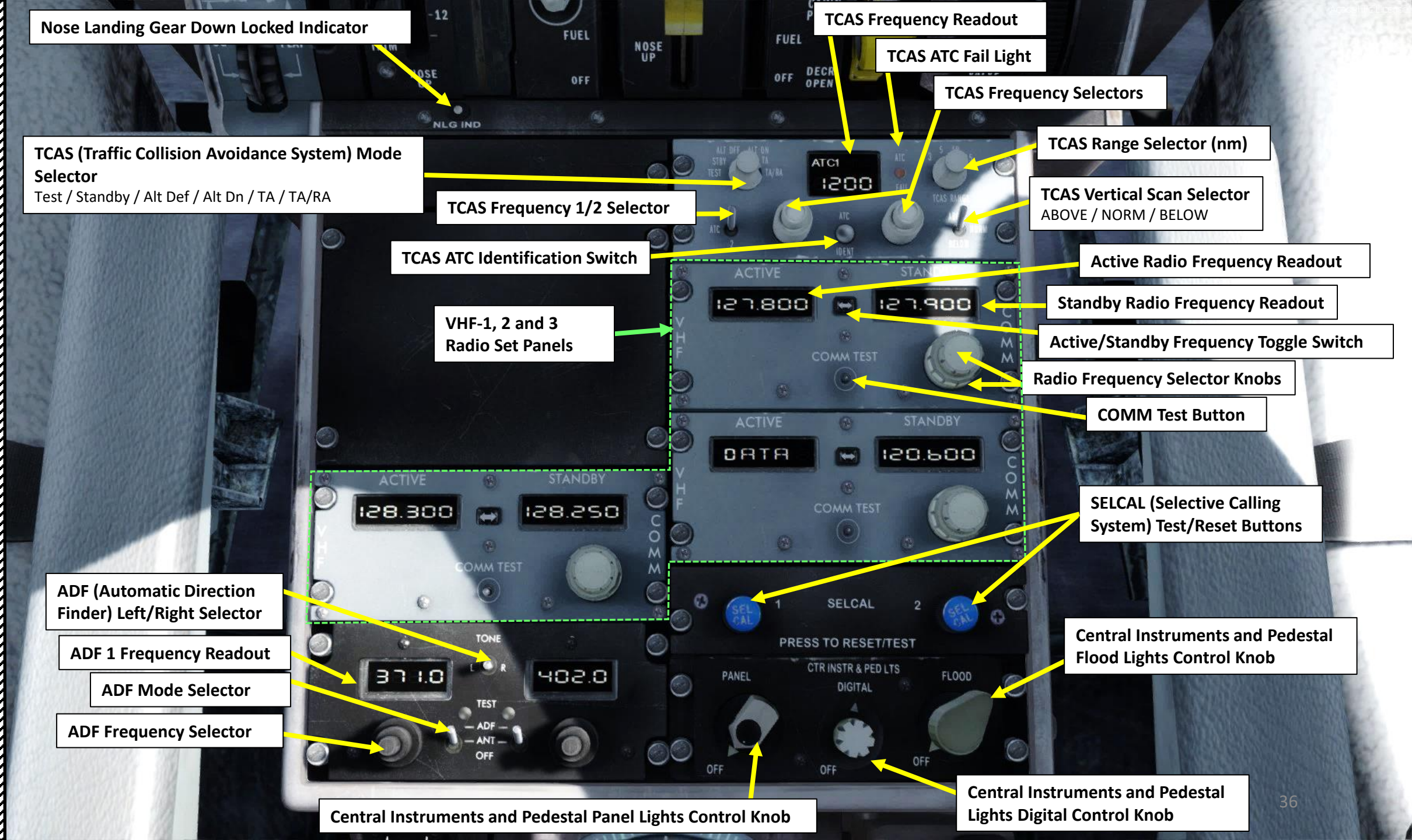


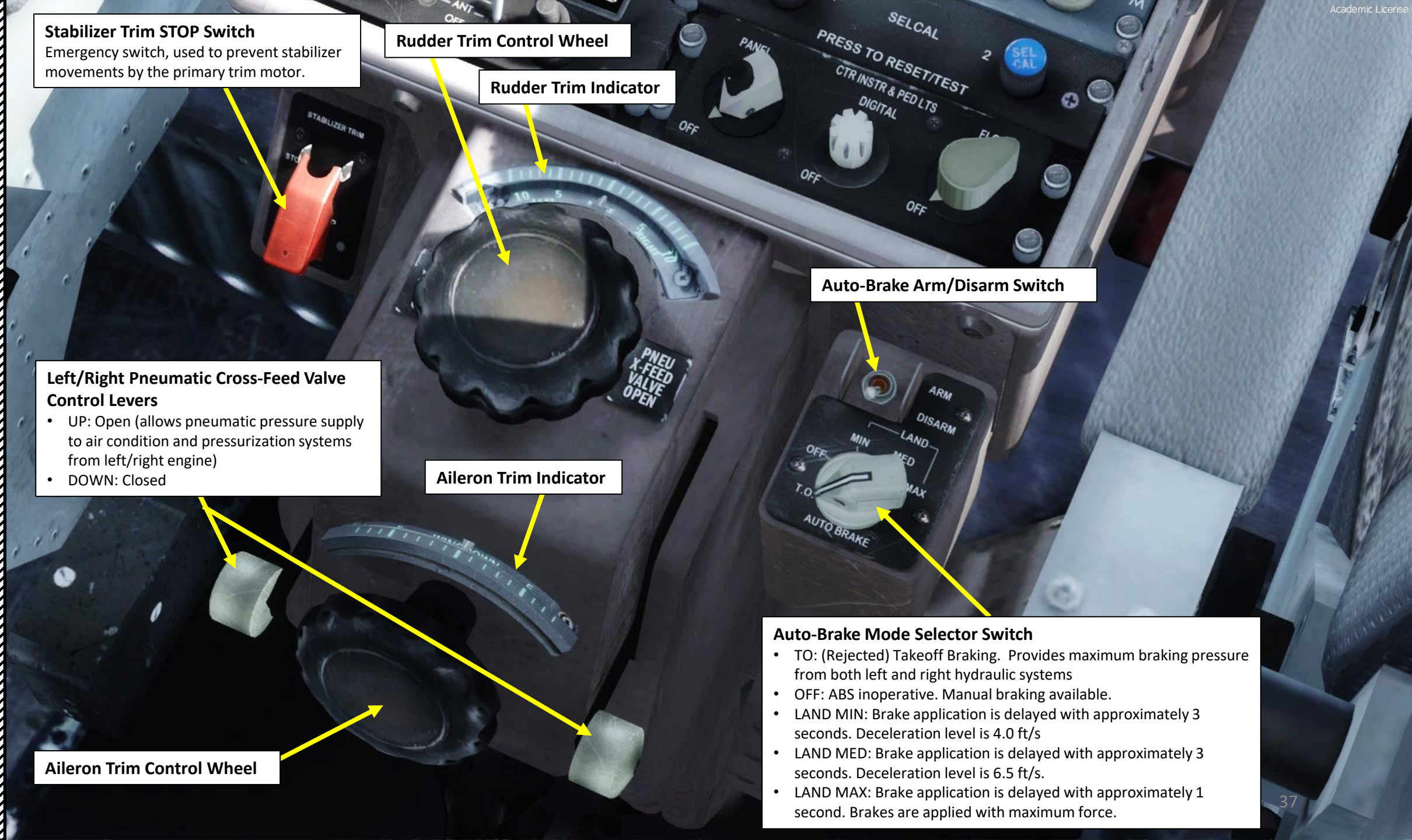
The Thrust Reverser lever can be moved by pressing and holding the “Throttle (decrease quickly)” control mapped to your joystick. Make sure that the “Repeat” slider is set fully to the right. The default key binding is “F2”.

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.






Nose Landing Gear Down Locked Indicator
TCAS Frequency Readout
TCAS ATC Fail Light
TCAS Frequency Selectors
TCAS (Traffic Collision Avoidance System) Mode Selector
Test / Standby / Alt Def / Alt Dn / TA / TA/RA
TCAS Range Selector (nm)
TCAS Vertical Scan Selector
ABOVE / NORM / BELOW
TCAS Frequency 1/2 Selector
TCAS ATC Identification Switch
Active Radio Frequency Readout
Standby Radio Frequency Readout
VHF-1, 2 and 3 Radio Set Panels
Active/Standby Frequency Toggle Switch
Radio Frequency Selector Knobs
COMM Test Button
SELCAL (Selective Calling System) Test/Reset Buttons
ADF (Automatic Direction Finder) Left/Right Selector
ADF 1 Frequency Readout
ADF Mode Selector
ADF Frequency Selector
Central Instruments and Pedestal Flood Lights Control Knob
Central Instruments and Pedestal Panel Lights Control Knob
Central Instruments and Pedestal Lights Digital Control Knob
NLG IND
ATC1
1200
ACTIVE
STANDBY
127.800
127.900
DATA
120.600
128.300
128.250
COMM TEST
SELCAL
PRESS TO RESET/TEST
TONE
371.0
402.0
TEST
ADF
ANT
OFF
PANEL
CTR INSTR & PED LTS
DIGITAL
FLOOD



Stabilizer Trim STOP Switch
Emergency switch, used to prevent stabilizer movements by the primary trim motor.

Rudder Trim Control Wheel

Rudder Trim Indicator

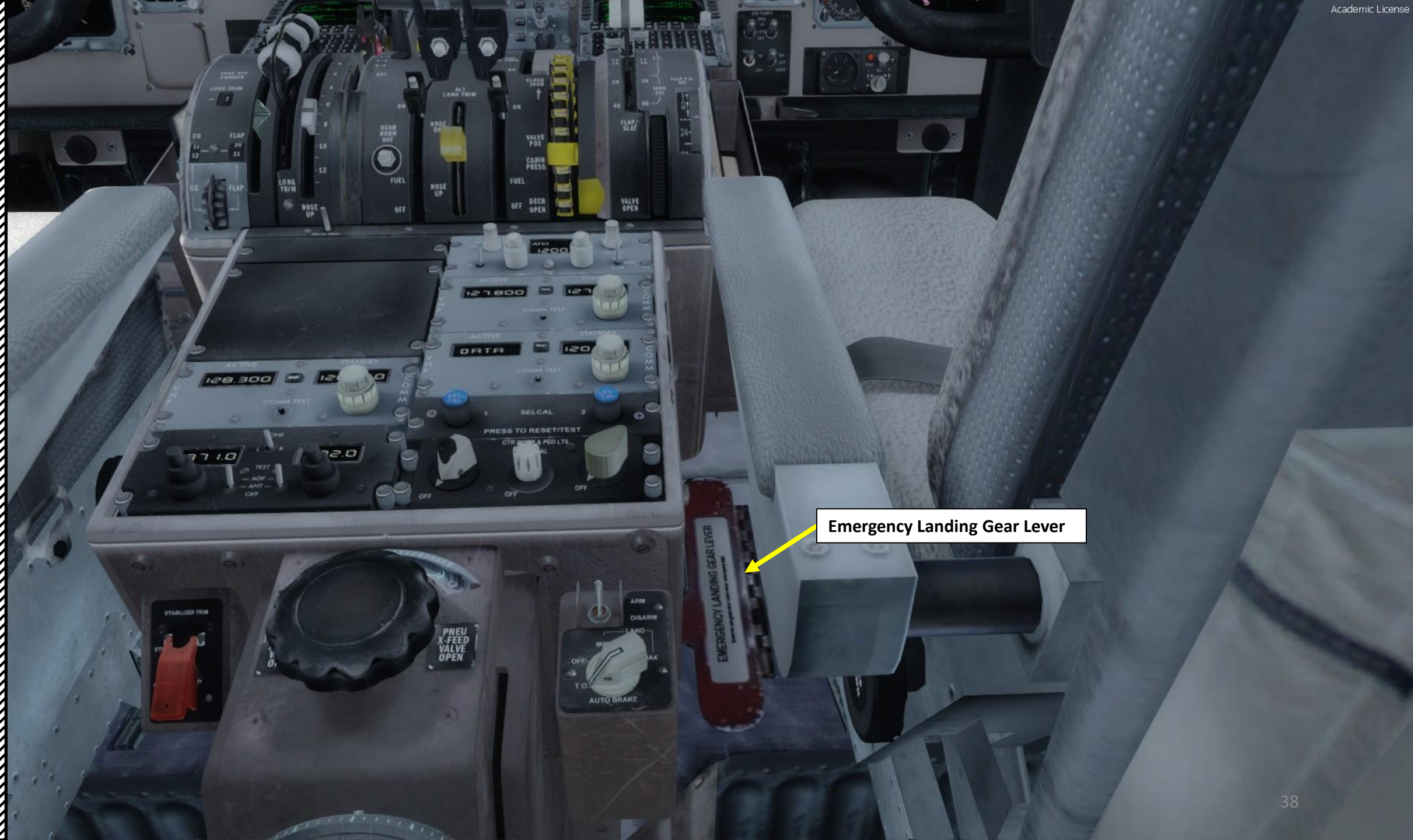
Auto-Brake Arm/Disarm Switch

Left/Right Pneumatic Cross-Feed Valve Control Levers
- UP: Open (allows pneumatic pressure supply to air condition and pressurization systems from left/right engine)
- DOWN: Closed

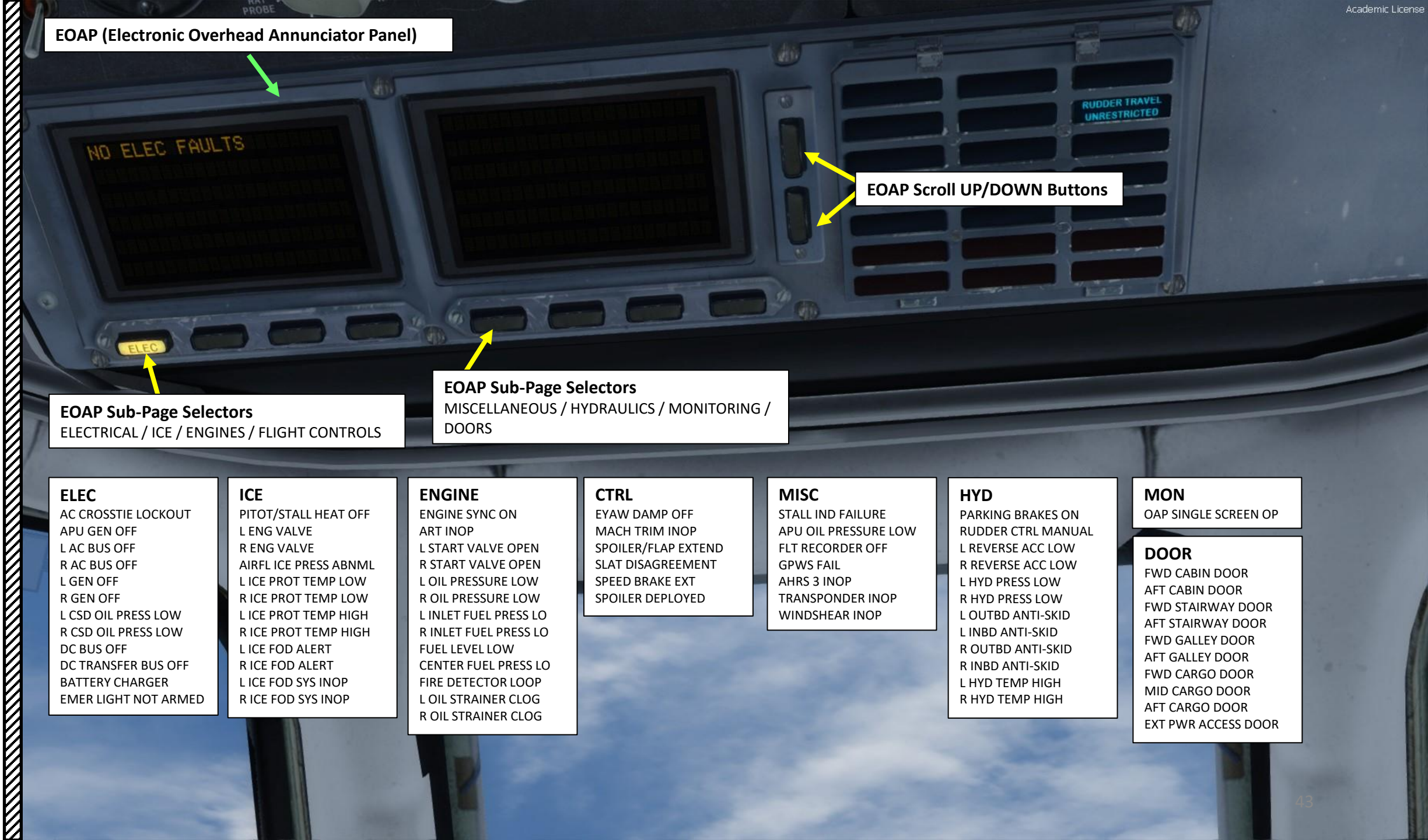
Aileron Trim Indicator

Aileron Trim Control Wheel

Auto-Brake Mode Selector Switch
- TO: (Rejected) Takeoff Braking. Provides maximum braking pressure from both left and right hydraulic systems
- OFF: ABS inoperative. Manual braking available.
- LAND MIN: Brake application is delayed with approximately 3 seconds. Deceleration level is 4.0 ft/s
- LAND MED: Brake application is delayed with approximately 3 seconds. Deceleration level is 6.5 ft/s.
- LAND MAX: Brake application is delayed with approximately 1 second. Brakes are applied with maximum force.




Electrical Panel
Flight Recorder Panel
Cockpit Lights Panel
APU (Auxiliary Power Unit) Panel
Test Panel
Air Conditioning Panel
Engine Starter Panel
Fuel Control Panel
Cabin Pressure Panel
Lights
Anti-Ice Systems Panel
Door & Wiper Panel
FLIGHT RECORDER
CSD TEMP
EGT
NO ELEC FAULTS
Academic License



EOAP (Electronic Overhead Annunciator Panel)

EOAP Scroll UP/DOWN Buttons

EOAP Sub-Page Selectors
ELECTRICAL / ICE / ENGINES / FLIGHT CONTROLS

EOAP Sub-Page Selectors
MISCELLANEOUS / HYDRAULICS / MONITORING / DOORS

ELEC
- AC CROSSTIE LOCKOUT
- APU GEN OFF
- L AC BUS OFF
- R AC BUS OFF
- L GEN OFF
- R GEN OFF
- L CSD OIL PRESS LOW
- R CSD OIL PRESS LOW
- DC BUS OFF
- DC TRANSFER BUS OFF
- BATTERY CHARGER
- EMER LIGHT NOT ARMED

ICE
- PITOT/STALL HEAT OFF
- L ENG VALVE
- R ENG VALVE
- AIRFL ICE PRESS ABNML
- L ICE PROT TEMP LOW
- R ICE PROT TEMP LOW
- L ICE PROT TEMP HIGH
- R ICE PROT TEMP HIGH
- L ICE FOD ALERT
- R ICE FOD ALERT
- L ICE FOD SYS INOP
- R ICE FOD SYS INOP

ENGINE
- ENGINE SYNC ON
- ART INOP
- L START VALVE OPEN
- R START VALVE OPEN
- L OIL PRESSURE LOW
- R OIL PRESSURE LOW
- L INLET FUEL PRESS LO
- R INLET FUEL PRESS LO
- FUEL LEVEL LOW
- CENTER FUEL PRESS LO
- FIRE DETECTOR LOOP
- L OIL STRAINER CLOG
- R OIL STRAINER CLOG

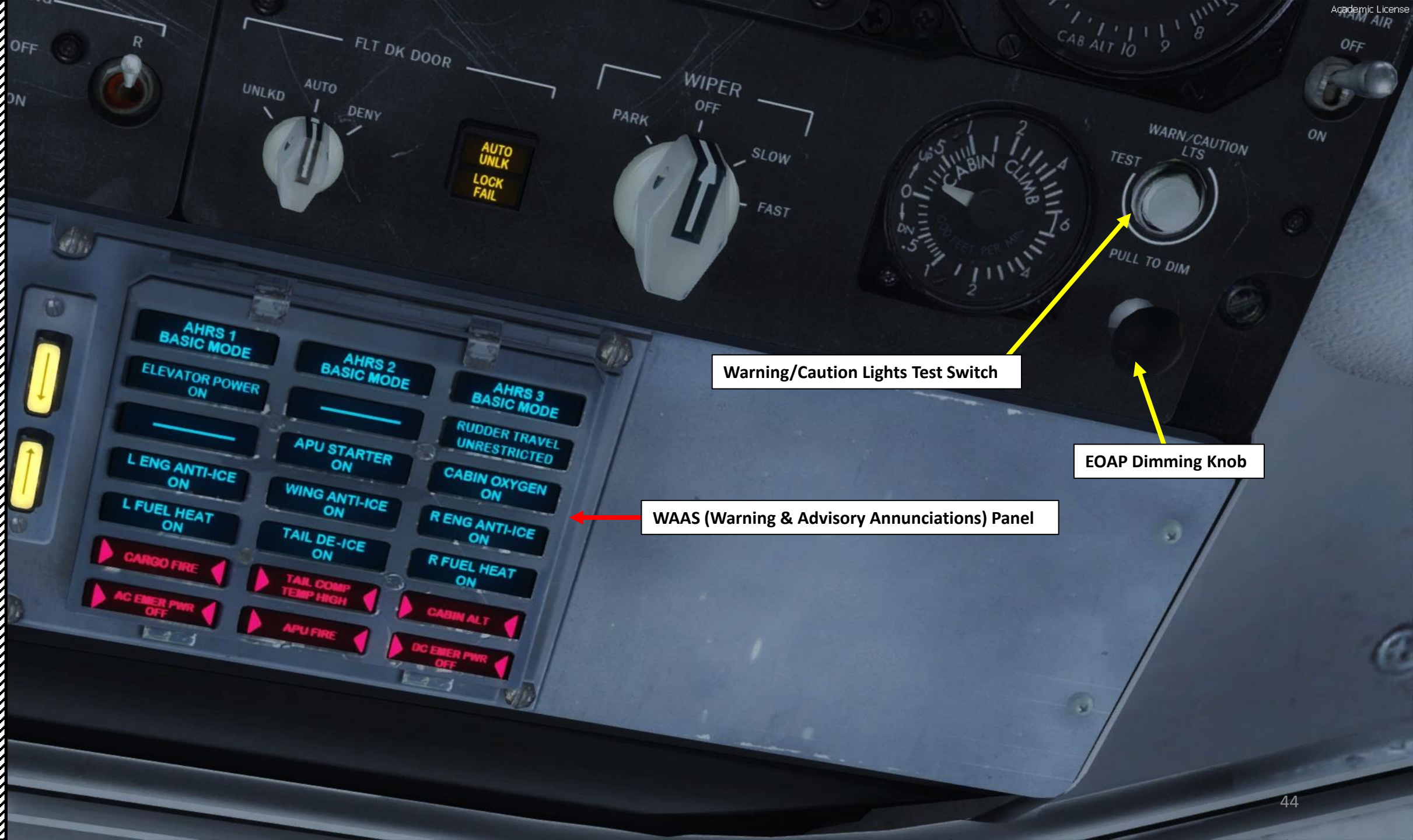
CTRL
- EYAW DAMP OFF
- MACH TRIM INOP
- SPOILER/FLAP EXTEND
- SLAT DISAGREEMENT
- SPEED BRAKE EXT
- SPOILER DEPLOYED

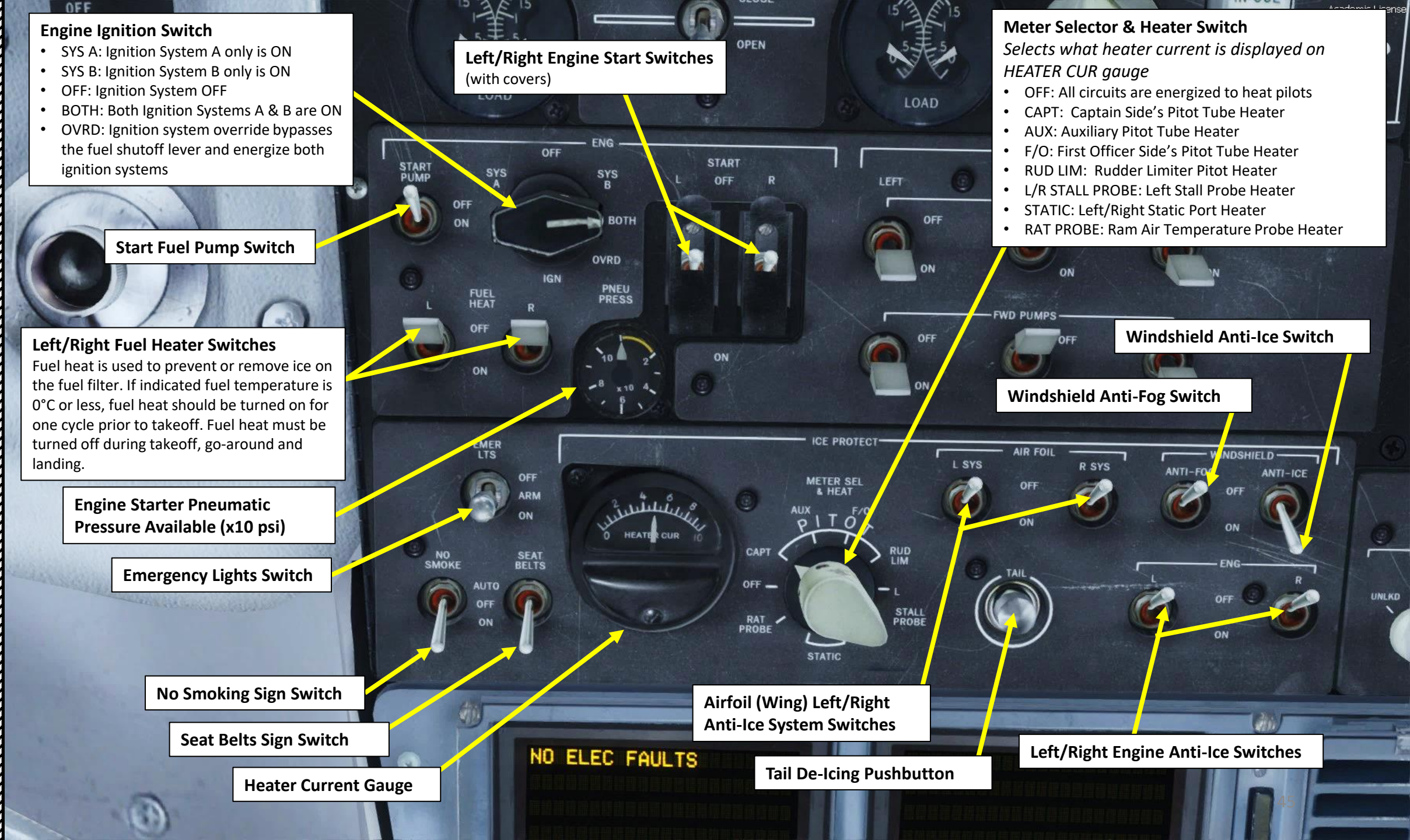
MISC
- STALL IND FAILURE
- APU OIL PRESSURE LOW
- FLT RECORDER OFF
- GPWS FAIL
- AHRS 3 INOP
- TRANSPONDER INOP
- WINDSHEAR INOP

HYD
- PARKING BRAKES ON
- RUDDER CTRL MANUAL
- L REVERSE ACC LOW
- R REVERSE ACC LOW
- L HYD PRESS LOW
- R HYD PRESS LOW
- L OUTBD ANTI-SKID
- L INBD ANTI-SKID
- R OUTBD ANTI-SKID
- R INBD ANTI-SKID
- L HYD TEMP HIGH
- R HYD TEMP HIGH

MON
- OAP SINGLE SCREEN OP

DOOR
- FWD CABIN DOOR
- AFT CABIN DOOR
- FWD STAIRWAY DOOR
- AFT STAIRWAY DOOR
- FWD GALLEY DOOR
- AFT GALLEY DOOR
- FWD CARGO DOOR
- MID CARGO DOOR
- AFT CARGO DOOR
- EXT PWR ACCESS DOOR


Academic License
FLT DK DOOR
UNLKD
AUTO
DENY
AUTO UNLK
LOCK FAIL
WIPER
PARK
OFF
SLOW
FAST
CAB ALT
CABIN CLIMB
WARN/CAUTION LTS
TEST
PULL TO DIM
ON
AHRS 1 BASIC MODE
AHRS 2 BASIC MODE
AHRS 3 BASIC MODE
ELEVATOR POWER ON
RUDDER TRAVEL UNRESTRICTED
APU STARTER ON
L ENG ANTI-ICE ON
CABIN OXYGEN ON
WING ANTI-ICE ON
L FUEL HEAT ON
R ENG ANTI-ICE ON
TAIL DE-ICE ON
CARGO FIRE
R FUEL HEAT ON
TAIL COMP TEMP HIGH
AC EMER PWR OFF
CABIN ALT
APU FIRE
DC EMER PWR OFF
Warning/Caution Lights Test Switch
EOAP Dimming Knob
WAAS (Warning & Advisory Annunciations) Panel



Engine Ignition Switch
- SYS A: Ignition System A only is ON
- SYS B: Ignition System B only is ON
- OFF: Ignition System OFF
- BOTH: Both Ignition Systems A & B are ON
- OVRD: Ignition system override bypasses the fuel shutoff lever and energize both ignition systems

Left/Right Engine Start Switches
(with covers)

Meter Selector & Heater Switch
Selects what heater current is displayed on HEATER CUR gauge
- OFF: All circuits are energized to heat pilots
- CAPT: Captain Side's Pitot Tube Heater
- AUX: Auxiliary Pitot Tube Heater
- F/O: First Officer Side's Pitot Tube Heater
- RUD LIM: Rudder Limiter Pitot Heater
- L/R STALL PROBE: Left Stall Probe Heater
- STATIC: Left/Right Static Port Heater
- RAT PROBE: Ram Air Temperature Probe Heater

Start Fuel Pump Switch

Left/Right Fuel Heater Switches
Fuel heat is used to prevent or remove ice on the fuel filter. If indicated fuel temperature is 0°C or less, fuel heat should be turned on for one cycle prior to takeoff. Fuel heat must be turned off during takeoff, go-around and landing.

Windshield Anti-Ice Switch

Windshield Anti-Fog Switch

Engine Starter Pneumatic Pressure Available (x10 psi)

Emergency Lights Switch

No Smoking Sign Switch

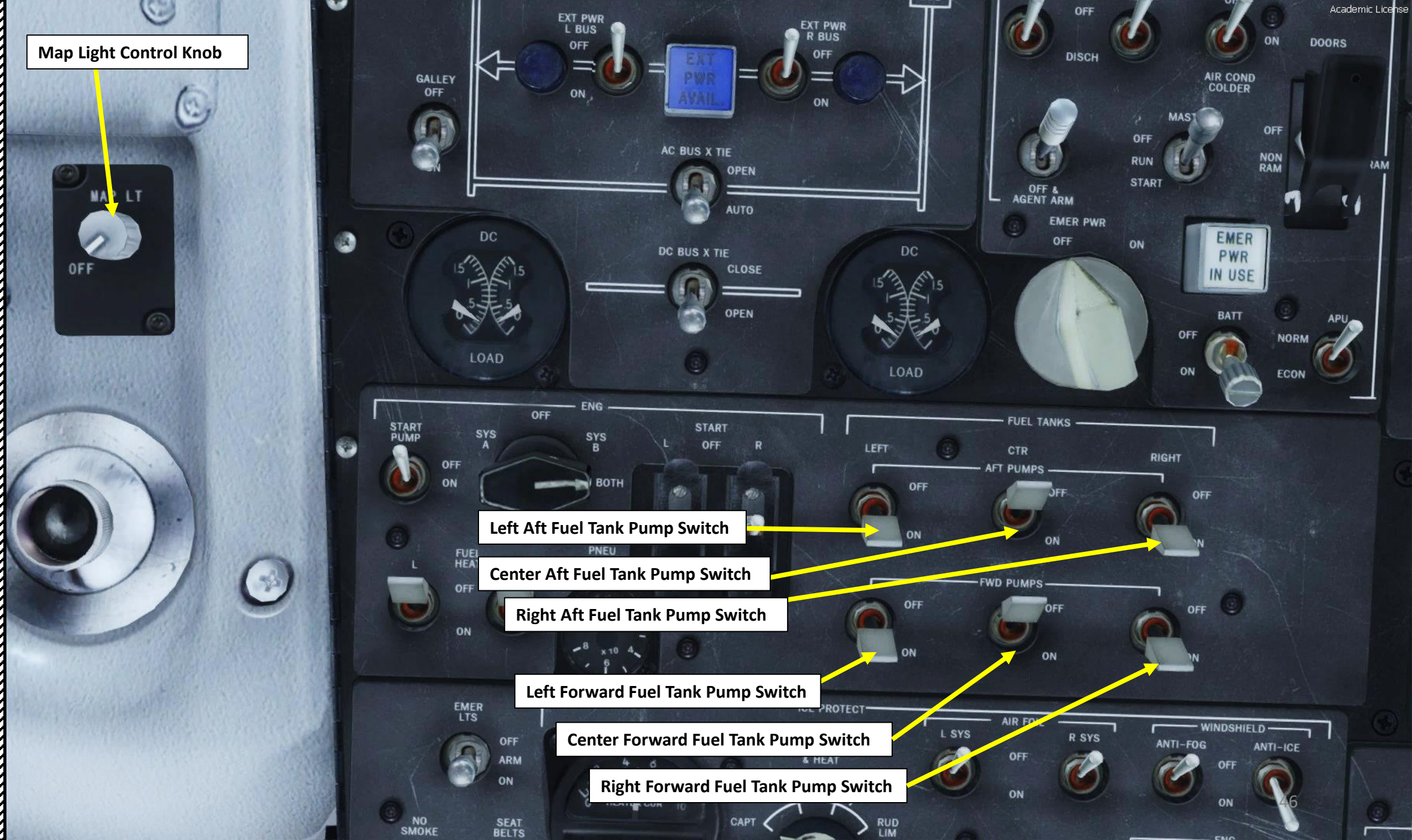
Seat Belts Sign Switch

Heater Current Gauge

Airfoil (Wing) Left/Right Anti-Ice System Switches

Tail De-Icing Pushbutton

Left/Right Engine Anti-Ice Switches


Map Light Control Knob
Left Aft Fuel Tank Pump Switch
Center Aft Fuel Tank Pump Switch
Right Aft Fuel Tank Pump Switch
Left Forward Fuel Tank Pump Switch
Center Forward Fuel Tank Pump Switch
Right Forward Fuel Tank Pump Switch
EXT PWR L BUS
EXT PWR R BUS
EXT PWR AVAIL
AC BUS X TIE
DC BUS X TIE
EMER PWR IN USE
FUEL TANKS
AFT PUMPS
FWD PUMPS
ENG
WINDSHIELD
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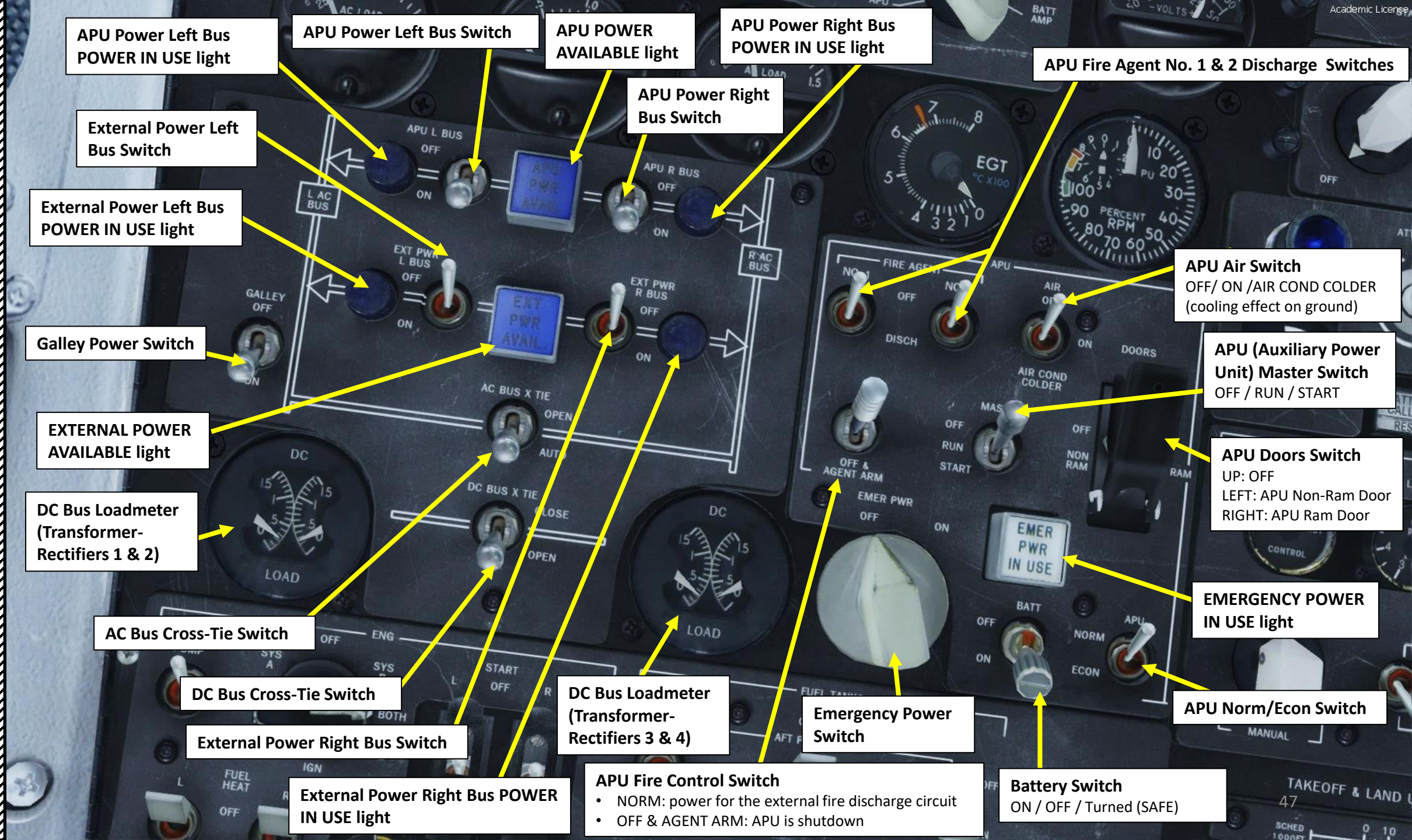
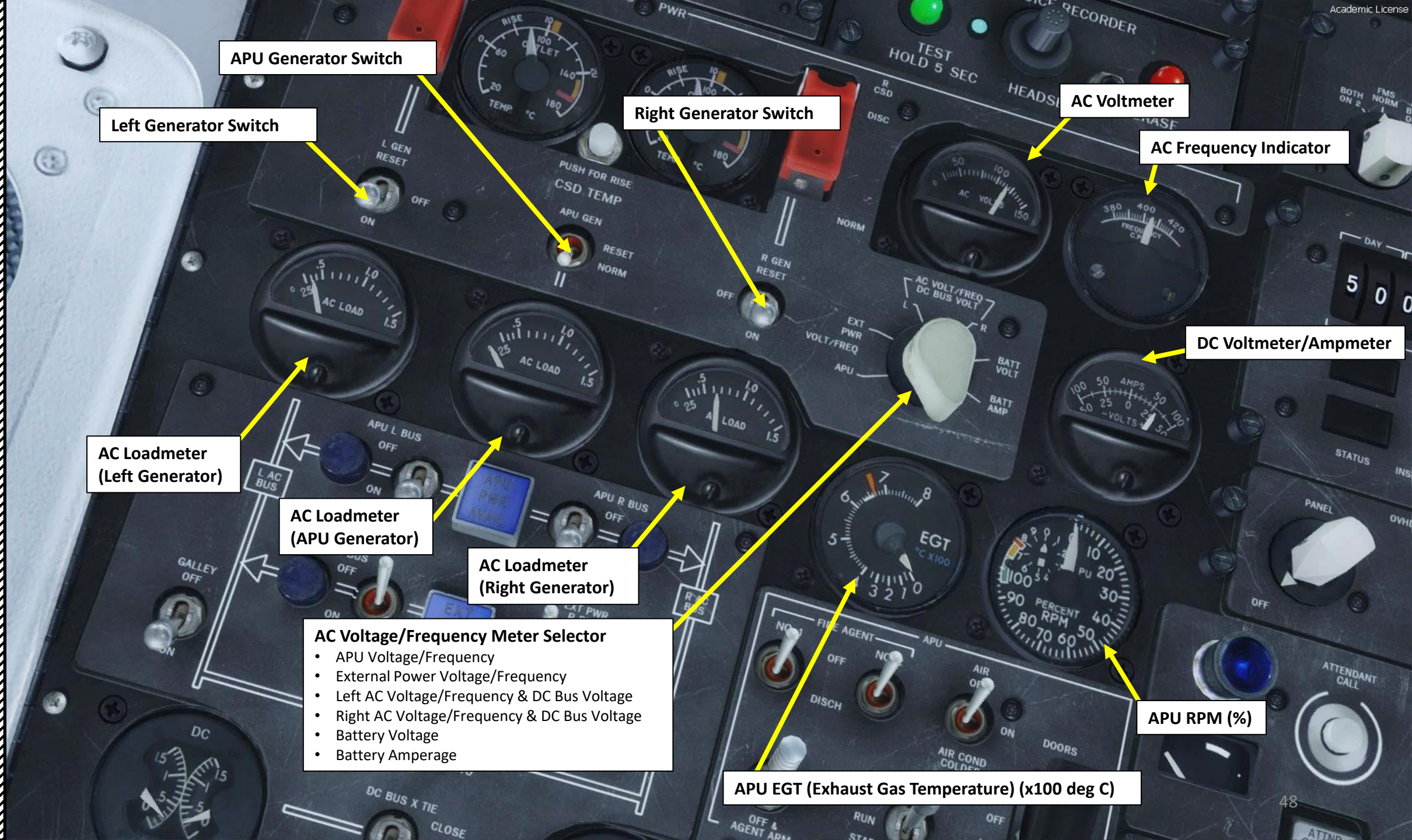
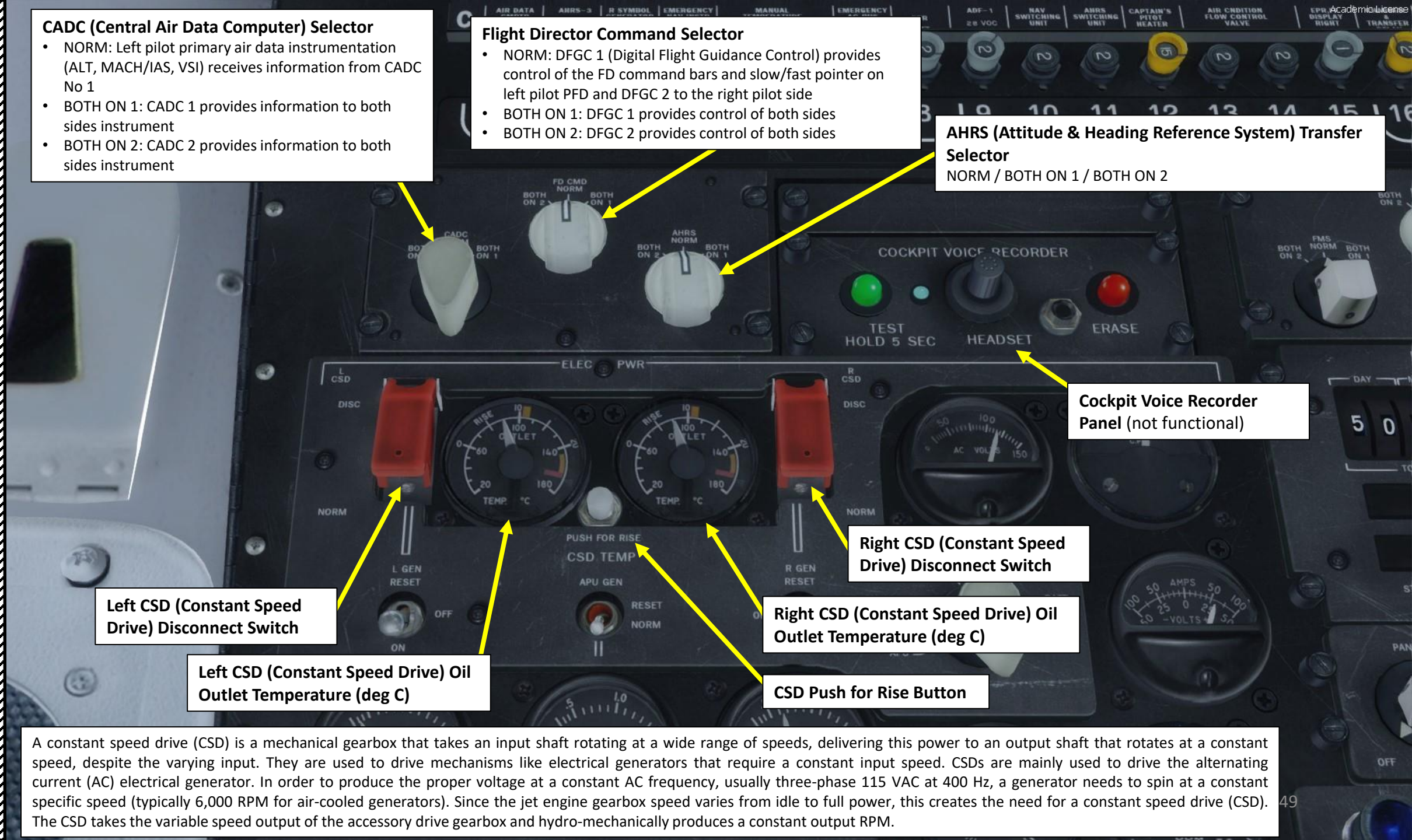

APU Power Left Bus POWER IN USE light
APU Power Left Bus Switch
APU POWER AVAILABLE light
APU Power Right Bus POWER IN USE light
APU Fire Agent No. 1 & 2 Discharge Switches
APU Power Right Bus Switch
External Power Left Bus Switch
External Power Left Bus POWER IN USE light
APU Air Switch
OFF/ ON /AIR COND COLDER (cooling effect on ground)
Galley Power Switch
APU (Auxiliary Power Unit) Master Switch
OFF / RUN / START
EXTERNAL POWER AVAILABLE light
APU Doors Switch
UP: OFF
LEFT: APU Non-Ram Door
RIGHT: APU Ram Door
DC Bus Loadmeter (Transformer-Rectifiers 1 & 2)
EMERGENCY POWER IN USE light
AC Bus Cross-Tie Switch
DC Bus Cross-Tie Switch
DC Bus Loadmeter (Transformer-Rectifiers 3 & 4)
Emergency Power Switch
APU Norm/Econ Switch
External Power Right Bus Switch
External Power Right Bus POWER IN USE light
APU Fire Control Switch
• NORM: power for the external fire discharge circuit
• OFF & AGENT ARM: APU is shutdown
Battery Switch
ON / OFF / Turned (SAFE)
APU L BUS
APU R BUS
L AC BUS
R AC BUS
EXT PWR L BUS
EXT PWR R BUS
GALLEY
AC BUS X TIE
DC BUS X TIE
FIRE AGENT
APU
DISCH
AIR COND COLDER
DOORS
OFF & AGENT ARM
EMER PWR
EMER PWR IN USE
BATT
NORM
ECON
RUN
START
NON RAM
RAM
EGT
PERCENT RPM
LOAD
ENG
FUEL HEAT
IGN
MANUAL
TAKEOFF & LAND


APU Generator Switch
Left Generator Switch
Right Generator Switch
AC Voltmeter
AC Frequency Indicator
DC Voltmeter/Ampmeter
AC Loadmeter (Left Generator)
AC Loadmeter (APU Generator)
AC Loadmeter (Right Generator)
AC Voltage/Frequency Meter Selector
• APU Voltage/Frequency
• External Power Voltage/Frequency
• Left AC Voltage/Frequency & DC Bus Voltage
• Right AC Voltage/Frequency & DC Bus Voltage
• Battery Voltage
• Battery Amperage
APU EGT (Exhaust Gas Temperature) (x100 deg C)
APU RPM (%)



CADC (Central Air Data Computer) Selector

- NORM: Left pilot primary air data instrumentation (ALT, MACH/IAS, VSI) receives information from CADC No 1
- BOTH ON 1: CADC 1 provides information to both sides instrument
- BOTH ON 2: CADC 2 provides information to both sides instrument

Flight Director Command Selector

- NORM: DFGC 1 (Digital Flight Guidance Control) provides control of the FD command bars and slow/fast pointer on left pilot PFD and DFGC 2 to the right pilot side
- BOTH ON 1: DFGC 1 provides control of both sides
- BOTH ON 2: DFGC 2 provides control of both sides

AHRS (Attitude & Heading Reference System) Transfer Selector

NORM / BOTH ON 1 / BOTH ON 2

Cockpit Voice Recorder Panel (not functional)

Right CSD (Constant Speed Drive) Disconnect Switch

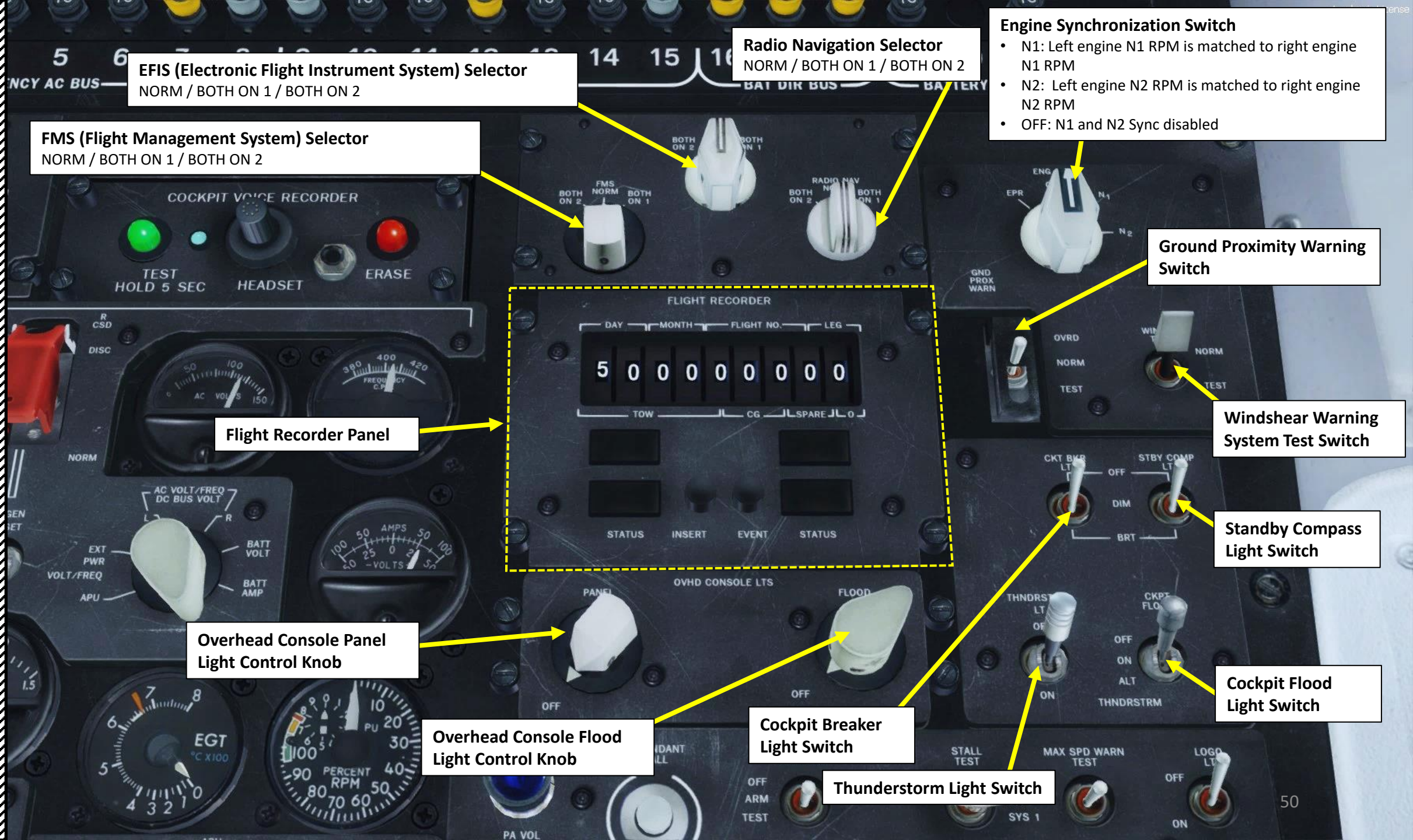
Right CSD (Constant Speed Drive) Oil Outlet Temperature (deg C)

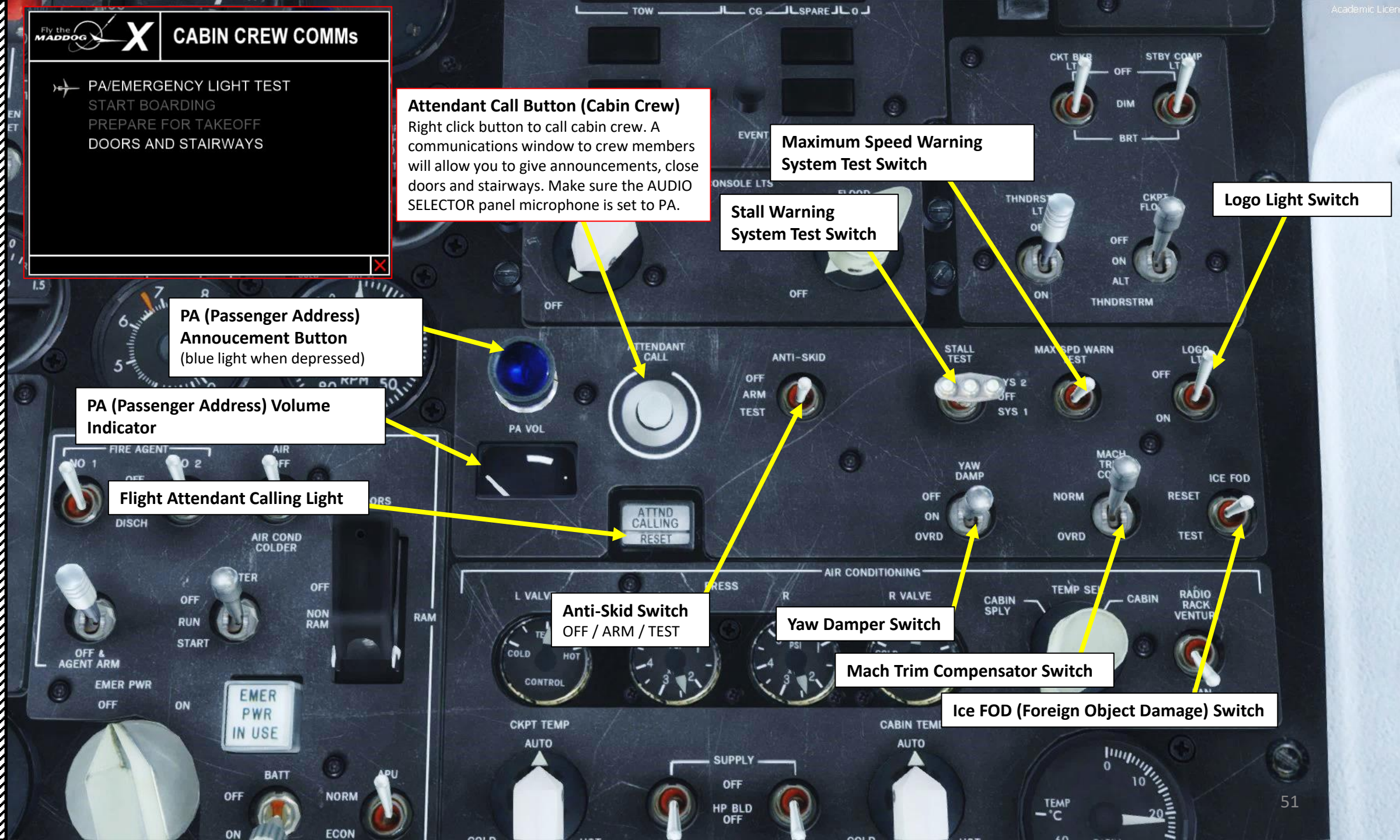
CSD Push for Rise Button

Left CSD (Constant Speed Drive) Disconnect Switch

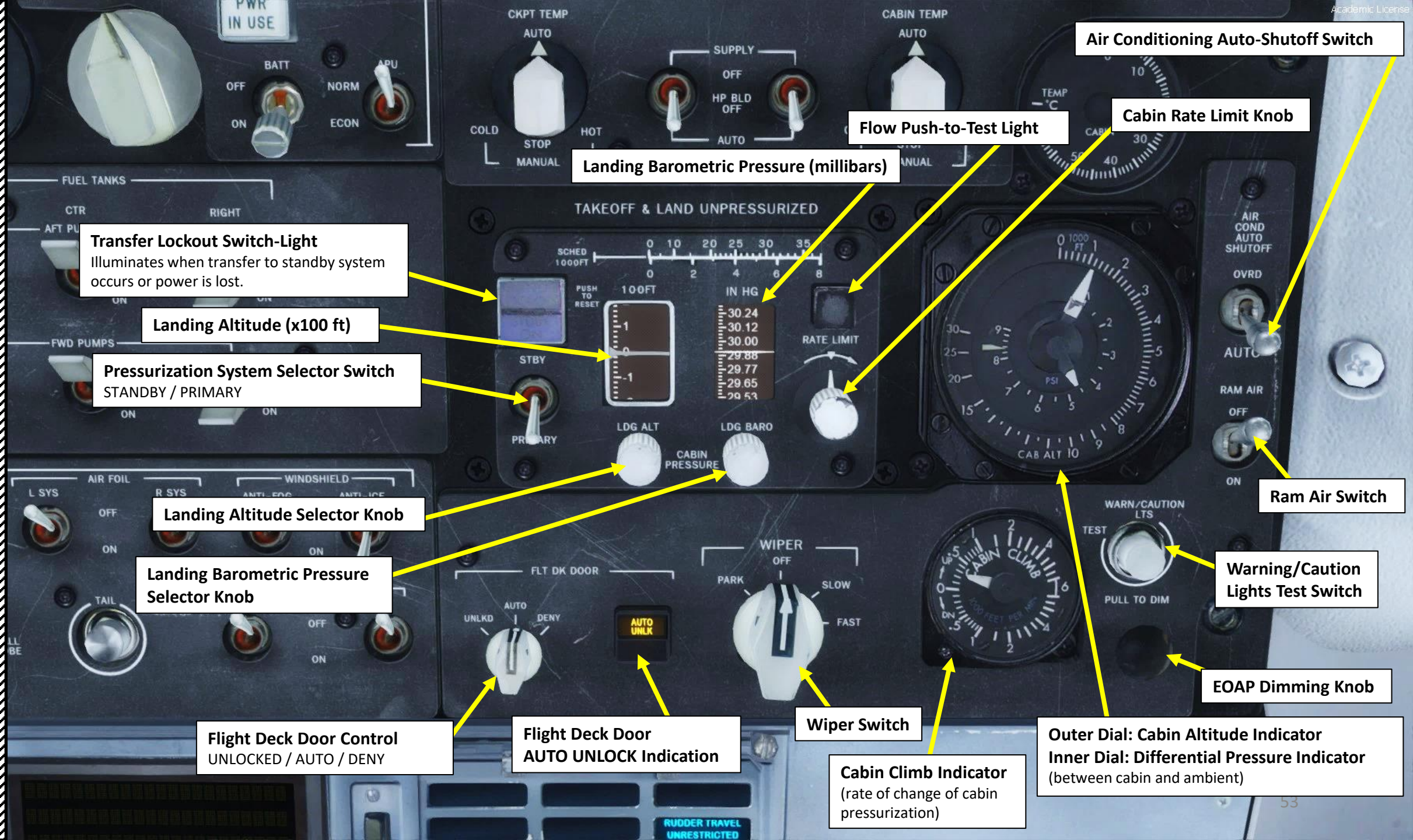
Left CSD (Constant Speed Drive) Oil Outlet Temperature (deg C)

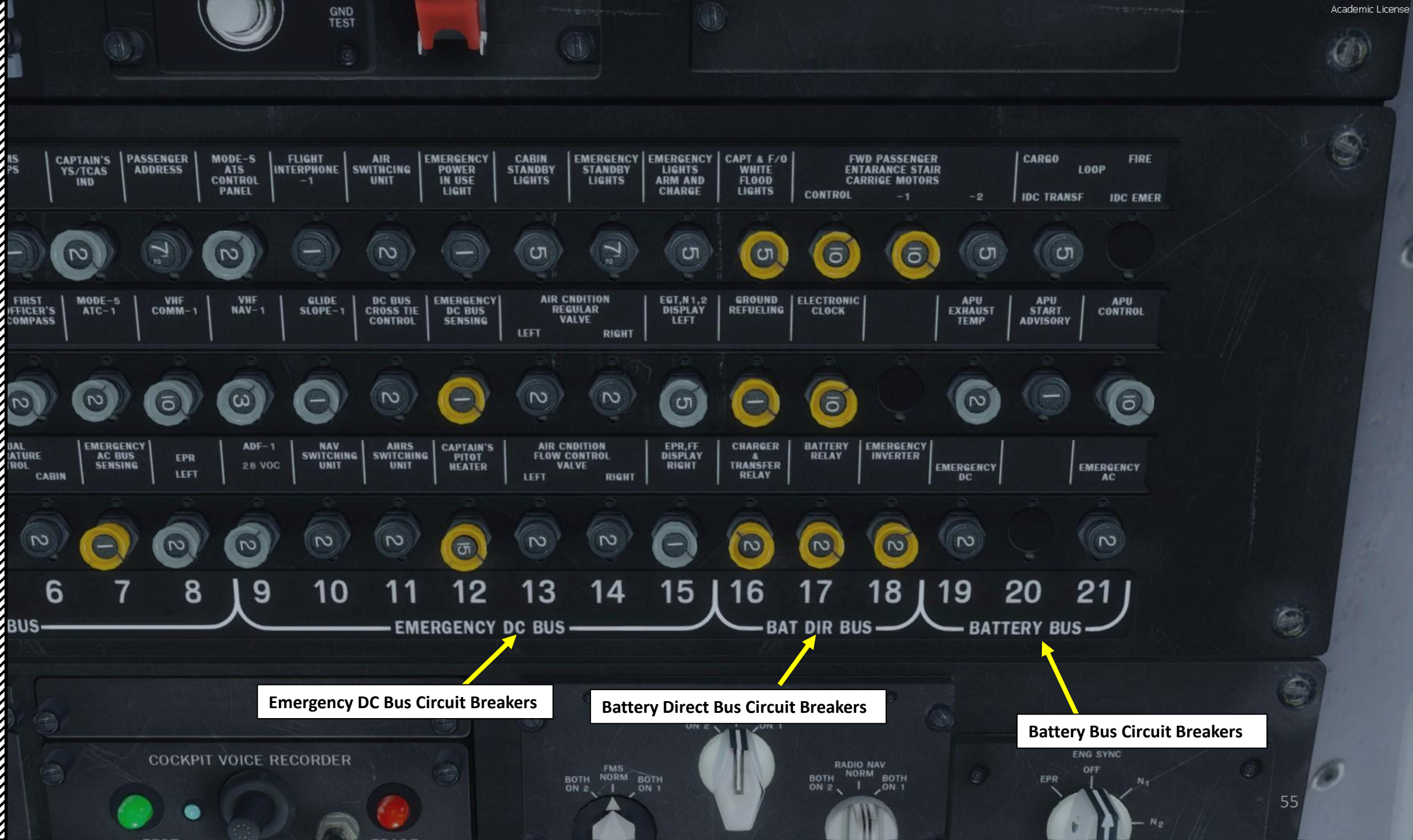
A constant speed drive (CSD) is a mechanical gearbox that takes an input shaft rotating at a wide range of speeds, delivering this power to an output shaft that rotates at a constant speed, despite the varying input. They are used to drive mechanisms like electrical generators that require a constant input speed. CSDs are mainly used to drive the alternating current (AC) electrical generator. In order to produce the proper voltage at a constant AC frequency, usually three-phase 115 VAC at 400 Hz, a generator needs to spin at a constant specific speed (typically 6,000 RPM for air-cooled generators). Since the jet engine gearbox speed varies from idle to full power, this creates the need for a constant speed drive (CSD). The CSD takes the variable speed output of the accessory drive gearbox and hydro-mechanically produces a constant output RPM.

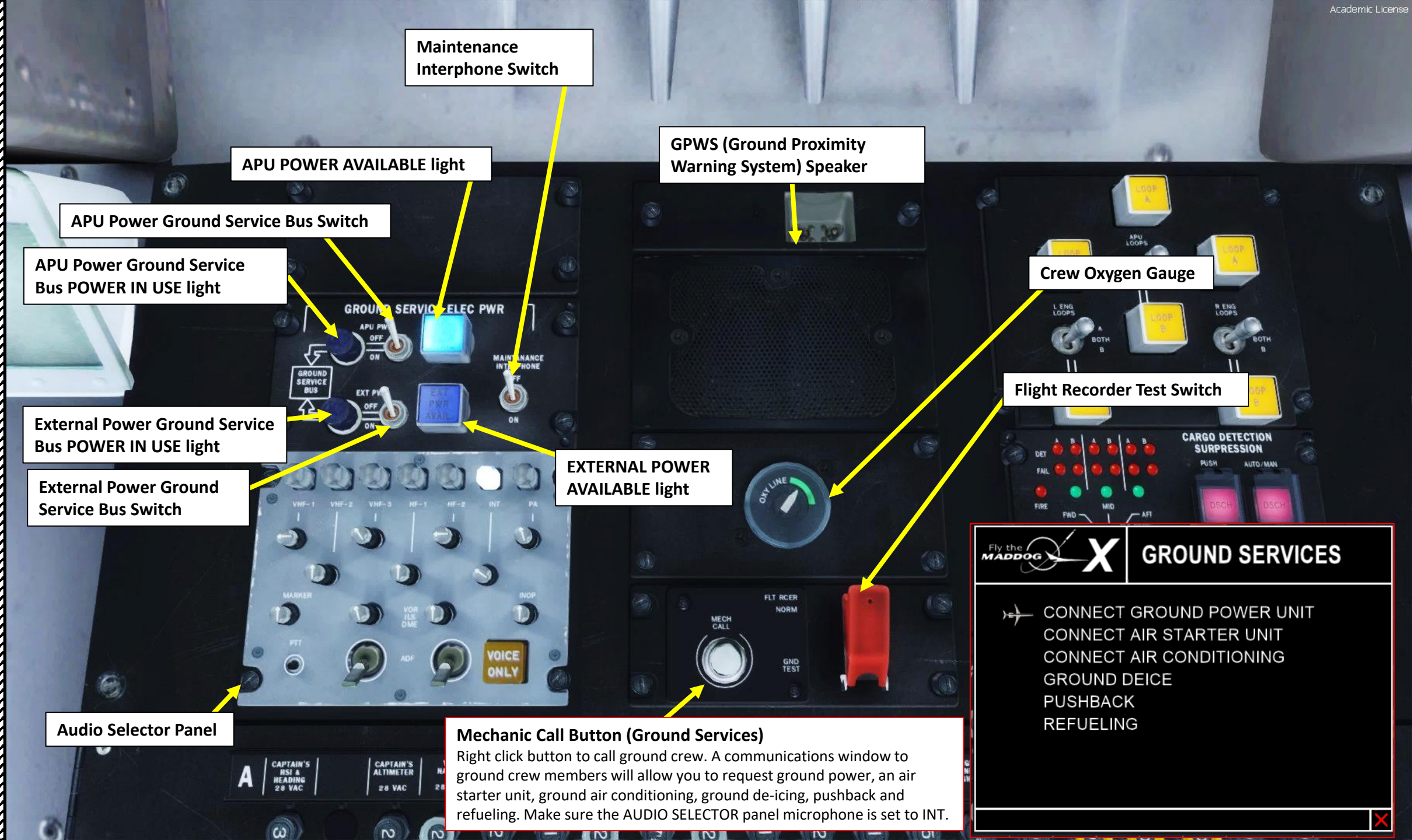

EFIS (Electronic Flight Instrument System) Selector
NORM / BOTH ON 1 / BOTH ON 2
Radio Navigation Selector
NORM / BOTH ON 1 / BOTH ON 2
Engine Synchronization Switch
• N1: Left engine N1 RPM is matched to right engine N1 RPM
• N2: Left engine N2 RPM is matched to right engine N2 RPM
• OFF: N1 and N2 Sync disabled
FMS (Flight Management System) Selector
NORM / BOTH ON 1 / BOTH ON 2
Ground Proximity Warning Switch
Flight Recorder Panel
Windshear Warning System Test Switch
Standby Compass Light Switch
Overhead Console Panel Light Control Knob
Overhead Console Flood Light Control Knob
Cockpit Breaker Light Switch
Thunderstorm Light Switch
Cockpit Flood Light Switch
COCKPIT VOICE RECORDER
TEST HOLD 5 SEC
HEADSET
ERASE
FLIGHT RECORDER
DAY
MONTH
FLIGHT NO.
LEG
TOW
CG
SPARE
STATUS
INSERT
EVENT
STATUS
OVHD CONSOLE LTS
PANEL
FLOOD
OFF
GND PROX WARN
OVRD
NORM
TEST
CKT BKR LT
STBY COMP LT
OFF
DIM
BRT
THNDRSTRM
ON
ALT
STALL TEST
MAX SPD WARN TEST
SYS 1
ARM
EGT
PERCENT RPM
PA VOL

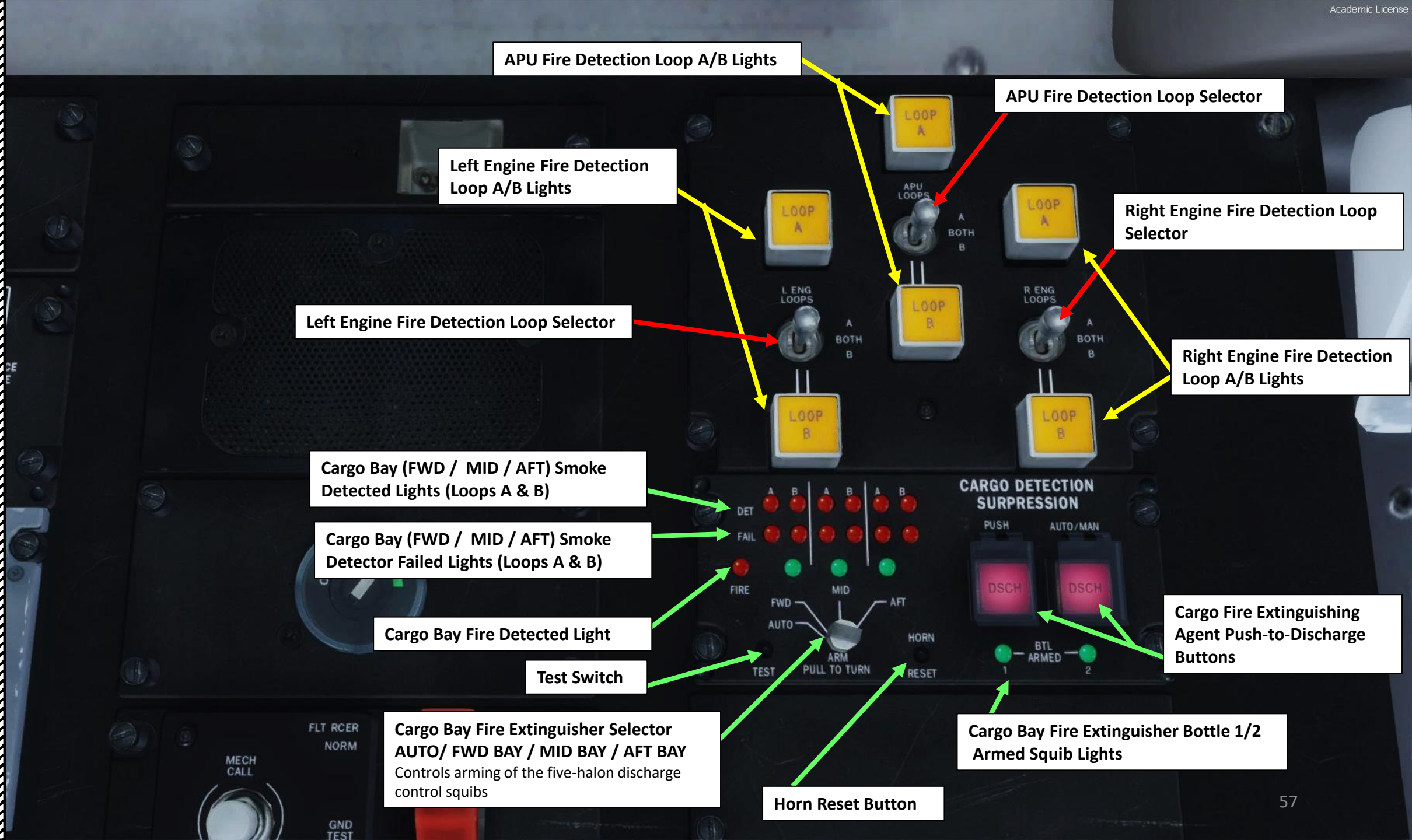

Fly the MADDOG X
CABIN CREW COMMs
PA/EMERGENCY LIGHT TEST
START BOARDING
PREPARE FOR TAKEOFF
DOORS AND STAIRWAYS
Attendant Call Button (Cabin Crew)
Right click button to call cabin crew. A communications window to crew members will allow you to give announcements, close doors and stairways. Make sure the AUDIO SELECTOR panel microphone is set to PA.
Maximum Speed Warning System Test Switch
Stall Warning System Test Switch
Logo Light Switch
PA (Passenger Address) Annoucement Button
(blue light when depressed)
PA (Passenger Address) Volume Indicator
Flight Attendant Calling Light
Anti-Skid Switch
OFF / ARM / TEST
Yaw Damper Switch
Mach Trim Compensator Switch
Ice FOD (Foreign Object Damage) Switch
ATTND CALLING
RESET
ANTI-SKID
STALL TEST
YAW DAMP
ICE FOD
AIR CONDITIONING
EMER PWR IN USE


Right Air Conditioning System Supply Pressure Indication (psi)
Right Air Conditioning Temperature Control Valve Indication
Radio Rack Switch
• VENTURI: In flight, opens Venturi valve and turns off radio rack fan.
• FAN: In flight, turns on primary radio rack fan and closes Venturi valve for radio rack cooling, and forward cargo compartment heating.
Left Air Conditioning System Supply Pressure Indication (psi)
Left Air Conditioning Temperature Control Valve Indication
Cabin Temperature Indicator (deg C)
Cockpit Temperature Control Selector
Air Conditioning Temperature Selector
CABIN SUPPLY DUCT / CABIN
Cabin Temperature Control Selector
Left/Right Air Conditioning Supply Switch
• OFF: Closes pressure regulator and flow control valves, the augmentation valves and shutoff and heat exchanger cooling fan.
• HP BLD OFF: Maintain augmentation valves at closed position.
• AUTO: Opens pressure regulator and flow control valves, provided pneumatic air pressure is available. Arms the augmentation valve for automatic operation and starts the heat exchanger cooling fan on ground.
AIR CONDITIONING
L VALVE
R VALVE
PRESS
CKPT TEMP
CABIN TEMP
SUPPLY
HP BLD OFF
CABIN SPLY
TEMP SEL
RADIO RACK VENTURI
FAN
EMER PWR IN USE
FUEL TANKS
TAKEOFF & LAND UNPRESSURIZED
CABIN PRESSURE
LDG BARO
AIR COND AUTO SHUTOFF
RAM AIR


Transfer Lockout Switch-Light
Illuminates when transfer to standby system occurs or power is lost.
Landing Altitude (x100 ft)
Pressurization System Selector Switch
STANDBY / PRIMARY
Landing Altitude Selector Knob
Landing Barometric Pressure Selector Knob
Flight Deck Door Control
UNLOCKED / AUTO / DENY
Flight Deck Door AUTO UNLOCK Indication
Wiper Switch
Cabin Climb Indicator
(rate of change of cabin pressurization)
Outer Dial: Cabin Altitude Indicator
Inner Dial: Differential Pressure Indicator
(between cabin and ambient)
Landing Barometric Pressure (millibars)
Flow Push-to-Test Light
Cabin Rate Limit Knob
Air Conditioning Auto-Shutoff Switch
Ram Air Switch
Warning/Caution Lights Test Switch
EOAP Dimming Knob
CKPT TEMP
CABIN TEMP
SUPPLY
TAKEOFF & LAND UNPRESSURIZED
FUEL TANKS
AIR FOIL
WINDSHIELD
FLT DK DOOR
WIPER
RATE LIMIT
LDG ALT
LDG BARO
CABIN PRESSURE
AIR COND AUTO SHUTOFF
RAM AIR
WARN/CAUTION LTS
PULL TO DIM
RUDDER TRAVEL UNRESTRICTED







APU Fire Detection Loop A/B Lights

APU Fire Detection Loop Selector

Left Engine Fire Detection Loop A/B Lights

Right Engine Fire Detection Loop Selector

Left Engine Fire Detection Loop Selector

Right Engine Fire Detection Loop A/B Lights

Cargo Bay (FWD / MID / AFT) Smoke Detected Lights (Loops A & B)

Cargo Bay (FWD / MID / AFT) Smoke Detector Failed Lights (Loops A & B)

Cargo Bay Fire Detected Light

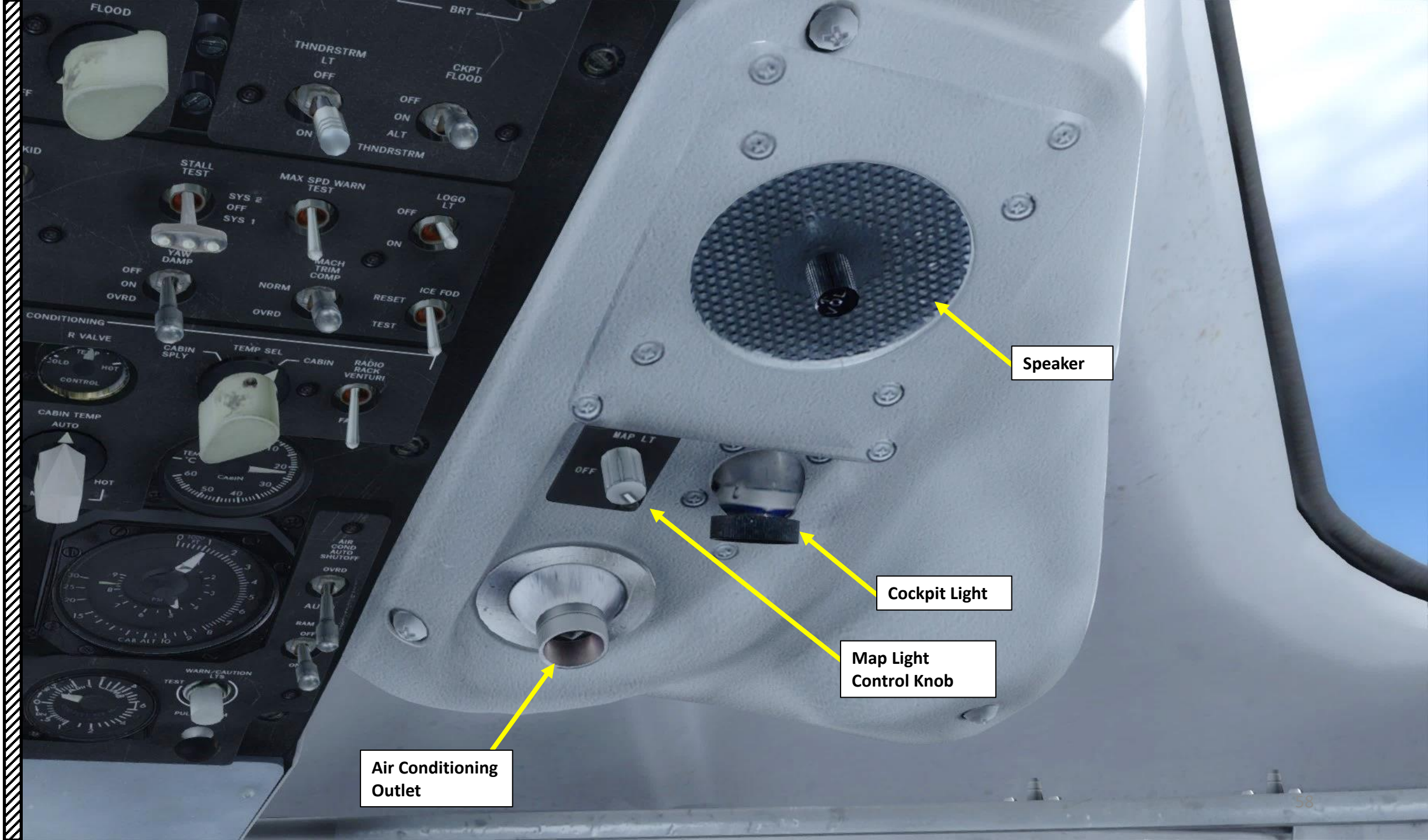
Cargo Fire Extinguishing Agent Push-to-Discharge Buttons

Test Switch

Cargo Bay Fire Extinguisher Selector AUTO/ FWD BAY / MID BAY / AFT BAY
Controls arming of the five-halon discharge control squibs

Cargo Bay Fire Extinguisher Bottle 1/2 Armed Squib Lights

Horn Reset Button


Speaker
Cockpit Light
Map Light Control Knob
Air Conditioning Outlet

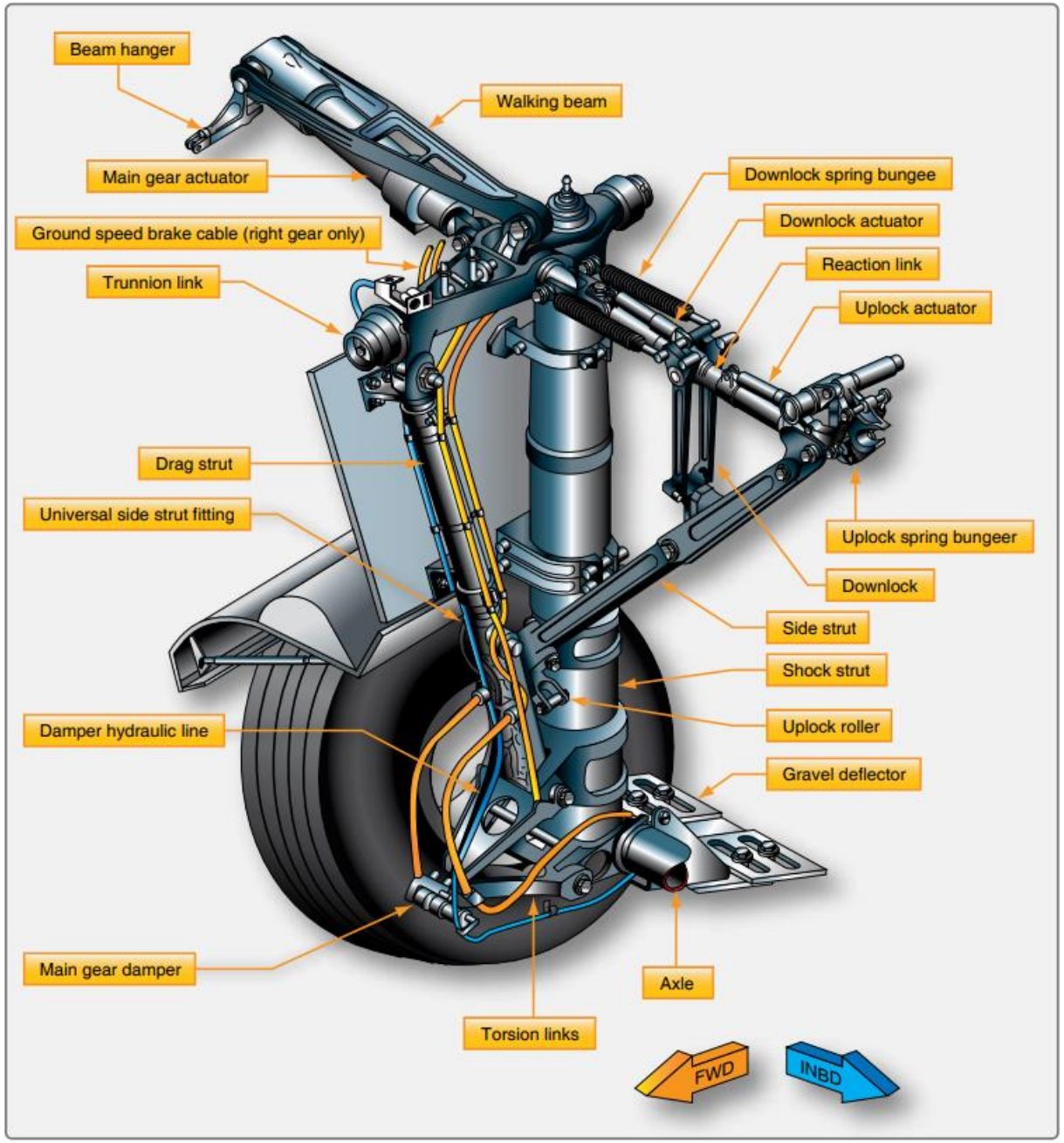
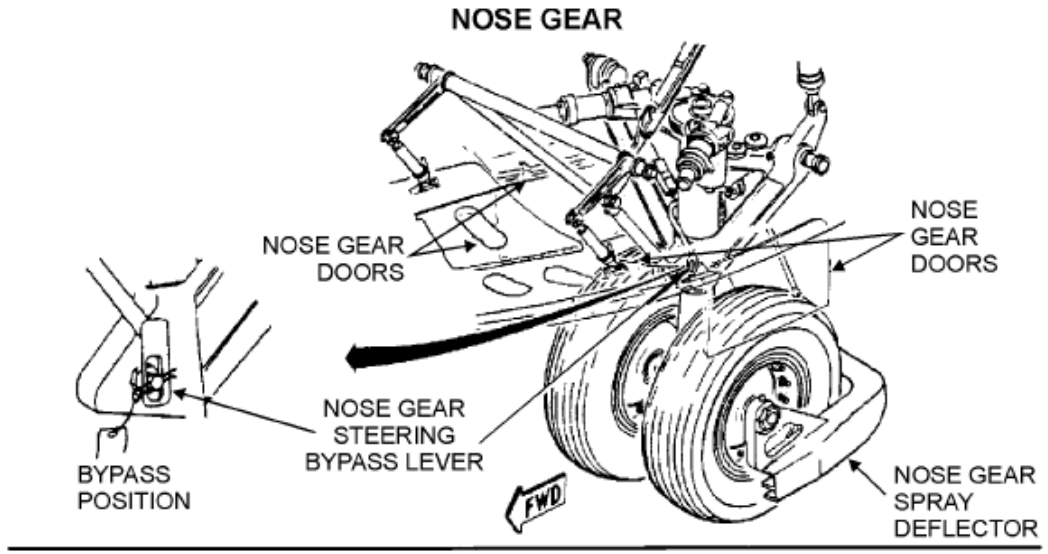
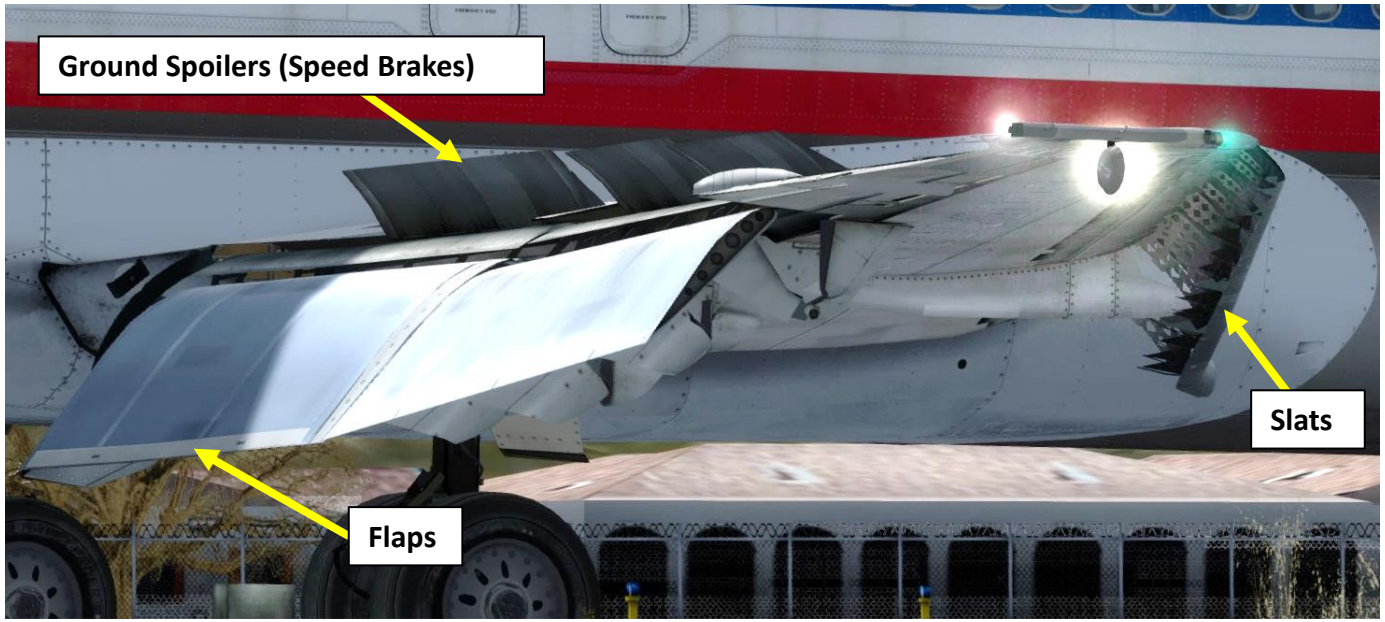
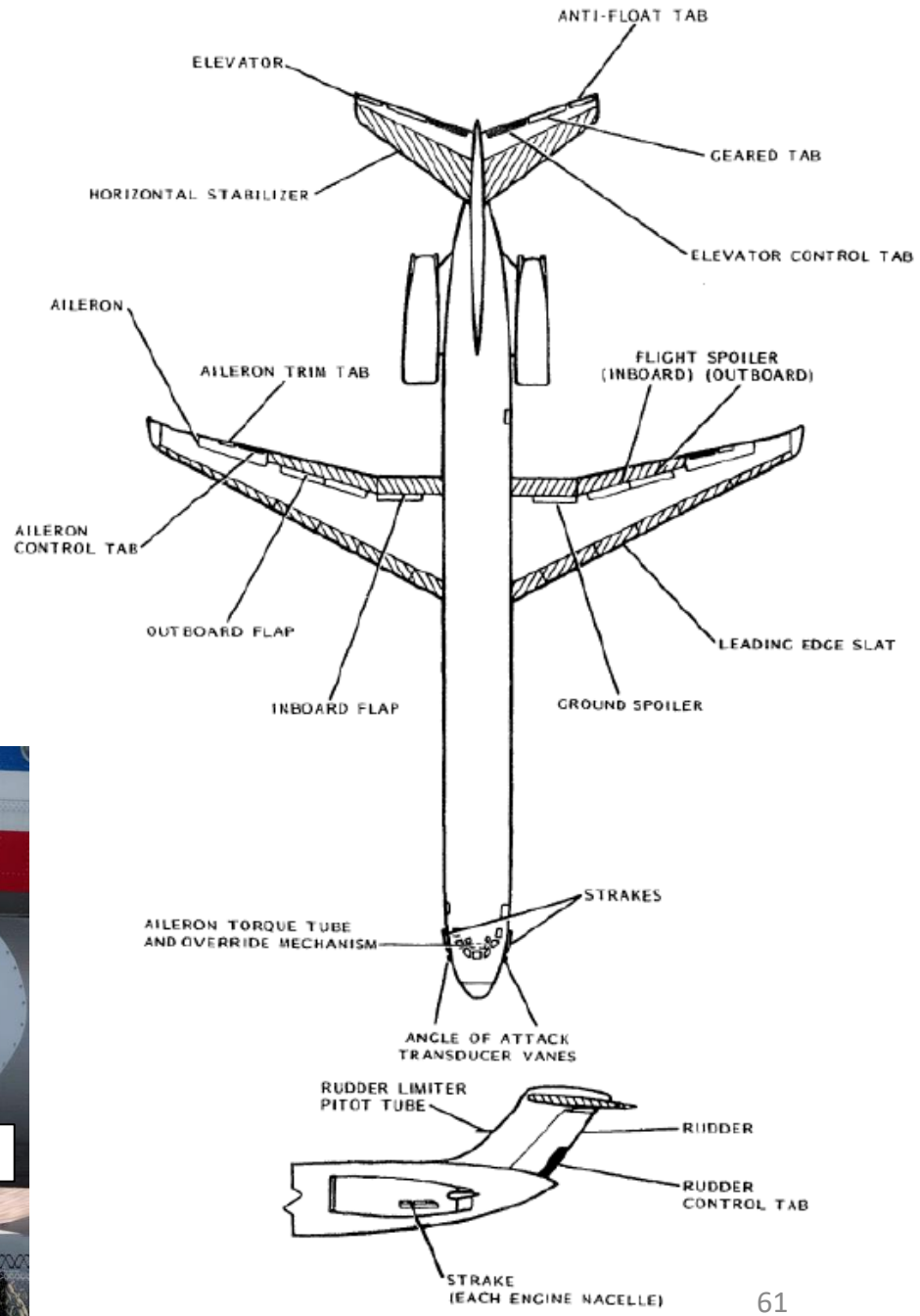


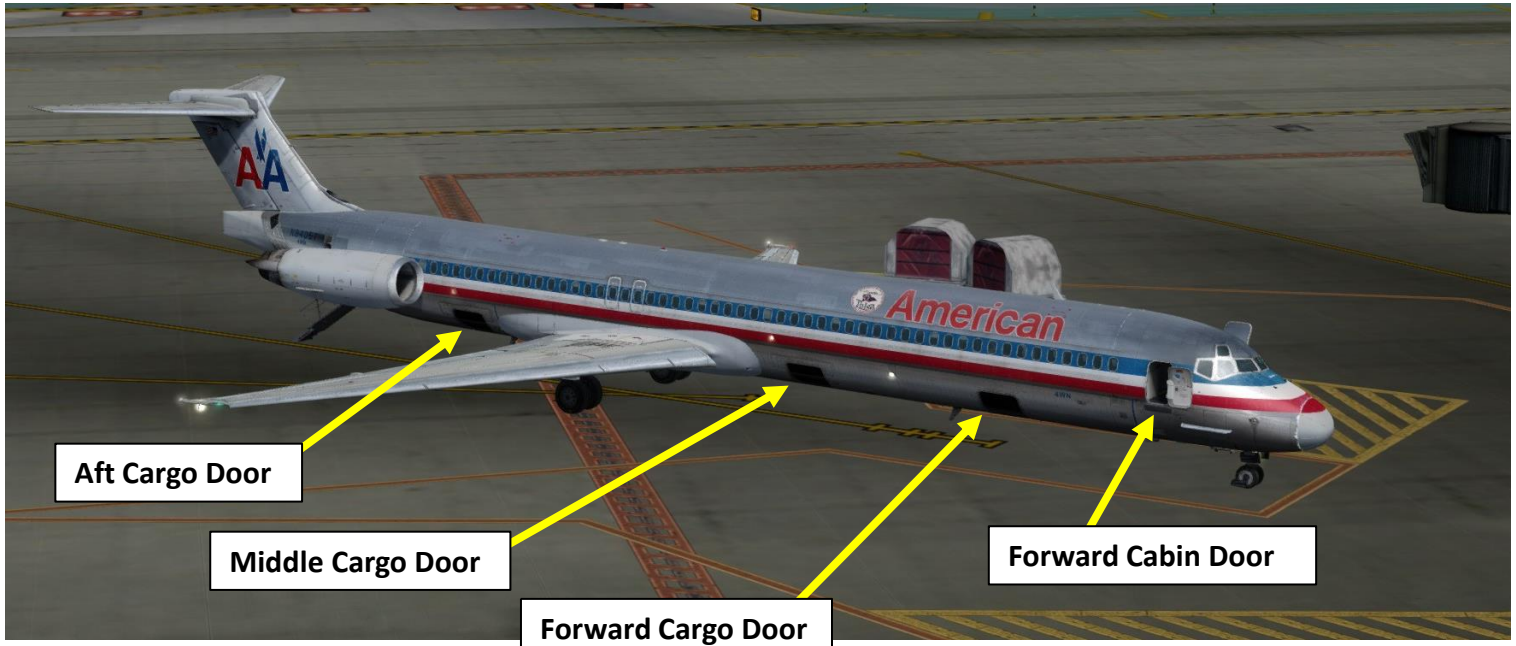
Figure 13-10. *Nomenclature of a main landing gear bogie truck.*

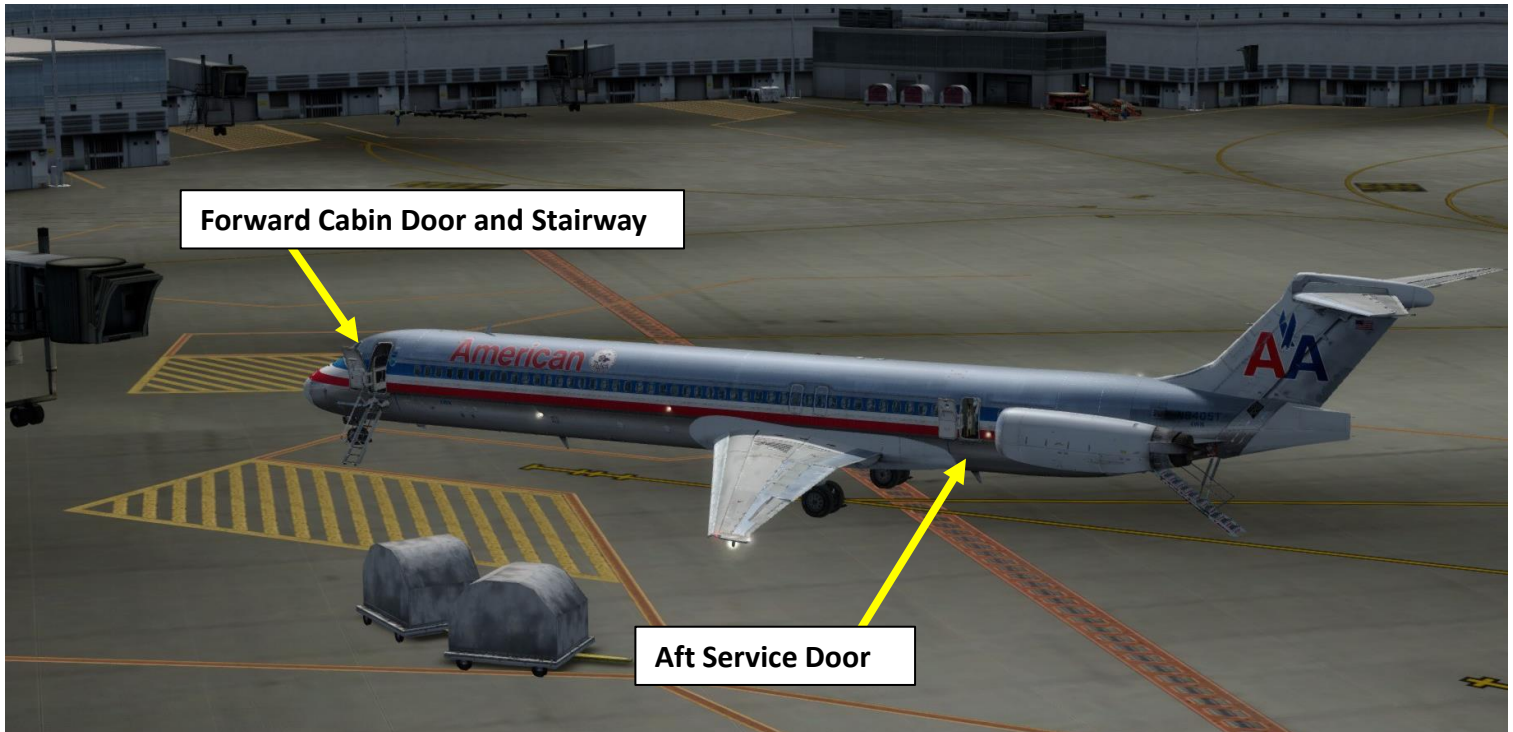



Slats
Flaps


Ground Spoilers (Speed Brakes)
Slats
Flaps


ANTI-FLOAT TAB
ELEVATOR
GEARED TAB
HORIZONTAL STABILIZER
ELEVATOR CONTROL TAB
AILERON
AILERON TRIM TAB
FLIGHT SPOILER
(INBOARD) (OUTBOARD)
AILERON
CONTROL TAB
OUTBOARD FLAP
LEADING EDGE SLAT
INBOARD FLAP
GROUND SPOILER
STRAKES
AILERON TORQUE TUBE
AND OVERRIDE MECHANISM
ANGLE OF ATTACK
TRANSDUCER VANES
RUDDER LIMITER
PITOT TUBE
RUDDER
RUDDER
CONTROL TAB
STRAKE
(EACH ENGINE NACELLE)

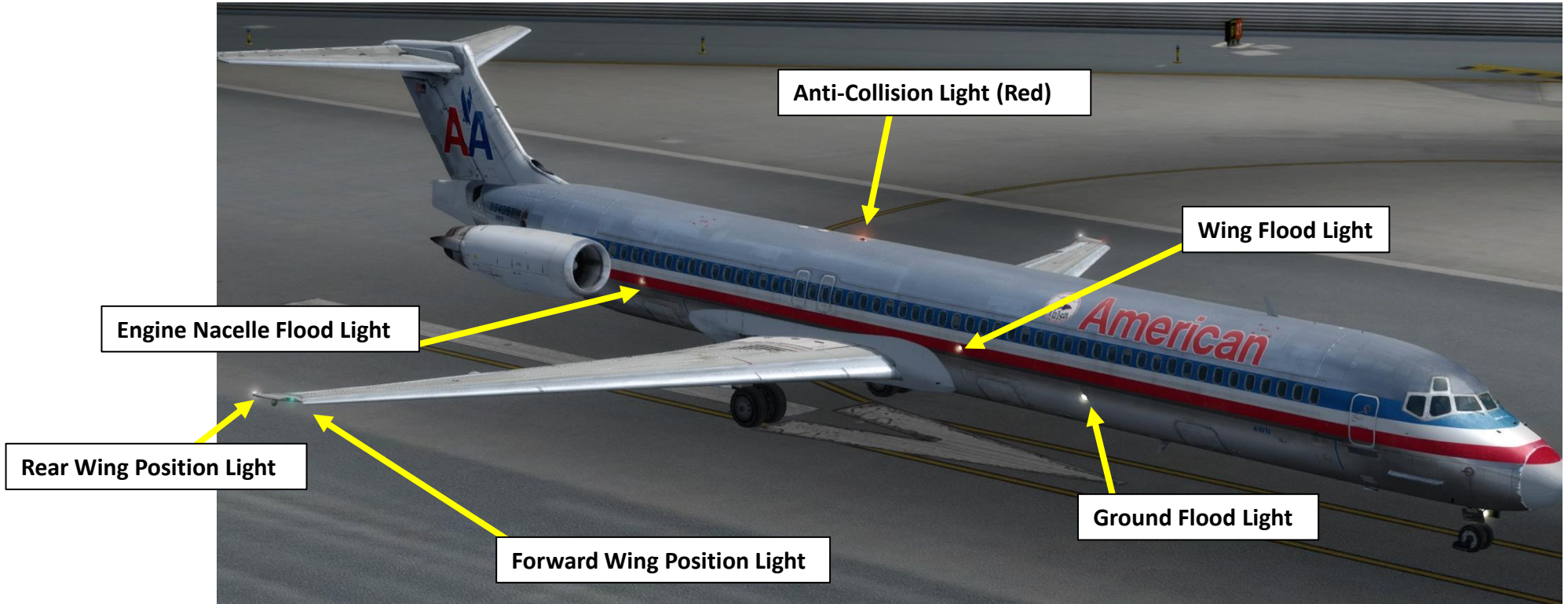

Aft Cargo Door
Middle Cargo Door
Forward Cargo Door
Forward Cabin Door


Forward Cabin Door and Stairway
Aft Service Door

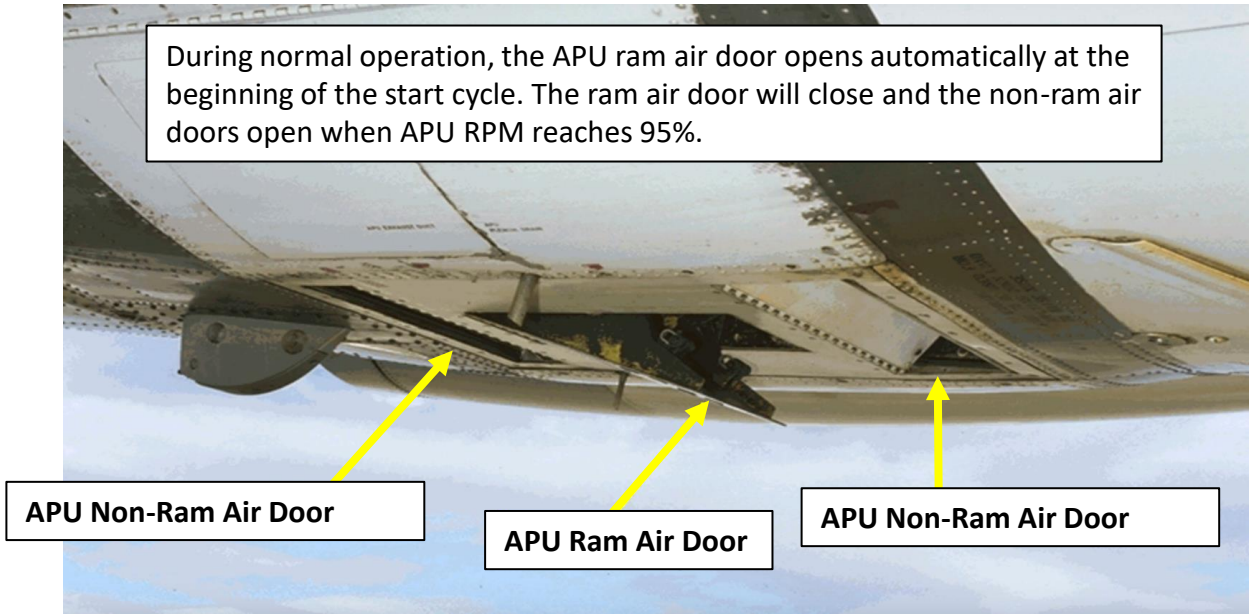

Aft Stairway & Aft Cabin Door
Stairway needs auxiliary hydraulic pumps ON to fully deploy

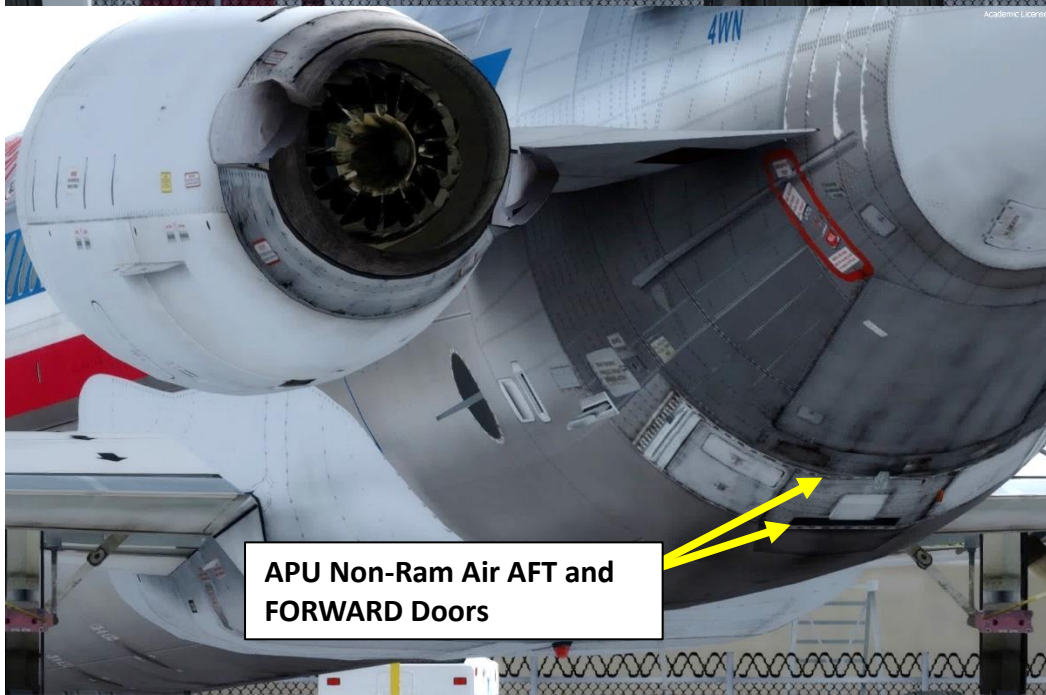
Wing Landing Light (Deployed & Dimmed)
The landing lights can be deployed or stowed. You will notice additional drag being generated by those lights when landing.

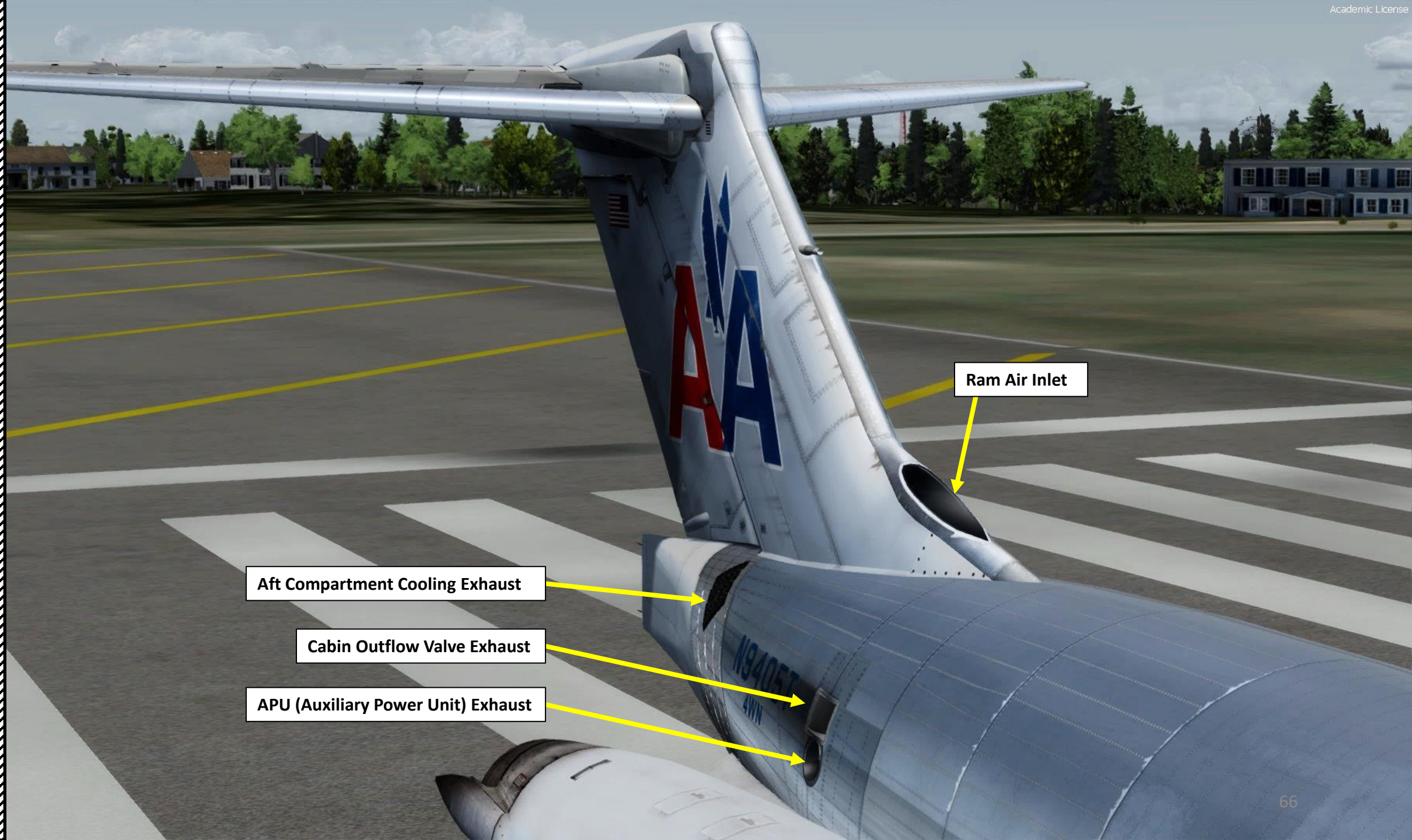

Strobe Lights (flashing)
Strobe lights will come on when the nosewheel is off the ground

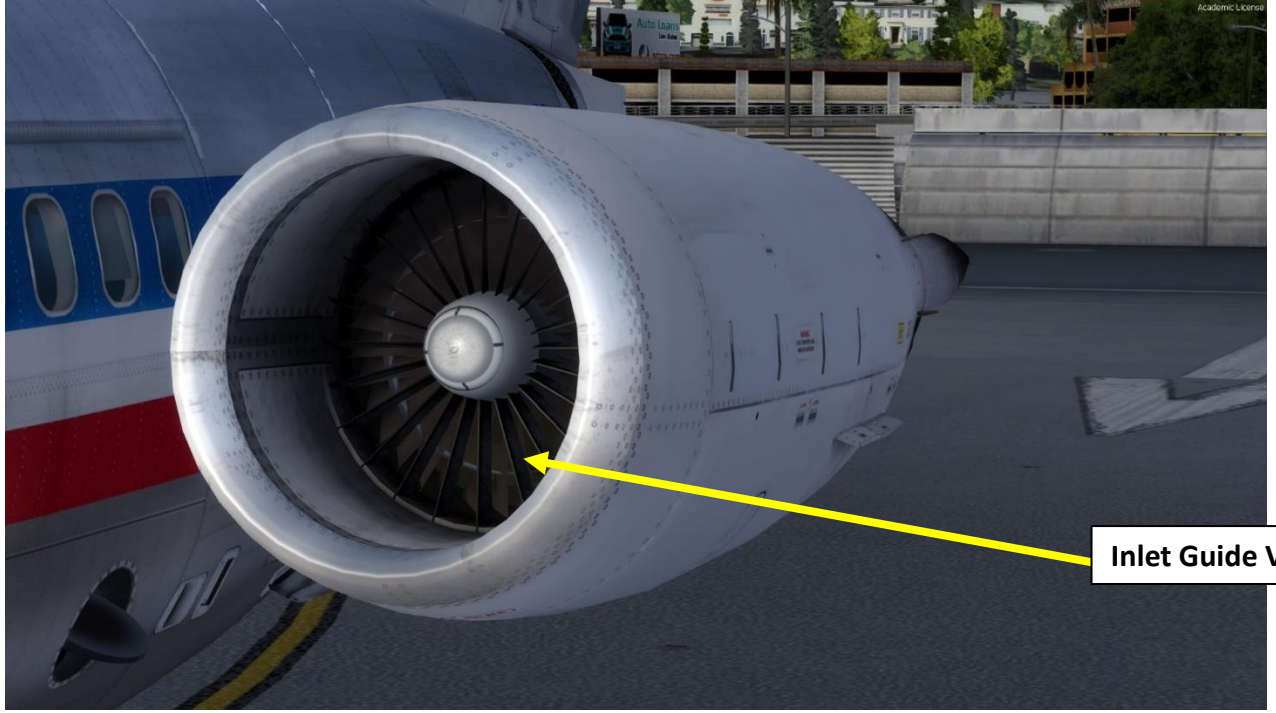

Anti-Collision Light (Red)
Wing Flood Light
Engine Nacelle Flood Light
Rear Wing Position Light
Ground Flood Light
Forward Wing Position Light

During normal operation, the APU ram air door opens automatically at the beginning of the start cycle. The ram air door will close and the non-ram air doors open when APU RPM reaches 95%.

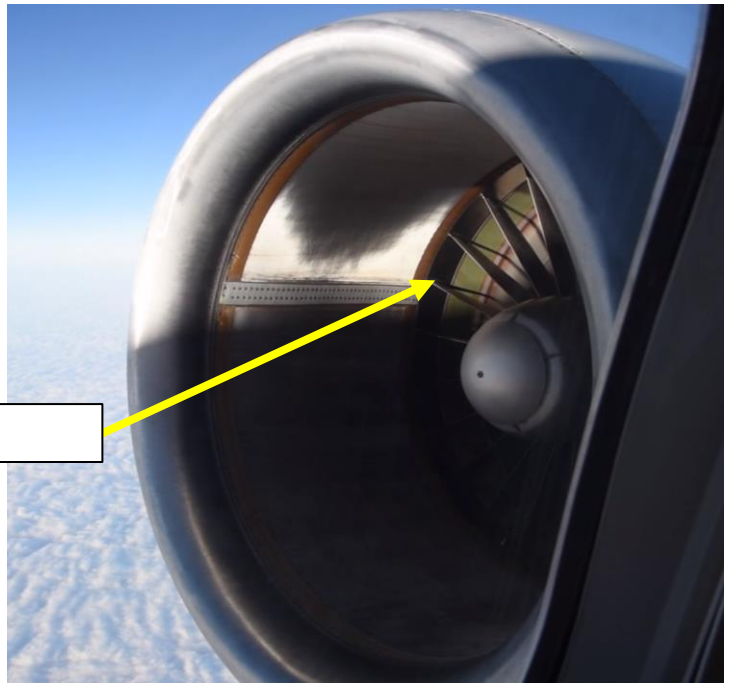




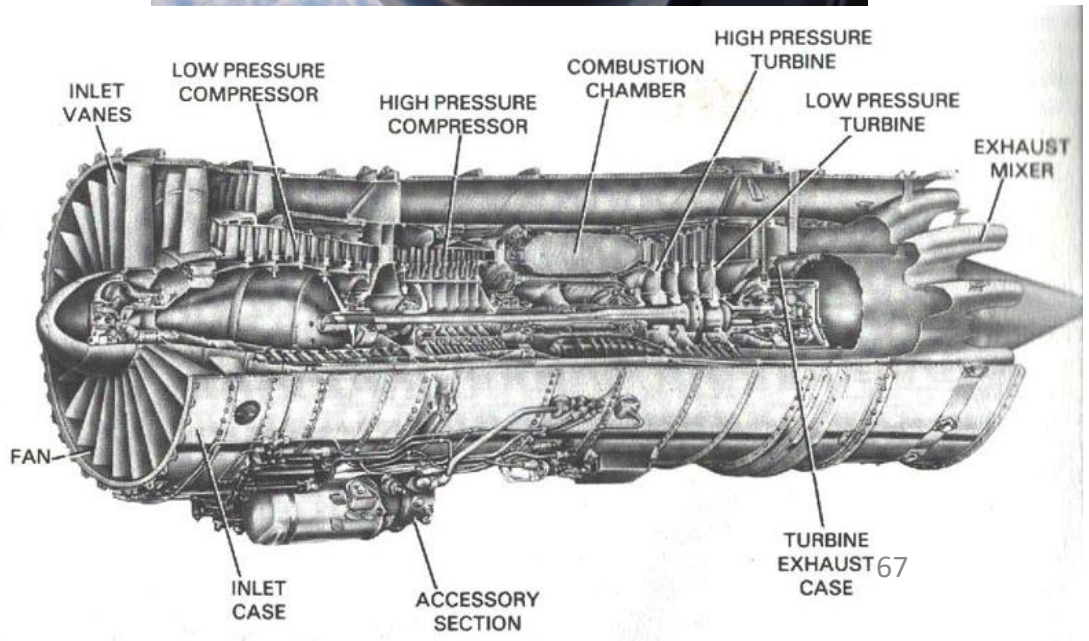

Academic License
Ram Air Inlet
Aft Compartment Cooling Exhaust
Cabin Outflow Valve Exhaust
APU (Auxiliary Power Unit) Exhaust



Props to Leonardo Softhouse for having designed such detailed Pratt & Whitney JT8D engines!



Inlet Guide Vane (Static)



PLANNING THE FLIGHT

In real life, you cannot just fly a MD-82 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 McDonnell Douglas 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:

KSAN *SID* ***IPL*** *J18* ***HOGGZ*** *STAR* ***KPHX***

Provided by RouteFinder

METAR:

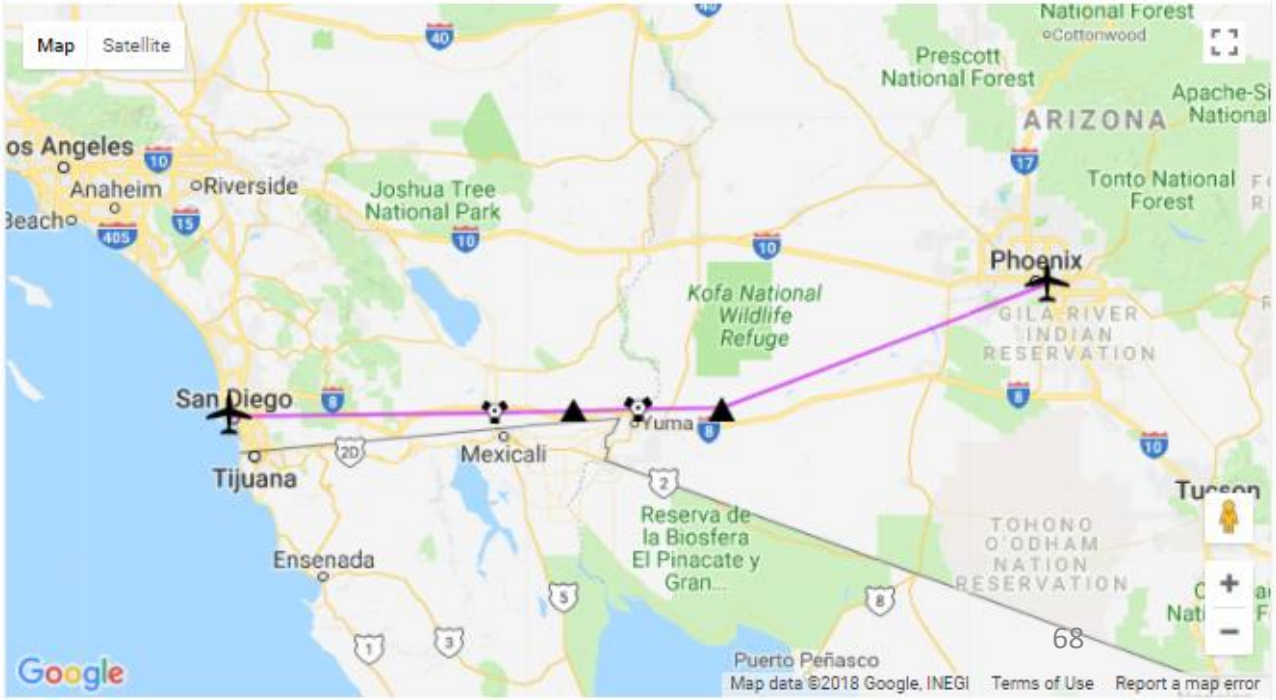
Departure: KSAN 060151Z 35005KT 10SM BKN250 19/M07 A3006 RMK AO2 SLP180 T01891072
Destination: KPHX 060151Z 29009KT 10SM BKN250 21/M16 A3001 RMK AO2 SLP154 T02061161

Provided by AVIATION WEATHER CENTER

Fuel quantity for McDonnell-Douglas MD80

	Fuel	Time
Fuel Usage	6415 lbs	01:01
Reserve Fuel	7831 lbs	01:15
Fuel on Board	14246 lbs	02:16

Provided by Fuelplanner.com



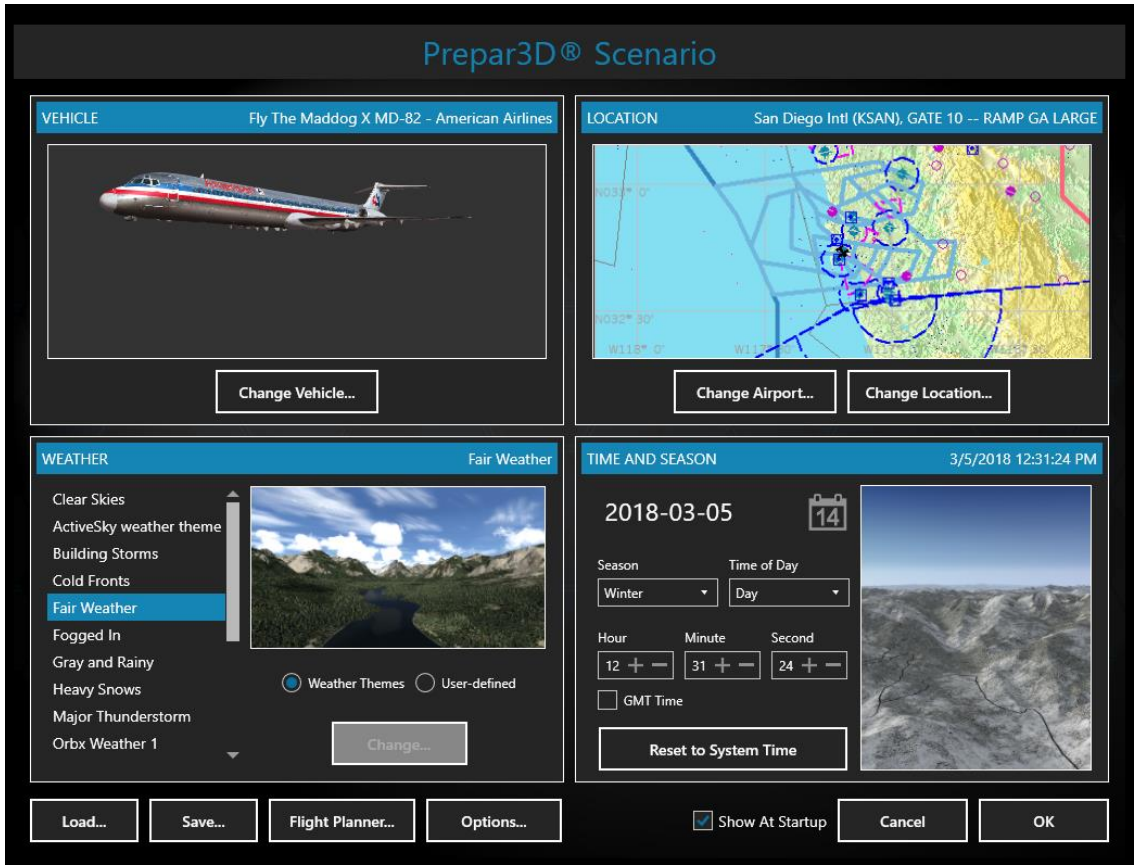
PLANNING THE FLIGHT

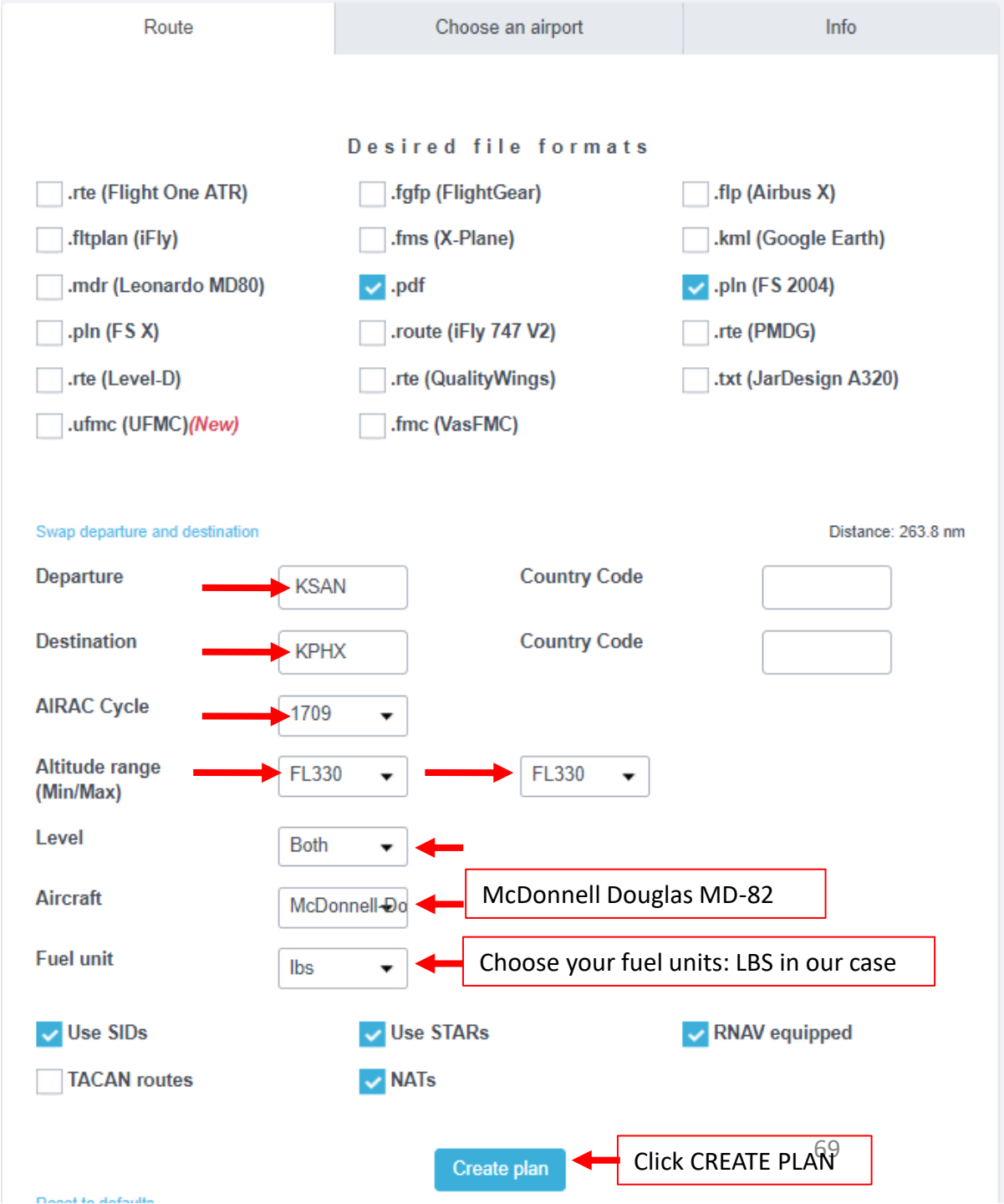
Today's flight will start from **SAN DIEGO INTERNATIONAL AIRPORT, CALIFORNIA (KSAN)** and our destination will be **PHOENIX SKY HARBOR INTERNATIONAL AIRPORT (KPHX).**

Using the "Online Flight Planner" available here: http://onlineflightplanner.org/ we will enter the Departure airport (KSAN), the Destination airport (KPHX) and the AIRAC Cycle desired (we will use the **AIRAC cycle 1709** as explained on the next page).

Click on CREATE PLAN to generate a flight plan.

Note: The latest AIRAC version in Service Pack 1 has been updated to 1801. This tutorial will still use 1709 since this is what was released initially.





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 AFMC when it was first coded by Leonardo Softhouse during late August, 2017 (period **09)** 20**17** (AIRAC cycle **1709**), 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).

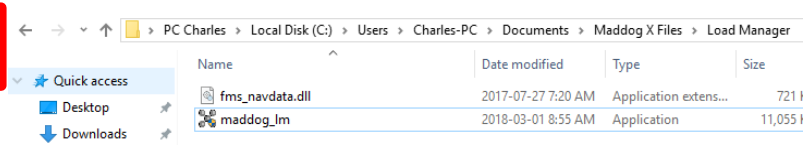
#	2003	2004*	2005	2006	2007	2008*	2009	2010	2011	2012*	2013	2014	2015	2016*	2017	2018	2019	2020*
01	23 Jan	22 Jan	20 Jan	19 Jan	18 Jan	17 Jan	15 Jan	14 Jan	13 Jan	12 Jan	10 Jan	9 Jan	8 Jan	7 Jan	5 Jan	4 Jan	3 Jan	2 Jan
02	20 Feb	19 Feb	17 Feb	16 Feb	15 Feb	14 Feb	12 Feb	11 Feb	10 Feb	9 Feb	7 Feb	6 Feb	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

Note: The latest AIRAC version in Service Pack 1 has been updated to 1801. This tutorial will still use 1709 since this is what was released initially.

PLANNING THE FLIGHT



FUEL PLANNING

For a flight of approx. **270 nm**, fuel planning can be estimated by using http://onlineflightplanner.org/ or Leonardo's custom fuel calculator available in **C:\Users\[YourUsername]\Documents\Maddog X Files\Load Manager**

In this tutorial, we will use a simplified method explained on the Hilmerby website http://www.hilmerby.com/fom/proc_fuel.html . We will use the distance estimated by flightplanner.org, then use this distance in the TOTAL FLIGHT TIME AND TRIP FUEL table to estimate flight time, and then we will use a ballpark figure for fuel consumption to estimate the total fuel required for the flight. Simple enough, eh?

Distance obtained from Onlinelightplanner.org = 270 nm
Direct flight time estimated by Table 1 for 300 nm distance and cruise altitude of 33,000 ft = Approx. 1 hour
Total Time Estimate = Flight Time Estimate + Time to Alternate Airport = 1 hour + 30 min = 1 hour 30 minutes.

Imperial Units
Fuel for Flight = Total Time Estimate x 6600 lbs/hour = 1.5 hours x 6600 lbs/hour = **9900 lbs**
Reserve Fuel = **4400 lbs** (estimate includes contingency fuel (5 % total trip fuel) and final reserve fuel)
Total Fuel = Fuel for Flight + Reserve Fuel = **16400 lbs**

Write this fuel weight down!

Metric Units
Fuel for Flight = Total Time Estimate x 3000 kg/hour = 1.5 hours x 3000 kg/hour = **4500 kg**
Reserve Fuel = **2000 kg** (estimate includes contingency fuel (5 % total trip fuel) and final reserve fuel)
Total Fuel = Fuel for Flight + Reserve Fuel = **6500 kg**

TABLE 1. TOTAL FLIGHT TIME AND TRIP FUEL.

This table shows the normal trip fuel and is valid for landing weight of 50 000 kg and less.
For each 2 000 kg deviation above 50 000 kg landing weight, add **corr**ections in kilos.
Time in hours and minutes.
Fuel in tons.
Ground distance in Nautical miles.
The table is valid for zero wind. 50kt wind will add/decrease time/fuel by approximately 10%.

Ground distance	27 000ft		29 000ft		31 000ft		33 000ft		35 000ft		37 000ft		Corr
	TIME	FUEL	TIME	FUEL	TIME	FUEL	TIME	FUEL	TIME	FUEL	TIME	FUEL	
2800	6:51	20,1	6:42	19,5	6:36	18,9	-	-	-	-	-	-	500
2600	6:24	18,6	6:15	18,1	6:10	17,5	-	-	-	-	-	-	450
2400	5:57	17,1	5:48	16,6	5:43	16,1	-	-	-	-	-	-	450
2200	5:29	15,6	5:21	15,2	5:16	14,7	5:14	14,3	-	-	-	-	400
2000	5:02	14,2	4:54	13,8	4:49	13,4	4:46	13,0	-	-	-	-	360
1900	4:48	13,4	4:40	13,1	4:35	12,7	4:33	12,4	-	-	-	-	360
1800	4:34	12,7	4:26	12,4	4:22	12,0	4:19	11,7	-	-	-	-	350
1700	4:20	12,0	4:13	11,7	4:08	11,4	4:06	11,1	-	-	-	-	300
1600	4:06	11,3	3:59	11,0	3:54	10,7	3:52	10,4	3:45	9,9	-	-	300
1500	3:52	10,6	3:45	10,3	3:41	10,1	3:39	9,8	3:38	9,6	-	-	300
1400	3:38	9,9	3:31	9,7	3:27	9,4	3:25	9,2	3:25	9,0	-	-	250
1300	3:24	9,2	3:17	9,0	3:13	8,8	3:11	8,5	3:11	8,3	-	-	250
1200	3:09	8,5	3:03	8,3	3:00	8,1	2:58	7,9	2:57	7,7	-	-	250
1100	2:55	7,9	2:49	7,7	2:46	7,5	2:44	7,3	2:44	7,1	-	-	200
1000	2:40	7,2	2:35	7,0	2:32	6,9	2:30	6,7	2:30	6,5	-	-	200
900	2:26	6,5	2:21	6,4	2:18	6,2	2:17	6,1	2:16	6,0	-	-	150
800	2:11	5,9	2:07	5,7	2:04	5,6	2:03	5,5	2:03	5,4	-	-	150
700	1:56	5,2	1:53	5,1	1:50	5,0	1:49	4,9	1:49	4,8	-	-	150
600	1:41	4,6	1:39	4,5	1:36	4,4	1:36	4,3	1:35	4,2	1:35	4,2	150
500	1:26	3,9	1:24	3,8	1:22	3,8	1:22	3,7	1:21	3,7	1:22	3,6	100
400	1:11	3,3	1:10	3,2	1:08	3,2	1:08	3,1	1:08	3,1	1:08	3,1	100
300	0:56	2,6	0:55	2,6	0:54	2,6	0:54	2,5	0:54;	2,5	0:54	2,5	100
200	0:41	2,0	0:40	2,0	0:40	2,0	0:40	2,0	-	-	-	-	100

San Diego International Airport (KSAN) ⇒ Phoenix Sky Harbor International Airport (KPHX)

ID	Frequency	Track	Distance (nm)	Coordinates		Name/Remarks
KSAN	-	0	0	N32°44'00.80"	W117°11'22.80"	SAN DIEGO INTL
IPL	115.9	84	85	N32°44'55.92"	W115°30'30.89"	IMPERIAL
HEEDS	-	84	25	N32°45'37.18"	W115°00'27.83"	HEEDS
BZA	116.8	84	20	N32°46'05.18"	W114°36'10.60"	BARD
HOGGZ	-	85	27	N32°46'29.50"	W114°04'09.12"	HOGGZ
KPHX	-	64	111	N33°26'03.40"	W112°00'41.70"	PHOENIX SKY HARBOR INTL

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

6 fixes, 268 nm.

Distance estimate from Online Flight Planner

Airways:
KSAN *SID* ***IPL*** *J18* ***HOGGZ*** *STAR* ***KPHX***

Fuel estimate from Online Flight Planner

Fuel quantity for McDonnell-Douglas MD80

	Fuel	Time
Fuel Usage	6415 lbs	01:01
Reserve Fuel	7831 lbs	01:15
Fuel on Board	14246 lbs	02:16

PLANNING THE FLIGHT

FLIGHT ROUTE

The flight route we could take from onlineflightplanner.com is:
KSAN SID **IPL** J18 **HOGGZ** STAR **KPHX**

Write this route down!

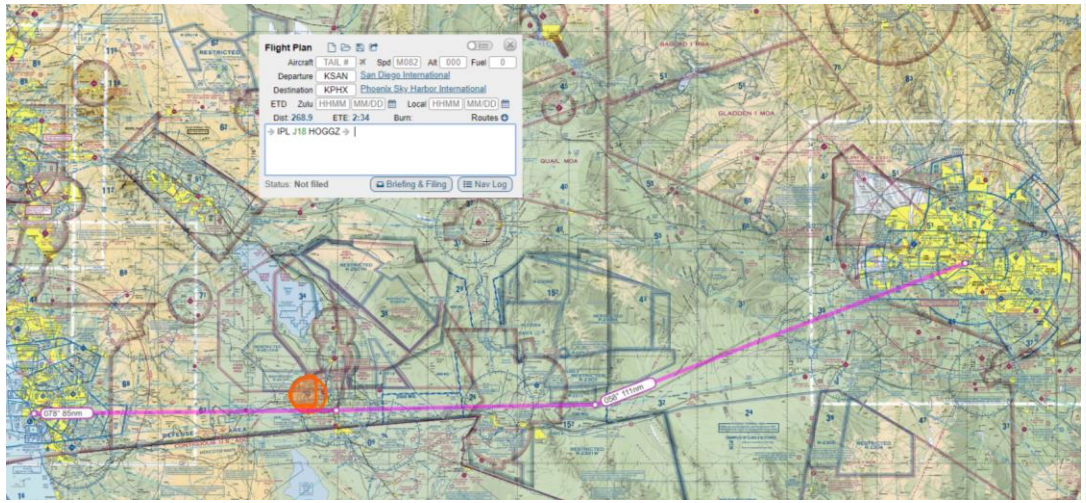
But what does it all mean? Here is a breakdown of this route:

- Depart from San Diego International Airport (KSAN)
- Follow the SID (Standard Instrument Departure) route from KSAN to IPL
- Navigate to IPL VOR
- Follow J18 Airway
- Navigate to HOGGZ VOR
- Follow the STAR (Standard Terminal Arrival Route) from HOGGZ to KPHX
- Land at Phoenix Sky Harbor International Airport (KPHX)

Keep in mind that you can find airport charts on www.skyvector.com

KSAN:
https://skyvector.com/airport/SAN/San-Diego-International-Airport

KPHX:
https://skyvector.com/airport/PHX/Phoenix-Sky-Harbor-International-Airport



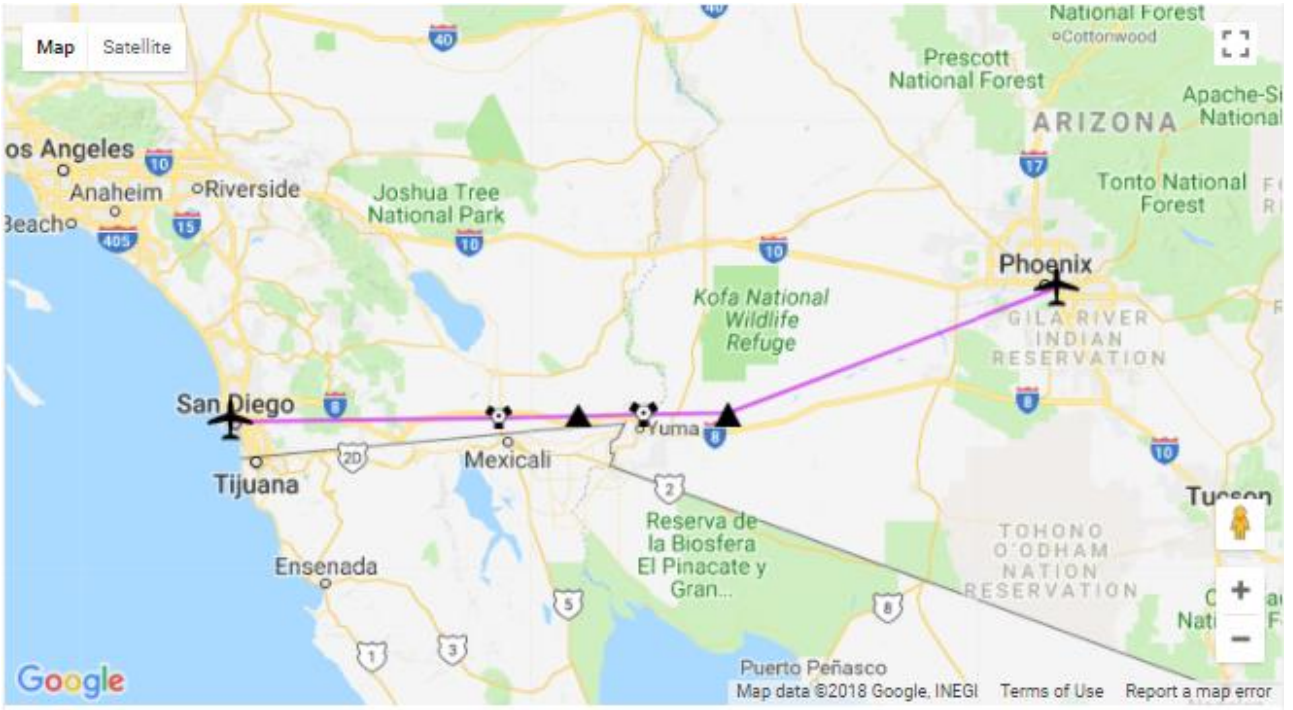
San Diego International Airport (KSAN) ⇒ Phoenix Sky Harbor International Airport (KPHX)

ID	Frequency	Track	Distance (nm)	Coordinates		Name/Remarks
KSAN	-	0	0	N32°44'00.80"	W117°11'22.80"	SAN DIEGO INTL
IPL	115.9	84	85	N32°44'55.92"	W115°30'30.89"	IMPERIAL
HEEDS	-	84	25	N32°45'37.18"	W115°00'27.83"	HEEDS
BZA	116.8	84	20	N32°46'05.18"	W114°36'10.60"	BARD
HOGGZ	-	85	27	N32°46'29.50"	W114°04'09.12"	HOGGZ
KPHX	-	64	111	N33°26'03.40"	W112°00'41.70"	PHOENIX SKY HARBOR INTL

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

6 fixes, 268 nm.

Airways:
KSAN *SID* ***IPL*** *J18* ***HOGGZ*** *STAR* ***KPHX***



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

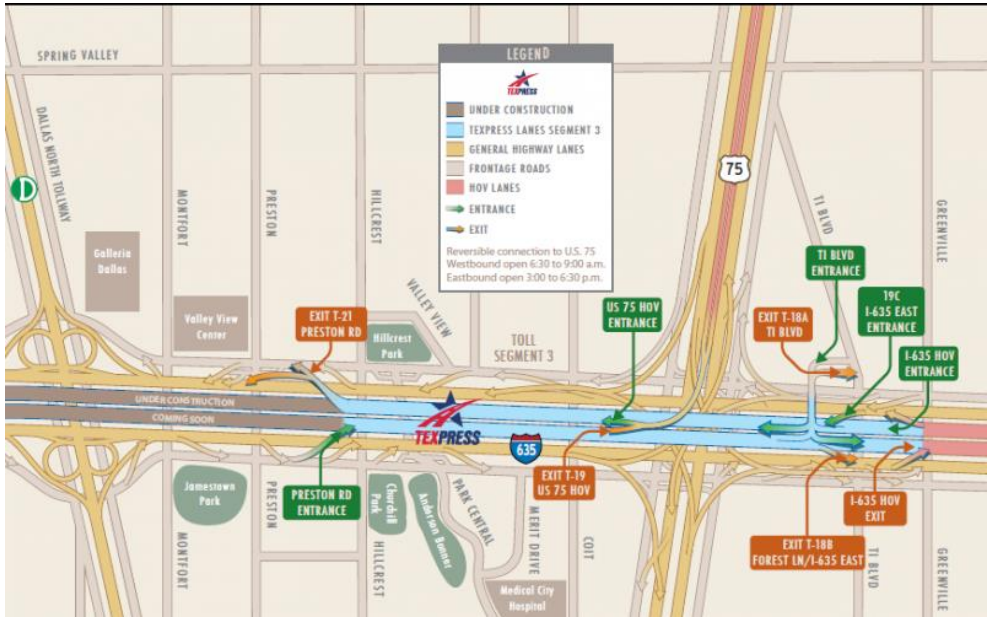
A **SID** (Standard Instrument Departure) is a small initial route which leads an aircraft from the runway they've just taken off from to the first point in his/her intended route. An airport usually has a lot of aircraft departing from it's runways. To save confusion (and for safety), a busy airport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

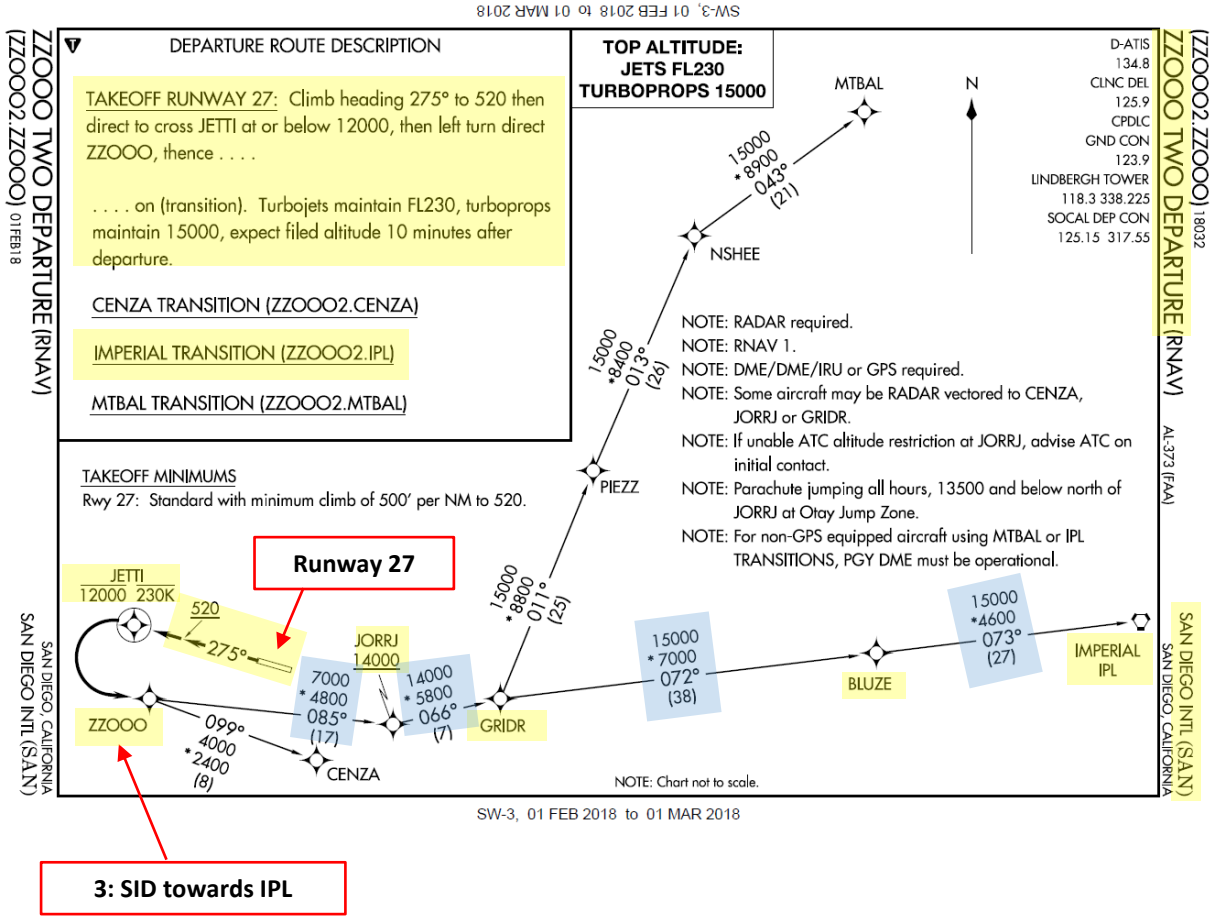
Typically, SIDs and STARs are provided by the ATC (Air Traffic Controller). Since we're doing a tutorial, I will just give you the SID and STAR to plug in the AFMC.

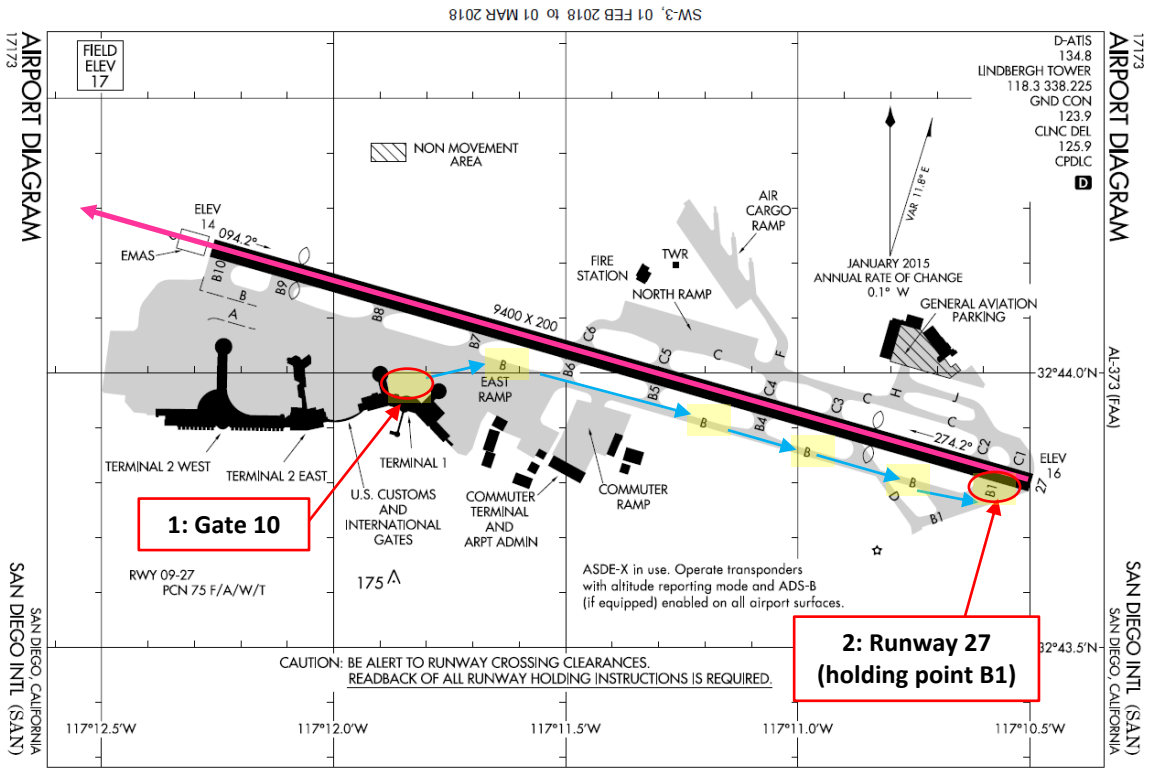


PLANNING THE DEPARTURE - SID

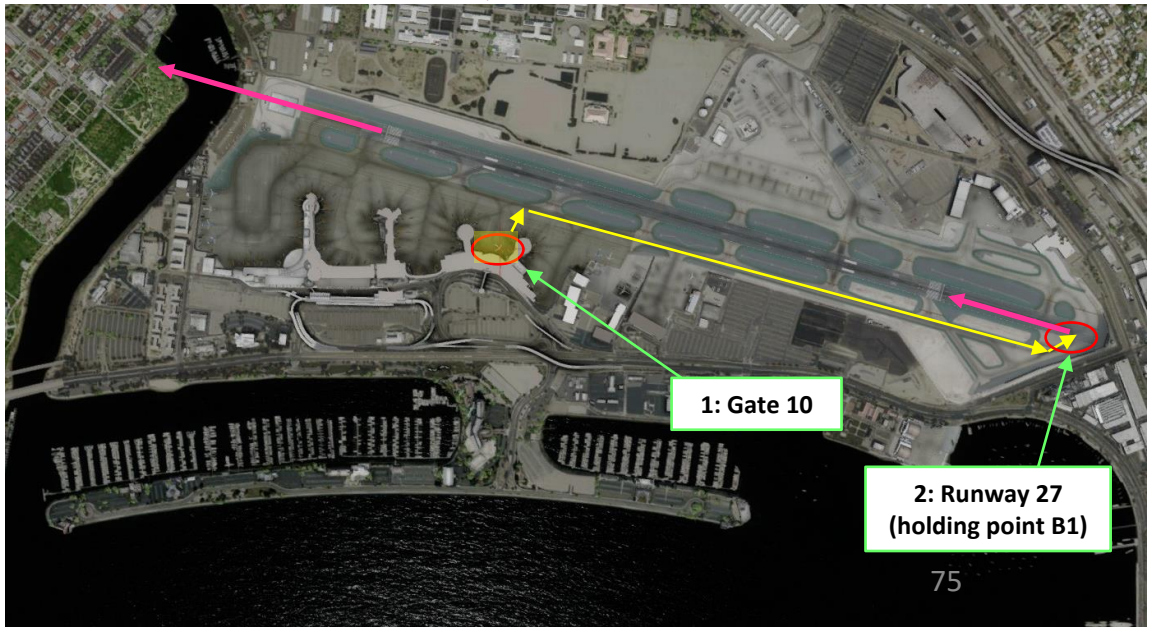
These charts are for the SID (Standard Instrument Departure) from San Diego International (KSAN) to IPL. We intend to:

1. Spawn at Gate 10 (personal preference)
2. Taxi towards **runway 27** (orientation: 275) using taxiways Bravo (B) and holding point B1.
3. Depart from KSAN using the SID from KSAN to IPL (ZZOOO TWO) to a target altitude of 15000 ft (FL150).
4. Climb to a cruising altitude of 33,000 ft





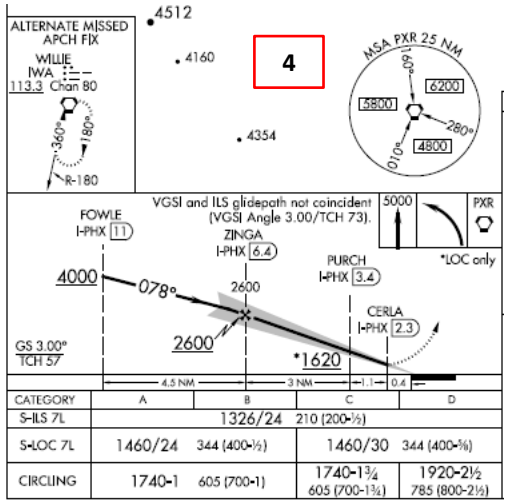
SW-3, 01 FEB 2018 to 01 MAR 2018

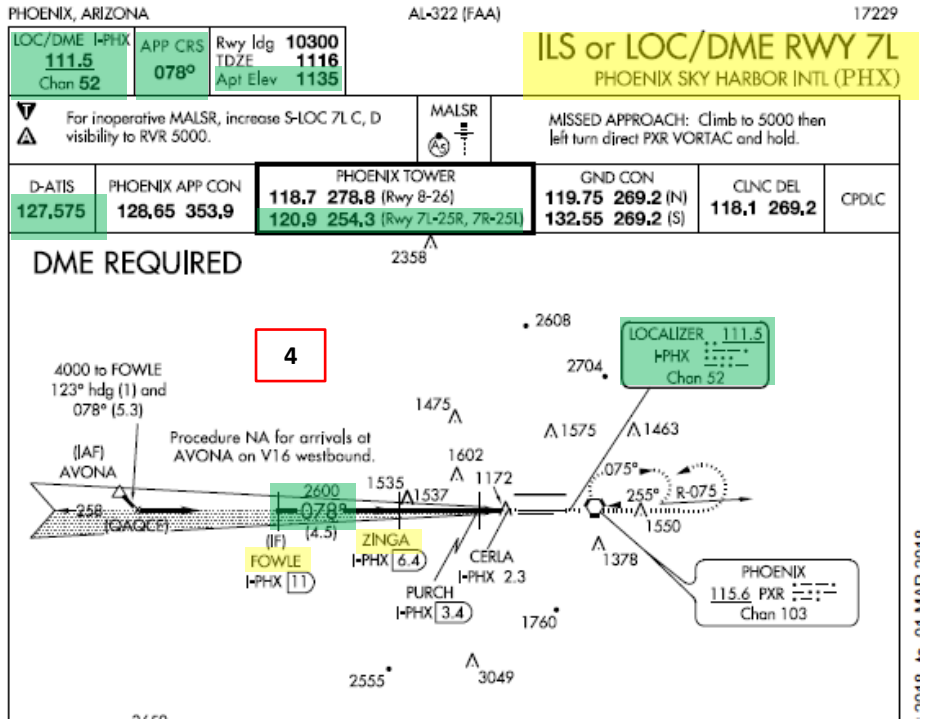


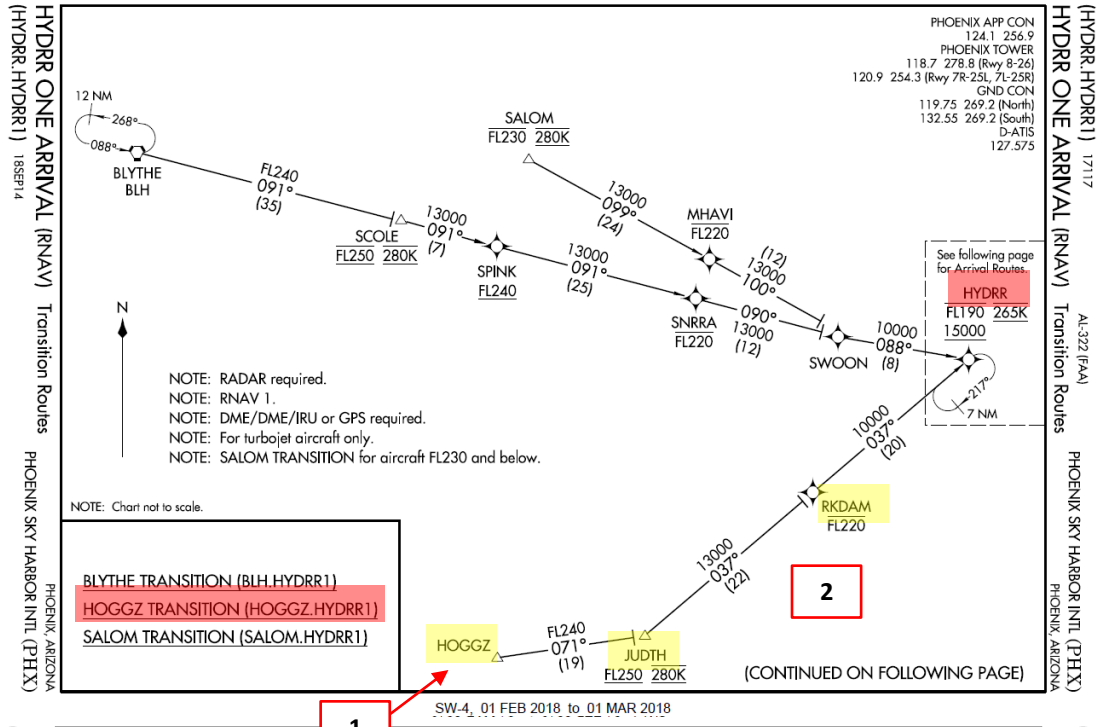
PLANNING THE APPROACH - STAR

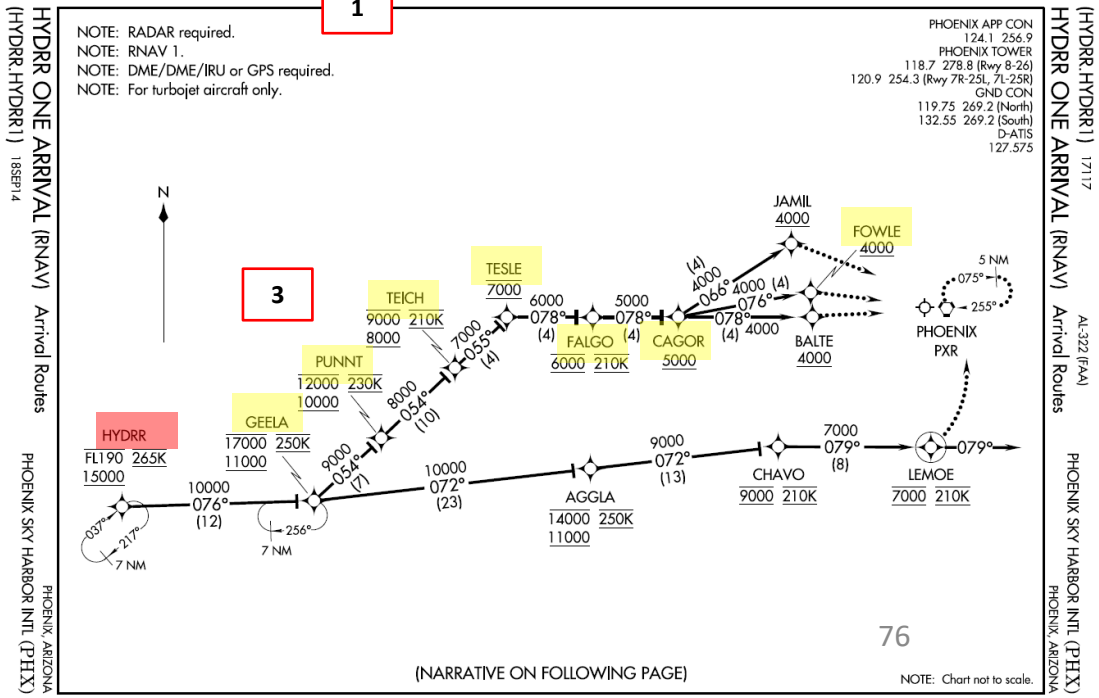
These charts are for the STAR (Standard Terminal Arrival Route) from HOGGZ to Phoenix Sky Harbor International Airport (KPHX). We intend to:

1. Come from HOGGZ waypoint
2. Fly from HOGGZ towards the HYDRR ONE arrival route via HOGGZ -> JUDTH -> RKDAM -> HYDRR.
3. Follow the STAR (HYDRR -> GEELA -> PUNNT -> TEICH -> TESLE -> FALGO -> CADOR -> FOWLE)
4. Follow the approach towards the runway, guided by the KPHX airport's ILS (Instrument Landing System) via FOWLE -> ZINGA.
5. Land at Phoenix (KPHX) on **runway 07L** (orientation: 078 Left)









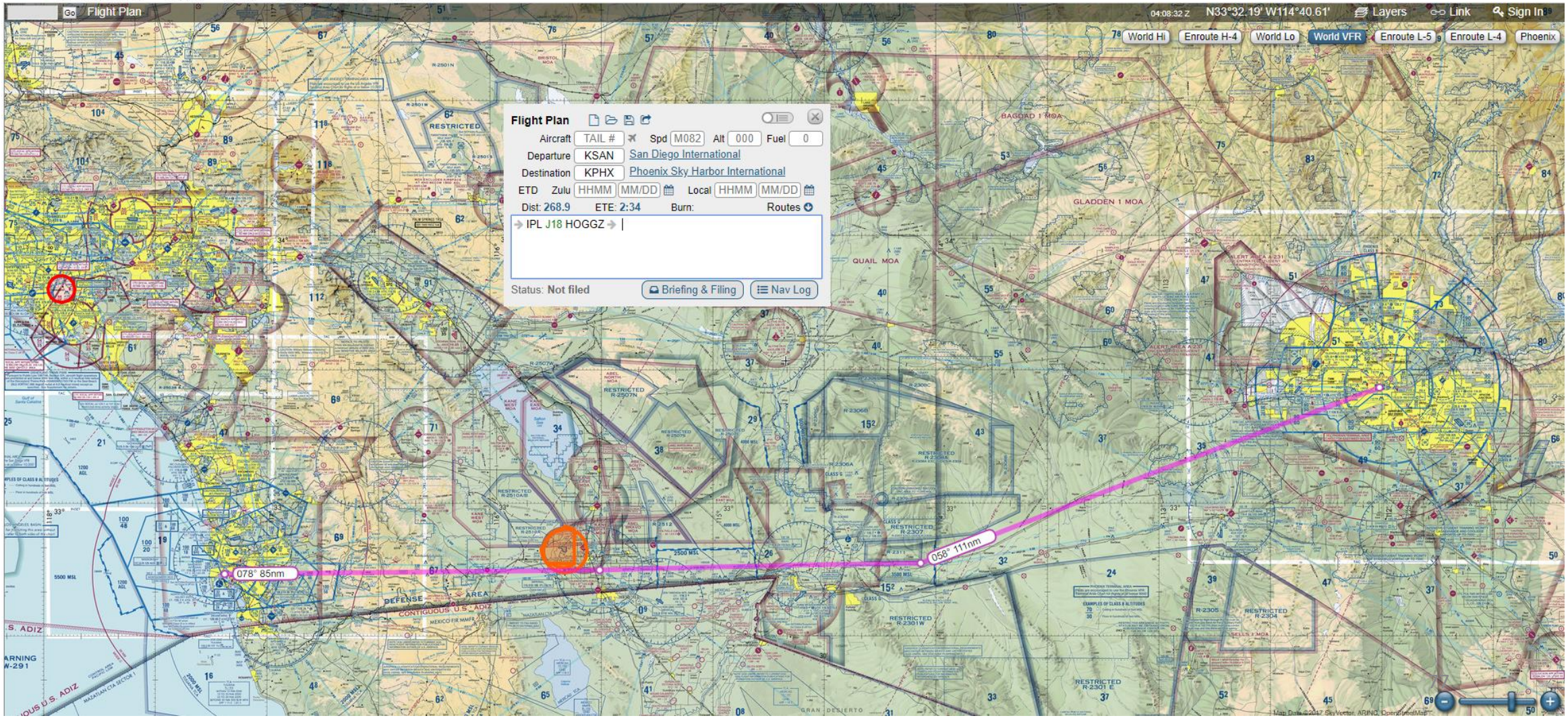
PLANNING THE FLIGHT - SUMMARY

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

Flight Plan Input to AFMC

KSAN SID **IPL** J18 **HOGGZ** STAR **KPHX**

TOTAL FUEL: 16,400 lbs



MCDU/AFMC IN A NUTSHELL

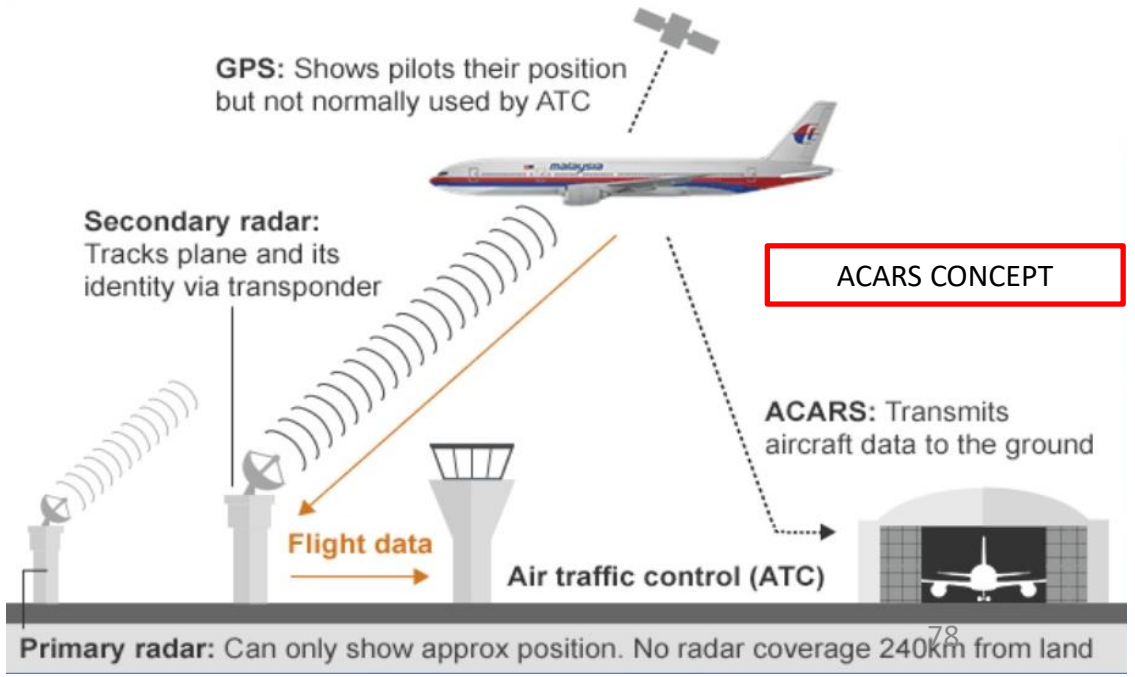
Most of the aircraft setup and flight planning will be done with the help of the MCDU, which encompasses various systems such as the AFMC system.

MCDU: Multifunction Control Display Unit

MAIN MENU page:

- **AFMC** -> Advanced Flight Management Computer
  - Fundamental component of a modern airliner's avionics. The AFMC 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), or Navigation Display (ND)
- **ACARS** -> Aircraft Communication Addressing and Reporting System
  - Digital datalink system for transmission of short messages between aircraft and ground stations via airband radio or satellite. Such messages can be METAR weather reports.

MCDU MAIN MENU PAGE



ACARS CONCEPT

MCDU/AFMC IN A NUTSHELL

AFMC -> Advanced Flight Management Computer

- **INIT REF**: data initialization or for reference data
- **DIR INTC**: direct intercept, modifies flight plan to track an interception course
- **RTE**: input or change origins, destination or route
- **LEGS**: view or change lateral and vertical data
- **CLB**: view or change climb data and cruise altitude
- **CRZ**: view or change cruise data
- **DES**: view or change descent data
- **FIX**: create reference points (fix) on map display
- **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.

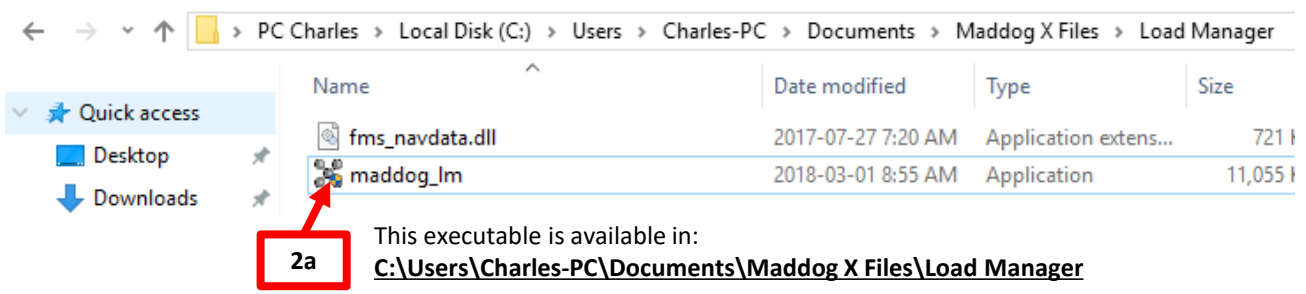
- **MENU**: view the main menu page (see previous page)
- **PREV PAGE / NEXT PAGE** : Cycles through previous and next page of selected FMC page
- **EXEC**: Makes data modifications active

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

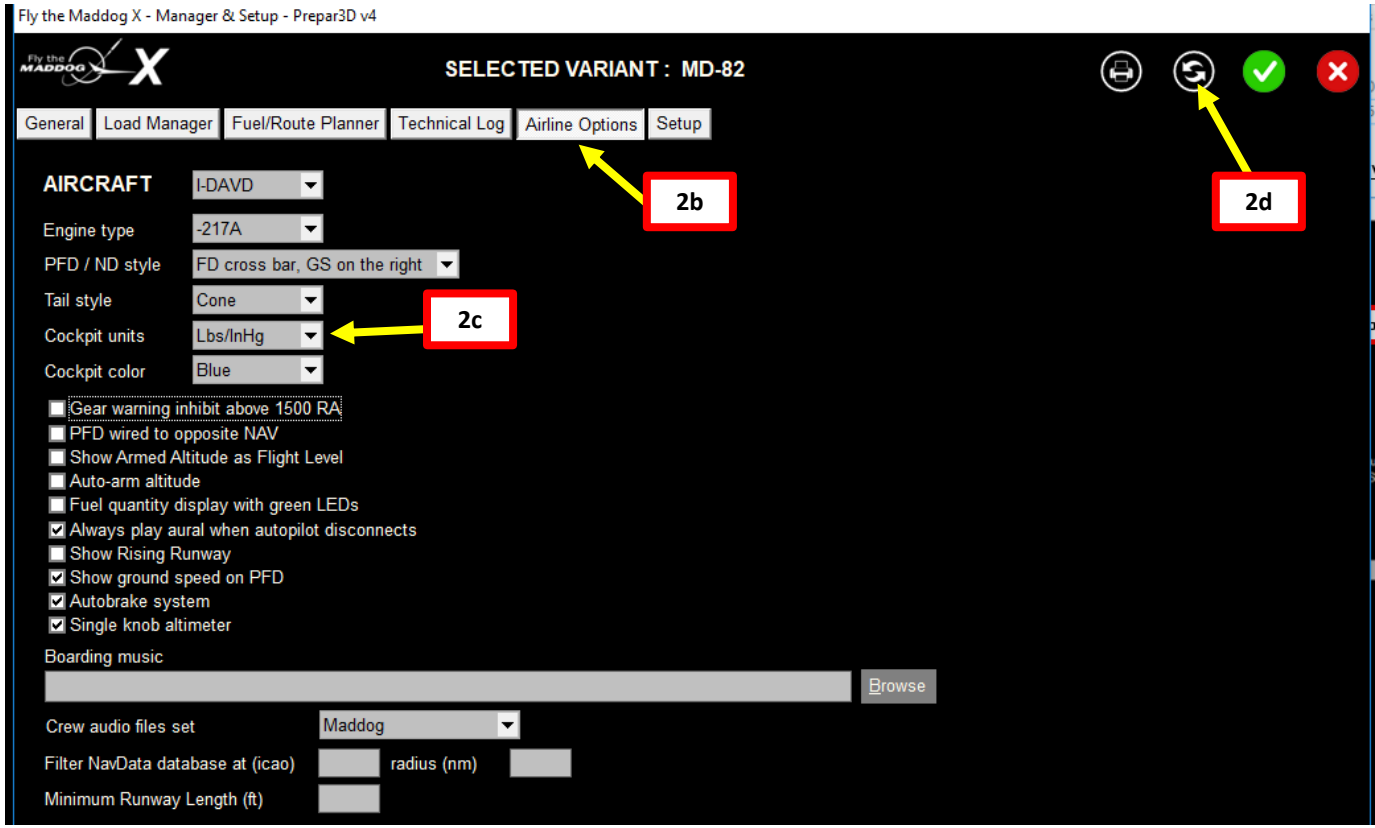
SET COLD & DARK STATE

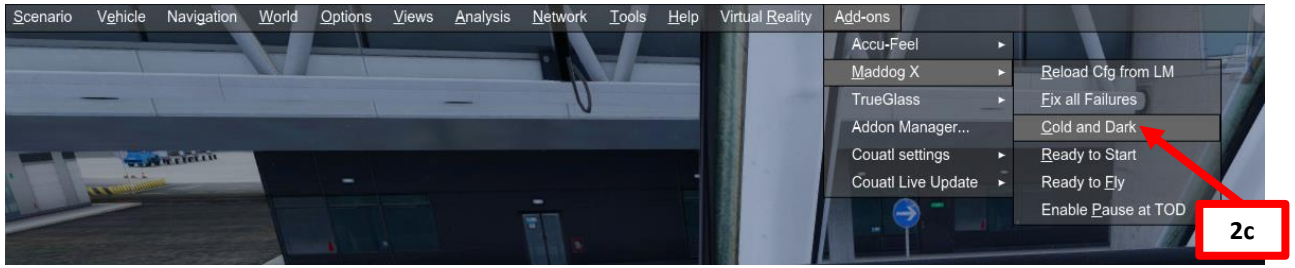
In Prepar3d or FSX, you will generally spawn with your engines running. A “cold & dark” start-up means that your aircraft is in an unpowered state with engines and every other system off. Before firing up Prepar3d, we will set the desired options right at the start using the Leonardo Load Manager Control Panel. Here is the procedure to spawn in Cold & Dark state:

1. Set cockpit in cold & dark state
   a) Press ALT key to show the Prepar3d toolbar
   b) Select « Add-ons » sub-menu, then « Maddog X »
   c) Click on « Cold and Dark »
2. Select desired measurement units (Imperial or International System)
   a) Open Load Manager executable maddog_lm.exe
   b) Click on the AIRLINE OPTIONS tab
   c) Select « Lbs/InHg » since we operate in the United States
   d) Click SAVE



This executable is available in:
C:\Users\Charles-PC\Documents\Maddog X Files\Load Manager

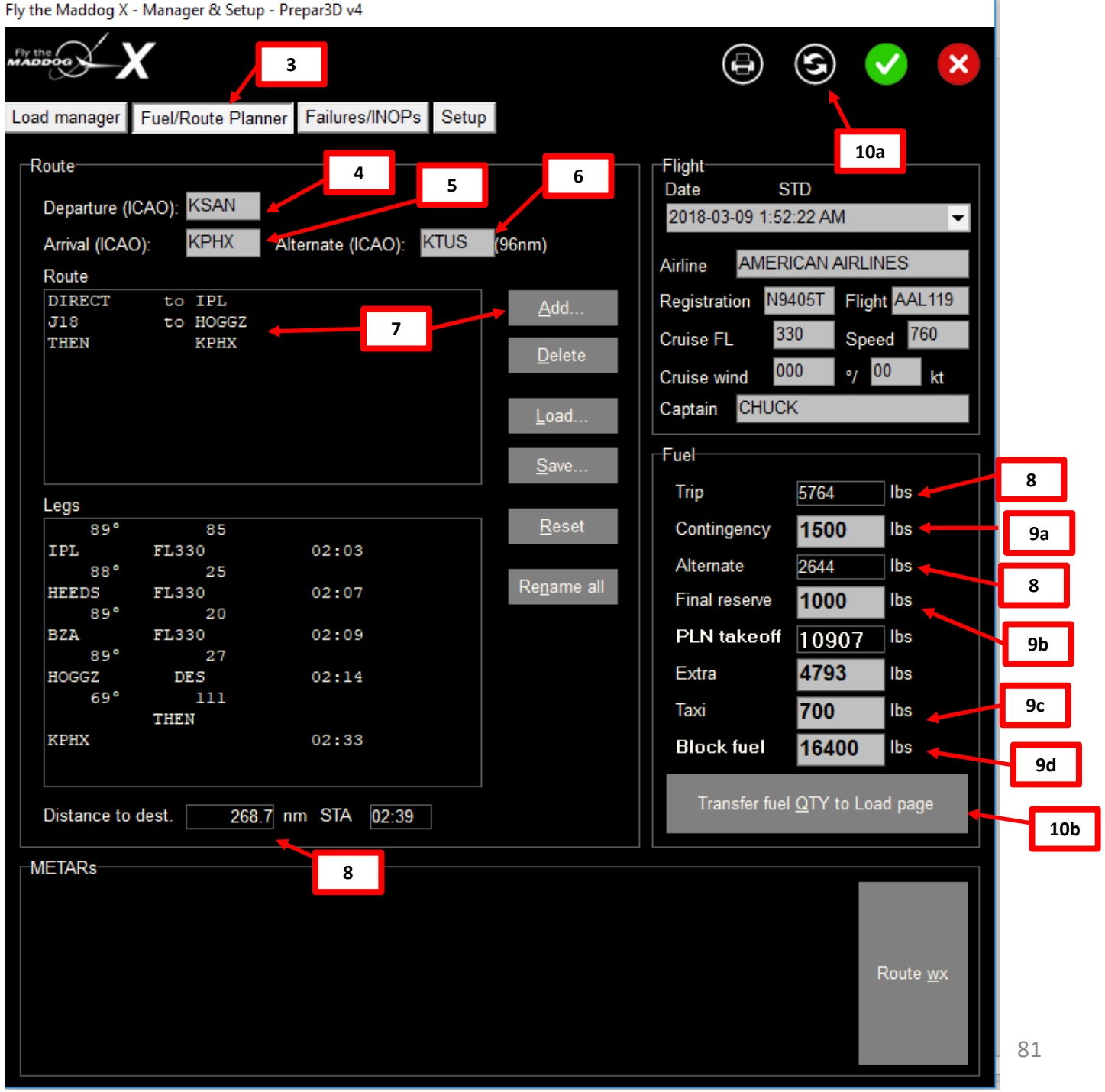




LOAD FUEL

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

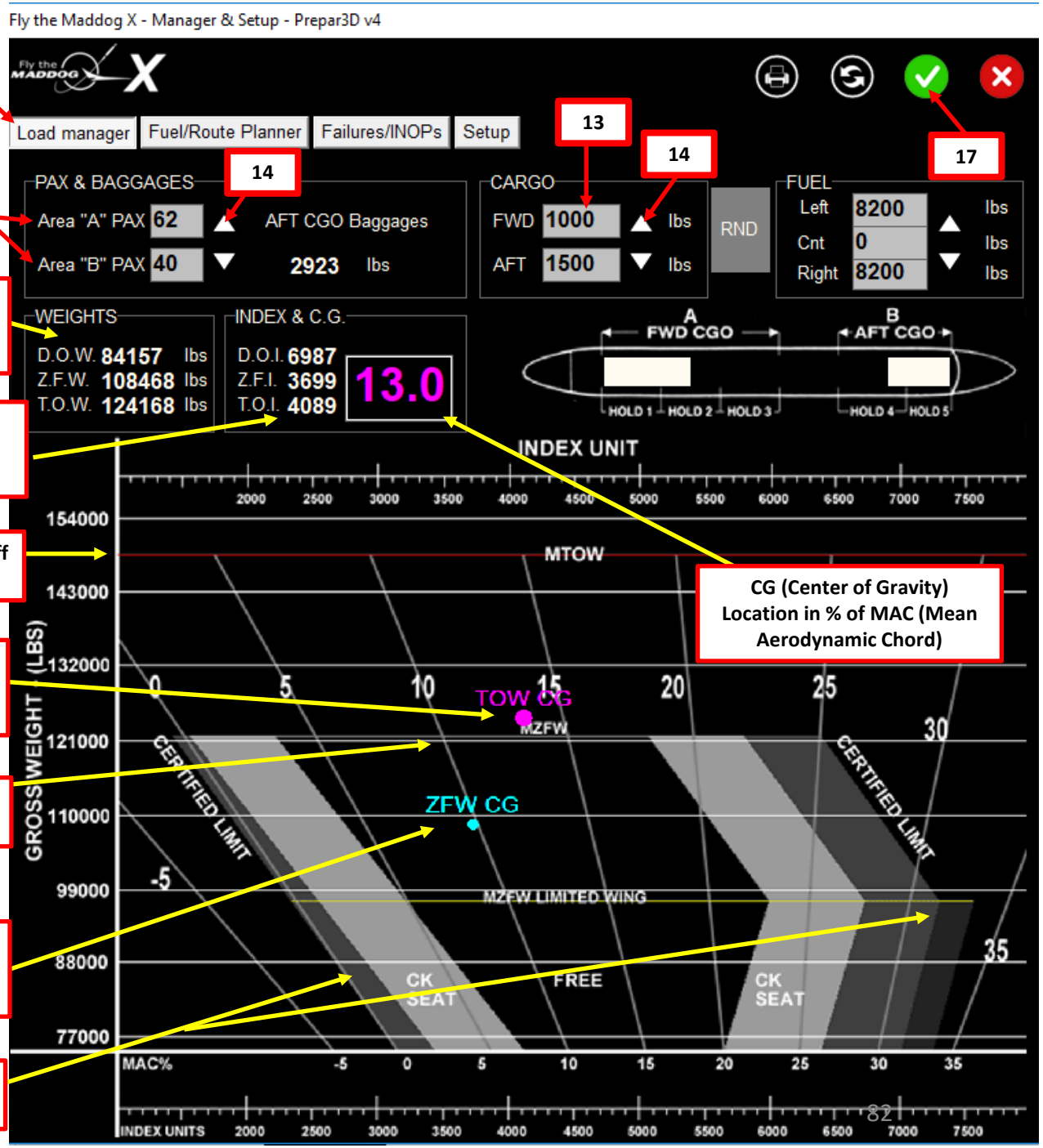
3. Click on the FUEL/ROUTE PLANNER tab
4. Set the Departure Airport ICAO Code (KSAN – San Diego)
5. Set Arrival Airport ICAO Code (KPHX – Phoenix)
6. Set Alternate Airport ICAO Code (KTUS – Tucson)
7. Add waypoints and airways of the flight plan we defined earlier
8. Distance to Destination, Trip Fuel and Alternate Fuel will be automatically generated.
9. Enter remaining fuel information
    a) Set Contingency fuel to approx. 1500 lbs
    b) Set Final Reserve fuel to approx. 1000 lbs
    c) Set Taxi Fuel to 700 lbs
    d) Set Block fuel (total fuel) to 16400, the value we approximated earlier. Extra fuel will be automatically calculated.
10. Click on SAVE, then click on "Transfer Fuel QTY to Load Page"



LOAD CARGO & PASSENGERS

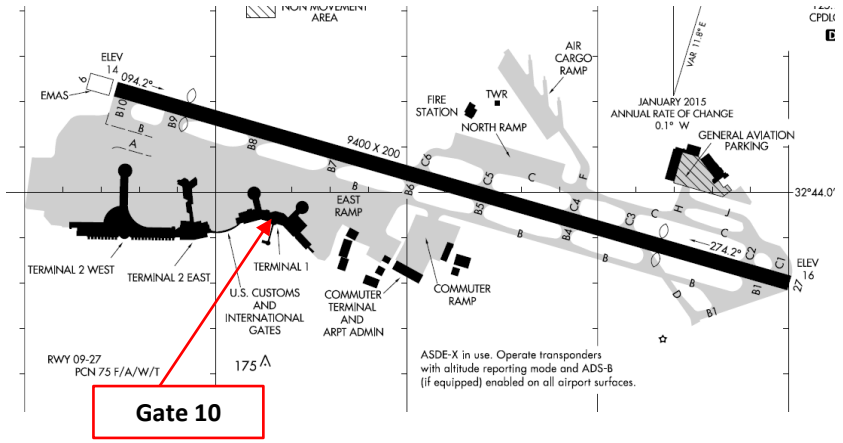
We will dynamically set our fuel, cargo and passenger loads using the Majestic Control Panel.

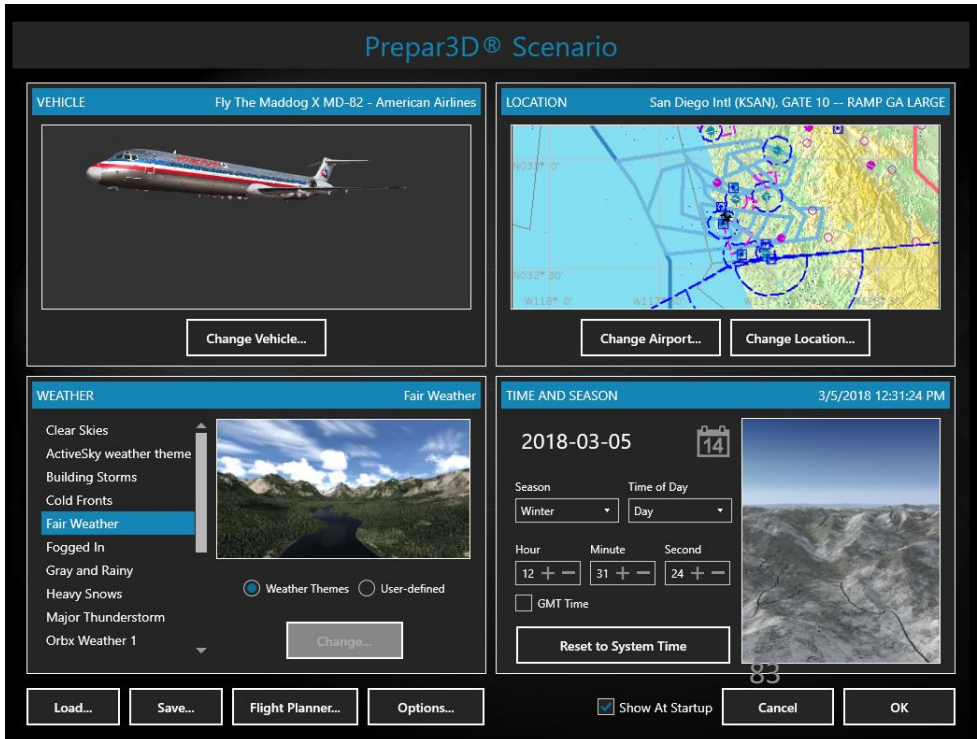
11. Click on the LOAD MANAGER tab
12. Set passenger numbers for PAX A and B areas (we will use 62 in A and 40 in B).
13. Set cargo load (we will use 1000 lbs in the FORWARD cargo bay and 1500 lbs in the AFT cargo bay)
14. Shift the passenger and cargo positions by clicking the FWD/AFT arrows to make sure the following weight & CG limits are respected:
    a) TOW CG (Takeoff Weight CG) is between the two certified limits
    b) TOW CG (Takeoff Weight CG) is below the MTOW (Maximum Takeoff Weight) line
    c) ZFW CG (Zero Fuel Weight CG) is between the two certified limits
    d) ZFW CG (Zero Fuel Weight CG) is below the MZFW (Maximum Zero Fuel Weight) line
15. Verify that the CG indexes and symbols are purple. A red symbol means that you are not within certified weight or CG limits.
16. Write down the following calculated parameters:
    - **CG Location = 13 % MAC (Mean Aerodynamic Chord)**
    - **ZFW (Zero Fuel Weight) = 108468 lbs**
17. Click on the SAVE AND EXIT button to save parameters and close the Load Manager. We can now spawn the aircraft with the passenger, cargo and fuel loads properly set.



SPAWN

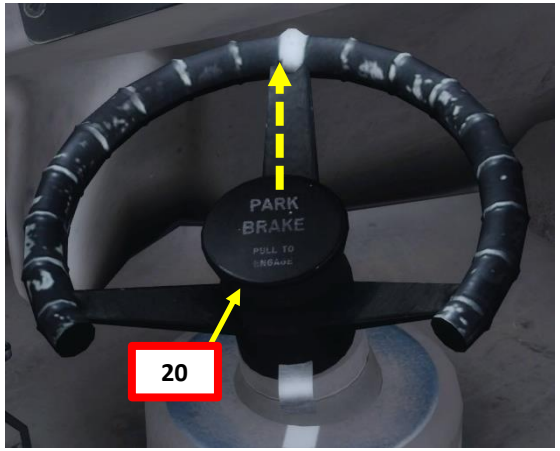
18. Spawn like you normally would at Gate 10 in KSAN (departure airport) in the MD-82

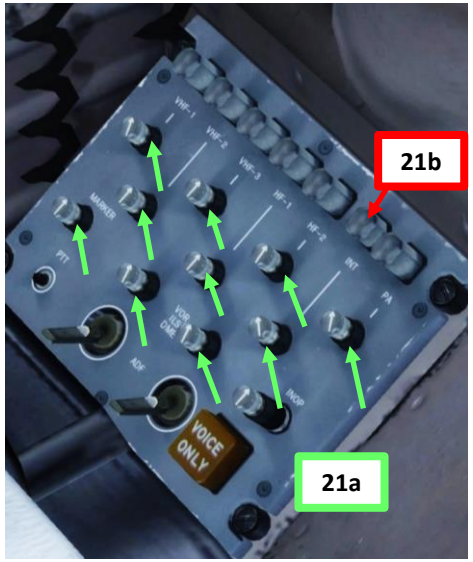


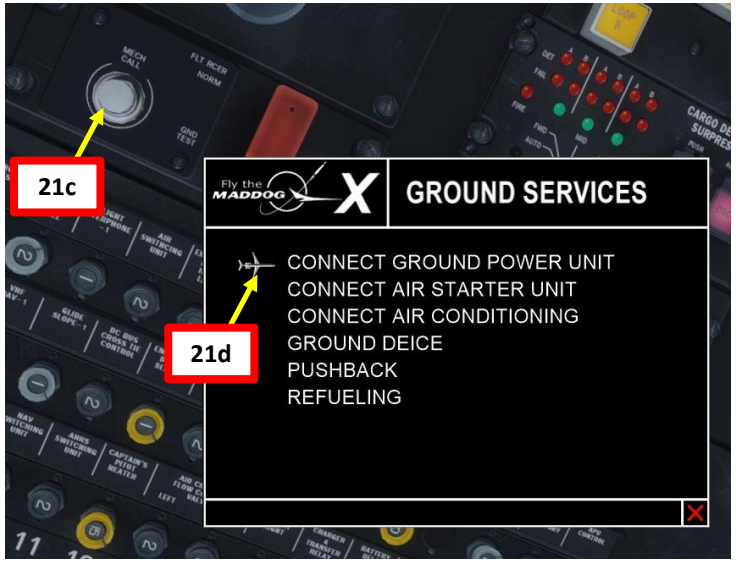


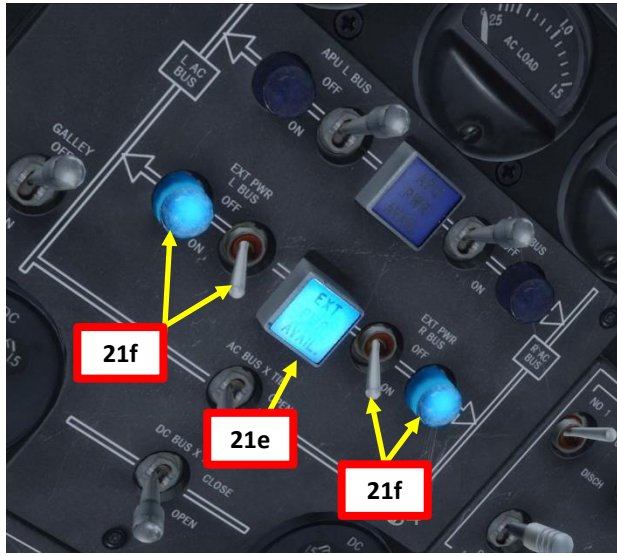
POWER UP AIRCRAFT

19. On Overhead panel, turn on battery power
    a) Set Battery switch to ON (DOWN)
    b) Lock battery switch by scrolling down mousewheel on switch safety guard
20. Set Parking Brake ON (UP)
21. Contact Ground Crew Mechanics to set ground power ON
    a) On Audio Select Panel, push in the VHF-1, VHF-2, VHF-3, HF-1, HF-2, INT, PA, VOR/ILS/DME and MARKER Audio Receive buttons.
    b) Press the INT (Intercom) microphone button
    c) Next to the circuit breaker panel on the overhead console, **right click** (*left clicking will not work*) on the MECH CALL button to contact ground crew
    d) Click "CONNECT GROUND POWER UNIT" (GPU) to connect ground power
    e) After a few seconds the EXT PWR AVAIL light should illuminate
    f) Set the EXT PWR L BUS and EXT PWR R BUS switches ON (DOWN)









AHRS & POSITION ALIGNMENT

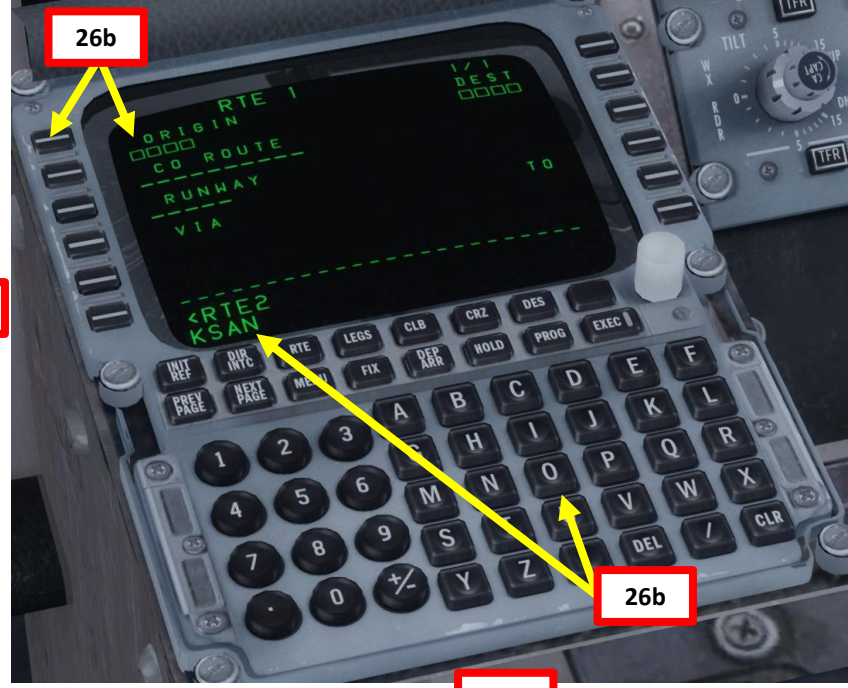
Note: the MD-82 we have does not come equipped with an IRS (Inertial Reference System) to gather positional data; instead our Mad Dog uses a GPS. This means that we will not need to go through the 5-to-10 minutes long alignment that's usually required on Boeing or Airbus aircraft.

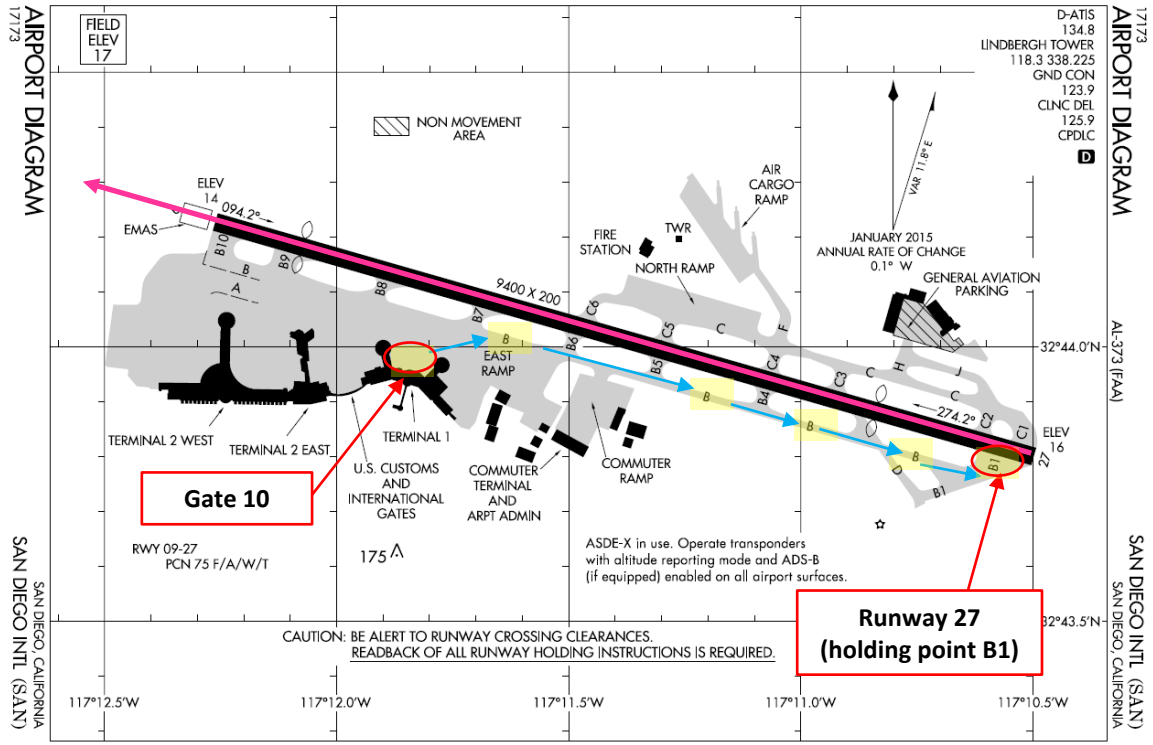
- The AHRS (Attitude & Heading Reference System (which drives the flight instruments) alignment starts immediately when the aircraft power is ON and takes less than a minute.
- The positional information of the navigation systems are provided by GPS, which does not require any alignment. You simply need to enter GPS coordinates in your AFMC (Advanced Flight Management Computer) and then the computer will know exactly where you are.

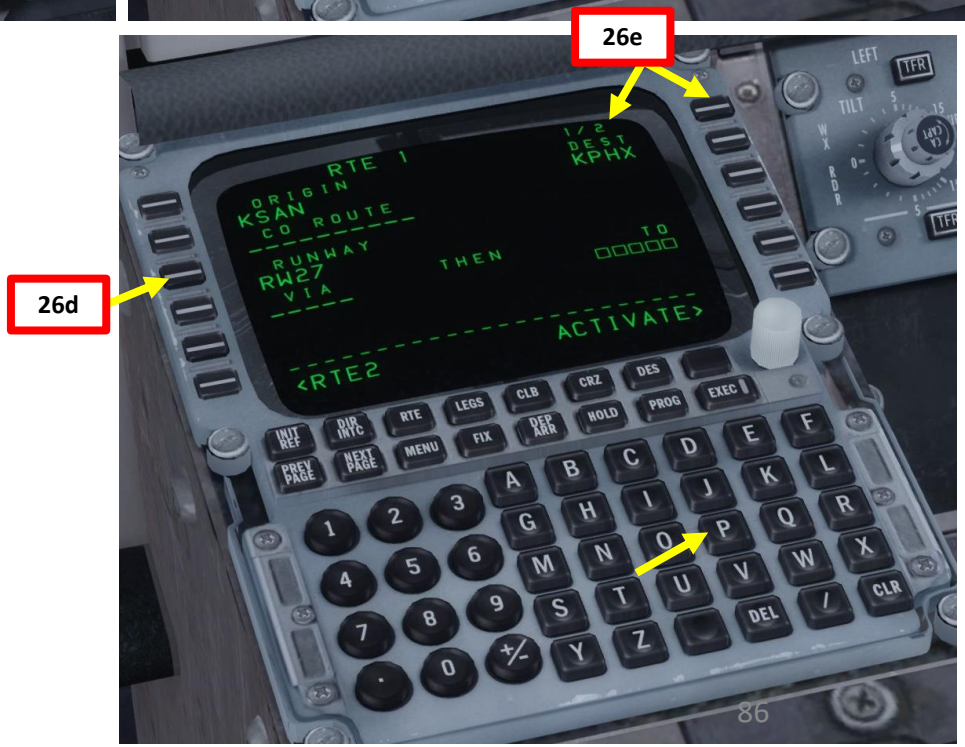
22. Wait for the AMFC to light up automatically
23. In the IDENT menu, click on the LSK (Line Select Key) next to POS INIT
24. Click on the LSK next to the GPS coordinates you have to copy them
25. Click on the LSK next to SET FMC POS to enter GPS coordinates in the AFMC and set your position reference.

AFMC SETUP – FLIGHT PLAN

26. Go on AFMC (Advanced Flight Management Computer) and set aircraft route
    a) In POS INIT menu, select ROUTE menu
    b) On the MCDU, type “KSAN” as the departure airport (San Diego) and click on LSK next to ORIGIN (departure airport)
    c) Consult navigation chart of KSAN airport and find runway from which you will takeoff from (Runway 27).
    d) Type “27” (for Runway 270) on MCDU keypad and click on LSK next to RUNWAY.
    e) Type “KPHX” on the MCDU keypad and click on LSK next to “DEST” to set Phoenix Airport as your destination

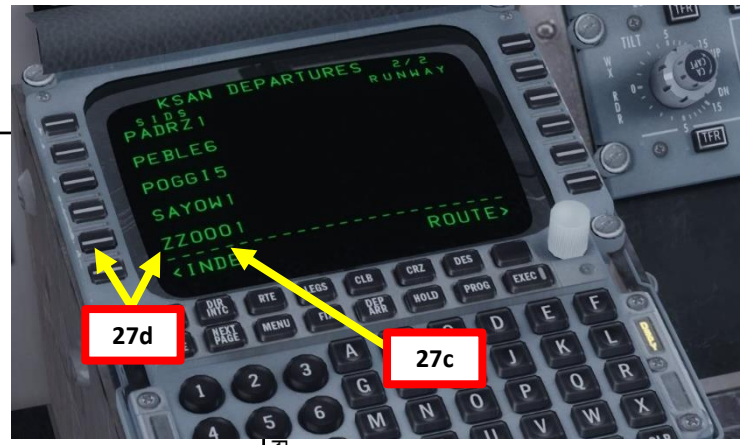


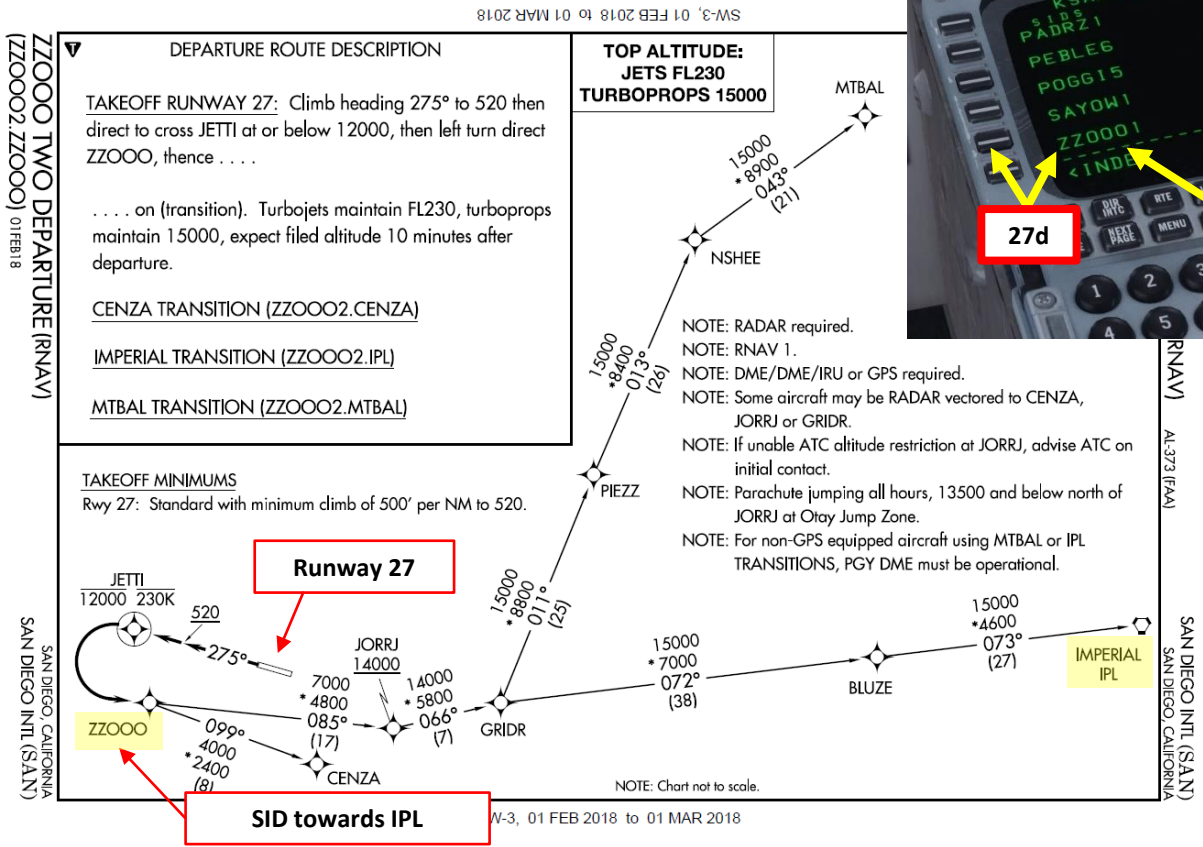




AFMC SETUP – FLIGHT PLAN (DEPARTURE)

27. Go on AFMC (Advanced Flight Management Computer) and set departure information (airport, SID and transition waypoint)
    a) Click on “DEP ARR” (Departure Arrival) button and click on “DEP – KSAN” to set San Diego as our Departure Point
    b) Select Runway 27
    c) Click NEXT to cycle SIDs available until you find ZZOOO1
    d) Select SID (Standard Instrument Departure) for ZZOOO1 as determined when we generated our flight plan.
    e) Select Transition to IPL (Imperial) Waypoint as determined when we generated our flight plan.
    f) Departure data is now entered

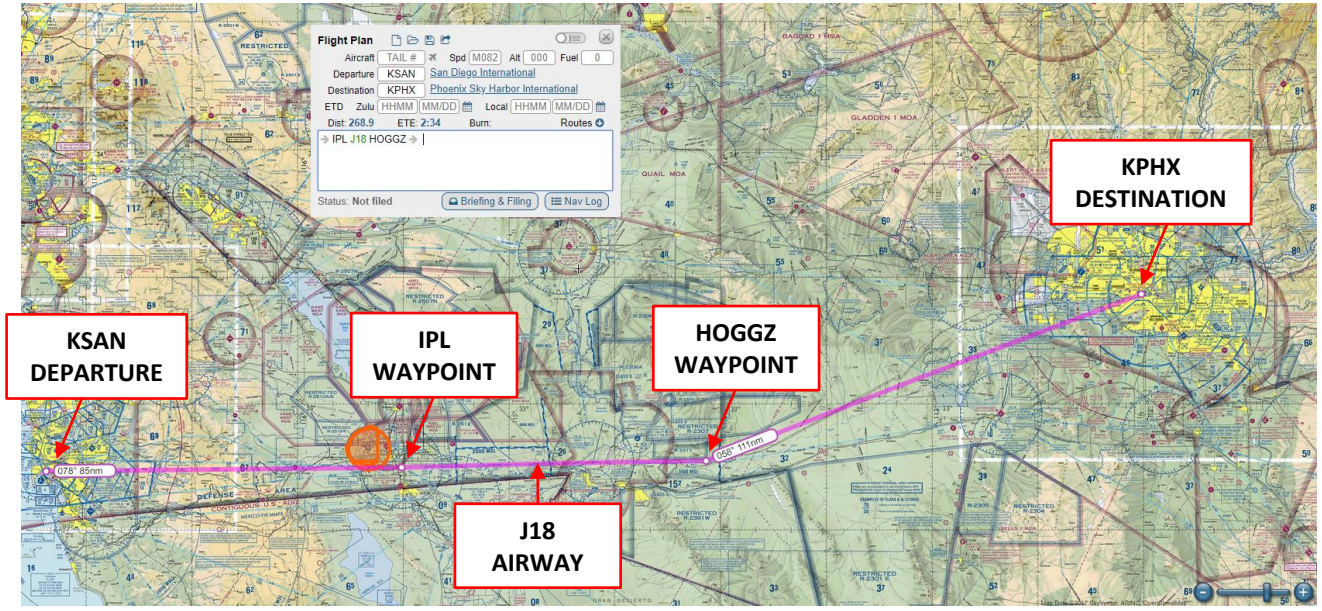


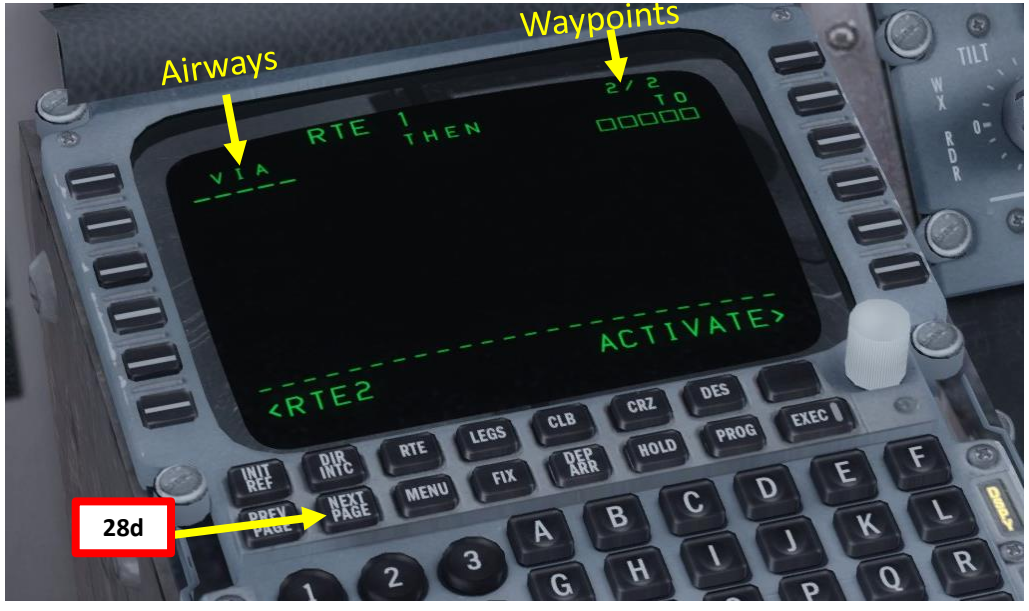


AFMC SETUP – FLIGHT PLAN (WAYPOINTS & AIRWAYS)

28. Go on AFMC (Flight Management Computer) and set up your waypoints and airways
    a) Select the ROUTE page by pressing the RTE button
    b) Type “J18” on the MCDU keypad and click on the LSK next to the dashed line on the left column (AIRWAYS) to set your next Airway.
    c) Type “HOGGZ” on the MCDU keypad and click on the LSK next to the squared line on the right column (WAYPOINTS) to set your next Waypoint to HOGGZ.
    d) Click on NEXT PAGE button to add additional airways and waypoints as shown in previous steps if need be.

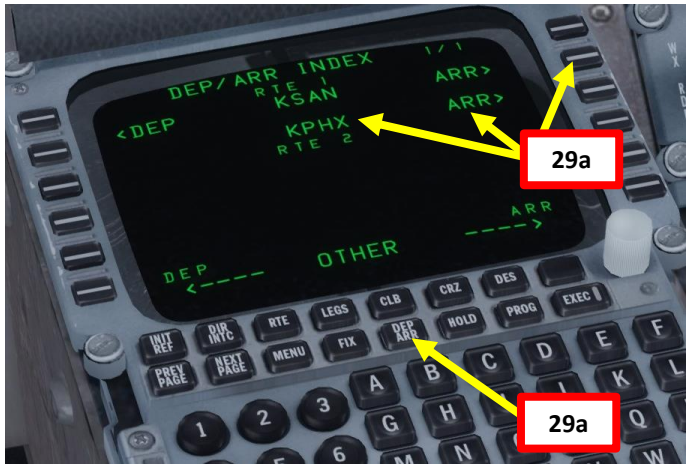
KSAN SID IPL J18 HOGGZ STAR KPHX

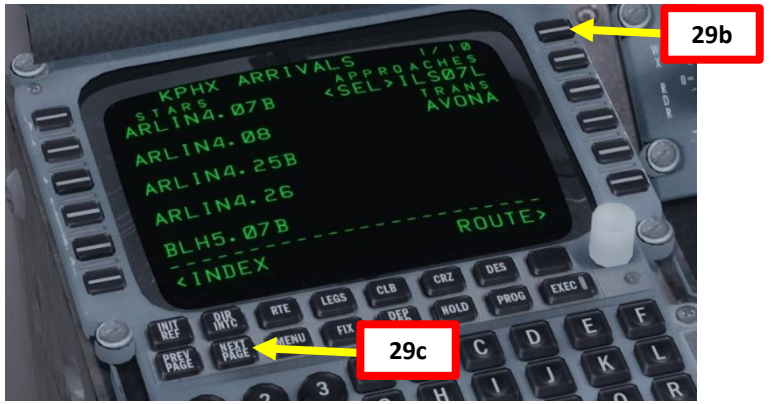


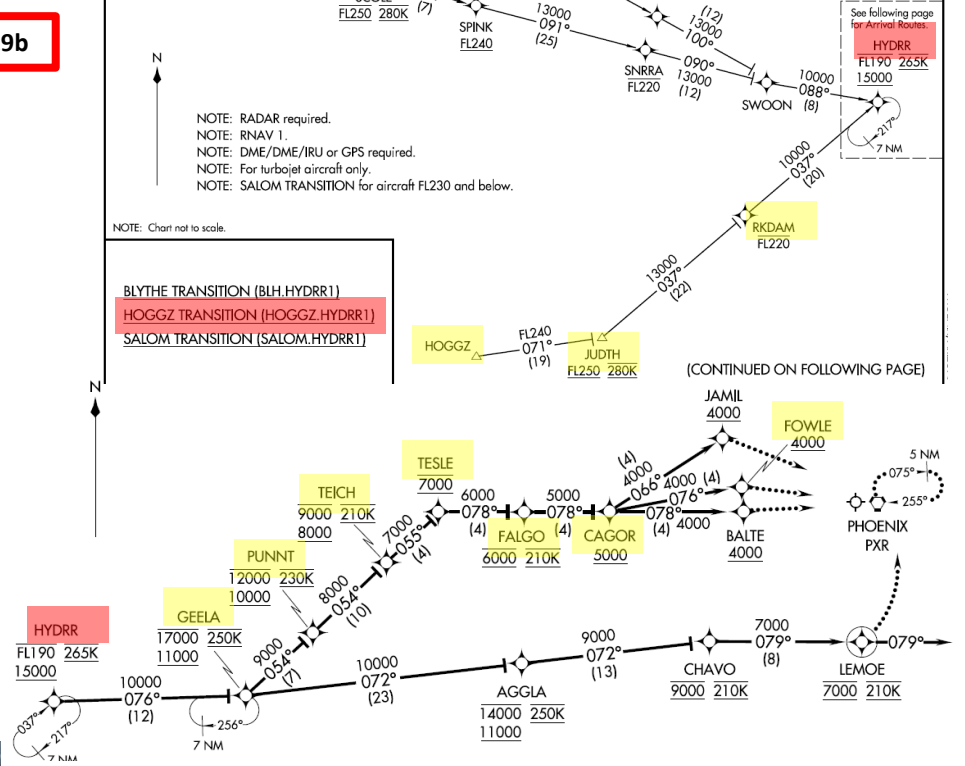


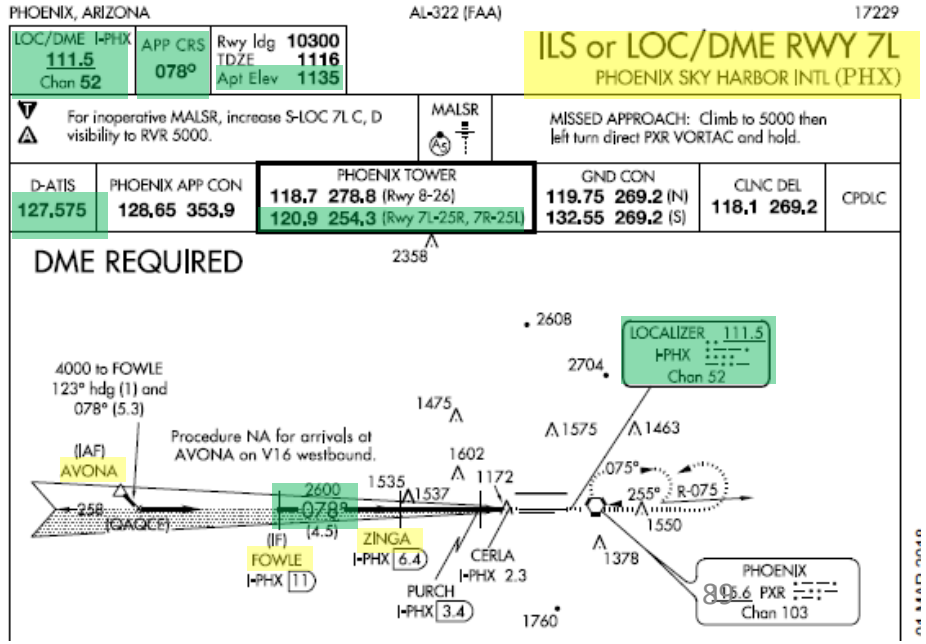
AFMC SETUP – FLIGHT PLAN (ARRIVAL)

29. Go on AFMC (Advanced Flight Management Computer) and set arrival information (airport, STAR and transition waypoint)
    a) Click on "DEP ARR" (Departure Arrival) button and click on "KPHX – ARR" to set Phoenix as our Arrival Point. If you are in the DEPARTURES or ARRIVALS sub-menu, you can click on the LSK next to INDEX to go back to the main DEP ARR menu.
    b) Select Runway ILS 07L (Instrument Landing System Runway 070 Left)
    c) Click NEXT to cycle STARs (Standard Terminal Arrival Route) available until you find HYDDR1.07L
    d) Select STAR (Standard Terminal and Arrival) for HYDDR1 as determined when we generated our flight plan.
    e) Select Transition Waypoint to HOGGZ as determined when we generated our flight plan.
    f) Arrival data is now entered



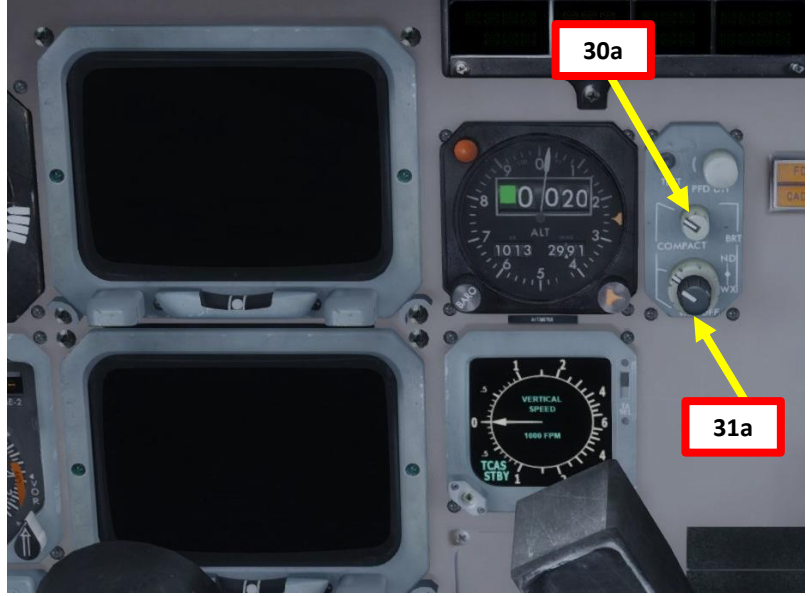


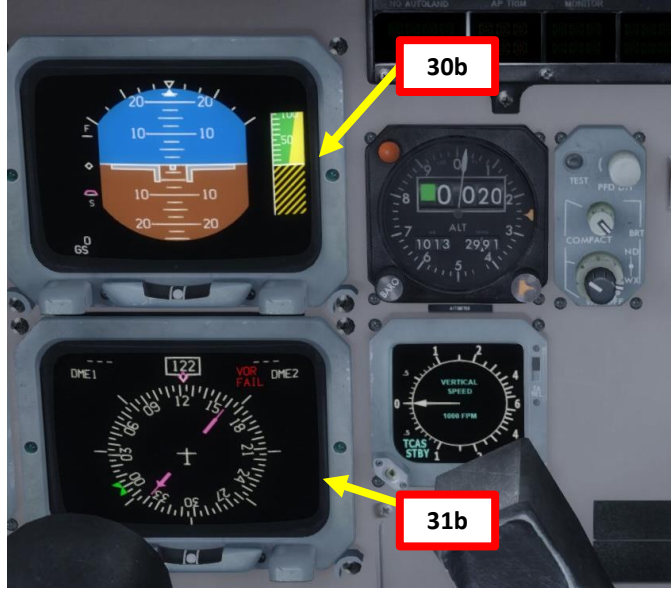


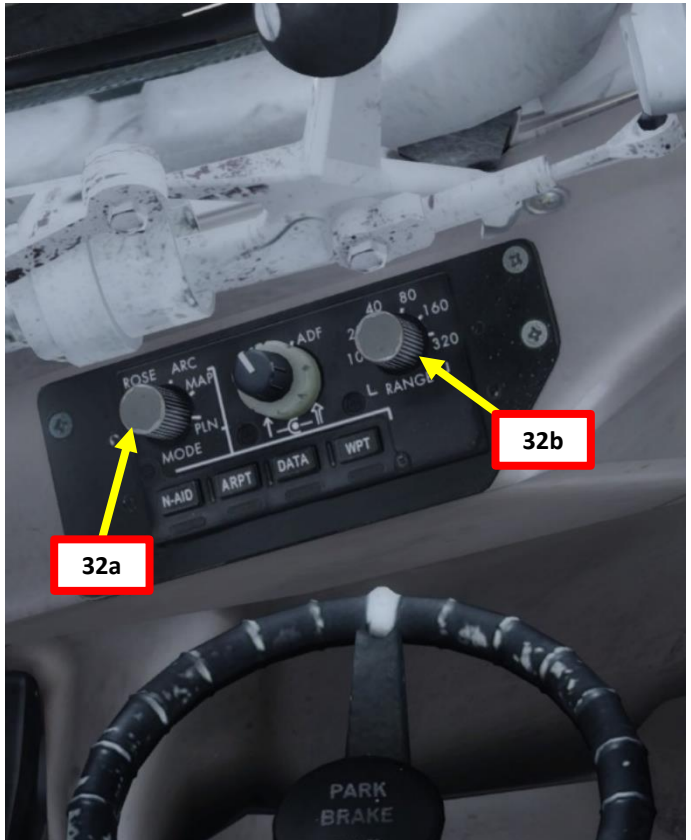


AFMC SETUP – FLIGHT PLAN (VERIFY FLIGHT PLAN)

30. Rotate the PFD (Primary Flight Display) Brightness Control Knob to turn on both the pilot and co-pilot PFD displays.
31. Rotate the ND (Navigation Display) Brightness Control Knob (Outer) to turn on both the pilot and co-pilot ND displays
32. Verify your waypoints and remove any discontinuity
    a) Set the EFIS mode knob to PLN (Plan)
    b) Set map scale to appropriate range
    c) Press the LEGS button on the MCDU
    d) Press the LSK next to STEP to cycle through waypoints and verify that they are all linked properly

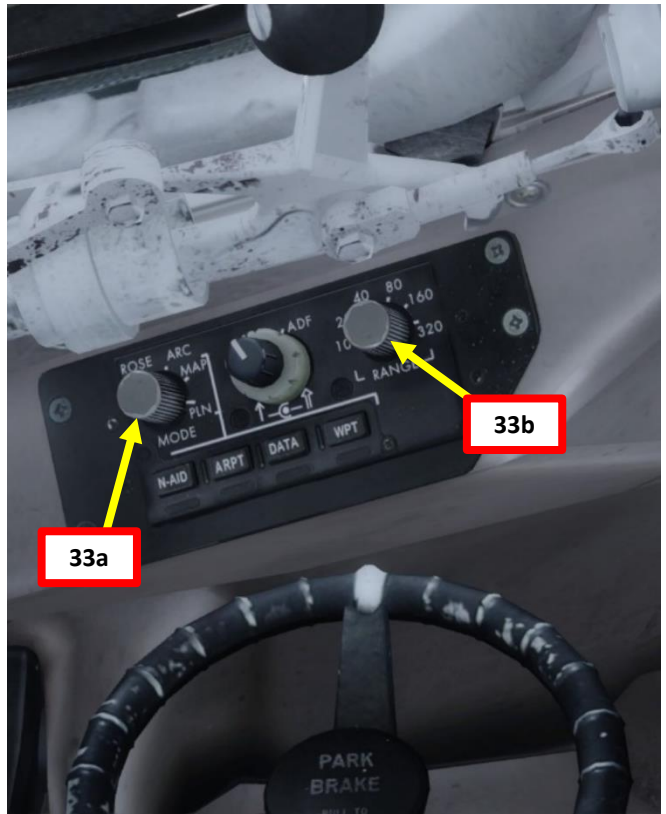






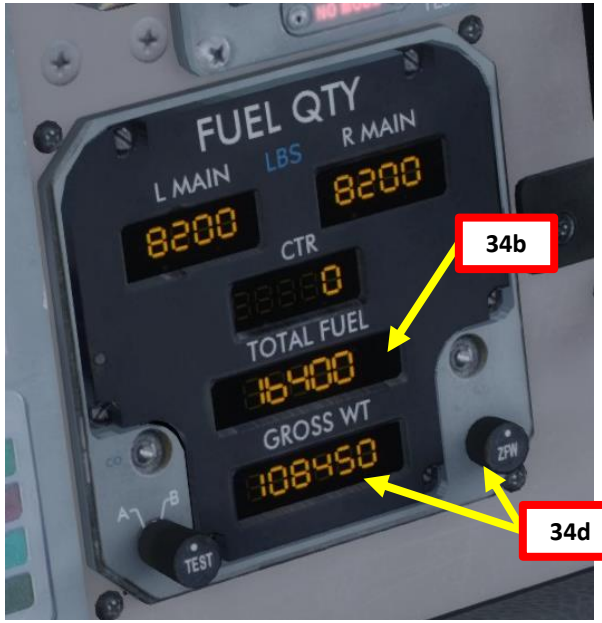
AFMC SETUP – FLIGHT PLAN (ACTIVATE FLIGHT PLAN)

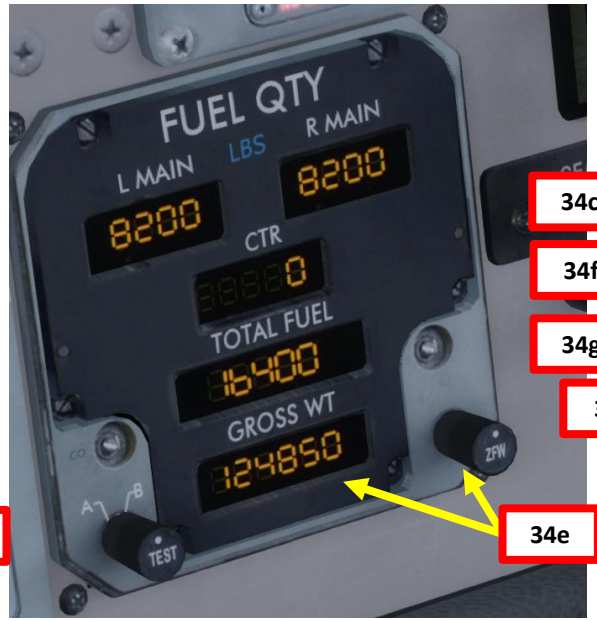
33. Activate the flight plan
    a) When everything is verified, set EFIS mode knob to MAP
    b) Set map scale to appropriate scale
    c) Click on the RTE (Route) MCDU button
    d) Click on the LSK next to ACTIVATE
    e) Click on the EXEC button
    f) Your flight plan is now activated in the AFMC



AFMC SETUP – PERF INIT

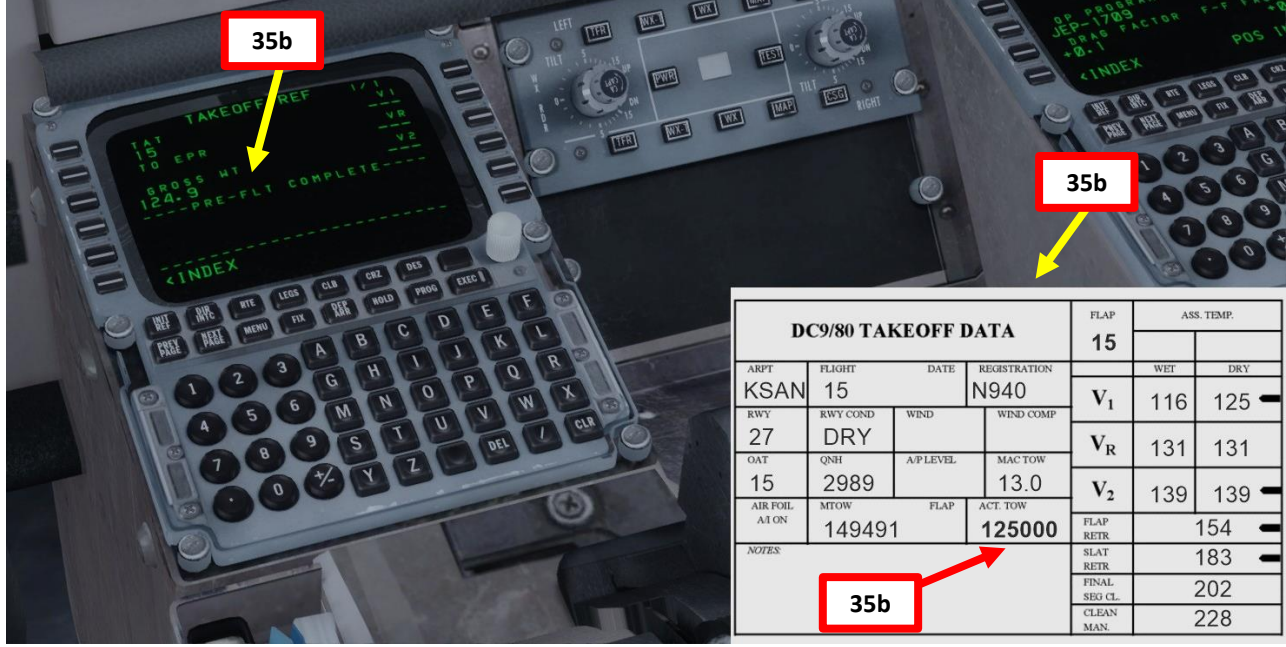
34. Enter Fuel & Weight information in AFMC
    a) Press the INIT REF button on the MCDU to display the PERF INIT page
    b) Check the total fuel quantity on your fuel indicator (16400 lbs)
    c) On the MCDU keypad, type “16.4/N”, and then click the LSK next to FUEL/SCHEDULE (16400 lbs total fuel)
    d) Press and hold the ZFW (Zero Fuel Weight) knob pushed in to display the zero fuel weight value in the GROSS WT indication (108450 lbs, which is close enough to the ZFW value estimated in the Load Manager which was 108468 lbs).
    e) Release the ZFW knob (OUT) to display the aircraft Gross Weight
    f) On the MCDU keypad, type “108.5”, and then click the LSK next to ZFW (108450 lbs zero fuel weight)
    g) On the MCDU keypad, type “2.0”, and then click the LSK next to RESERVES (2000 lbs fuel reserve, we’ll use a ballpark figure)
    h) The Gross Weight will automatically be calculated based on the three values we entered previously.
    i) On the MCDU keypad, type “45”, and then click the LSK next to COST INDEX
    j) On the MCDU keypad, type “330”, and then the LSK next to CRZ ALT to set a cruise altitude to 33000 ft
    k) On the MCDU keypad, type “18000”, and then click the LSK next to TRANS ALT to set a transition altitude to 18000 ft (U.S. transition altitude is generally 18,000 ft, while in Europe it’s usually 3000 ft)
    l) We will assume no winds and no deviation from standard temperature (ISA) for this tutorial.





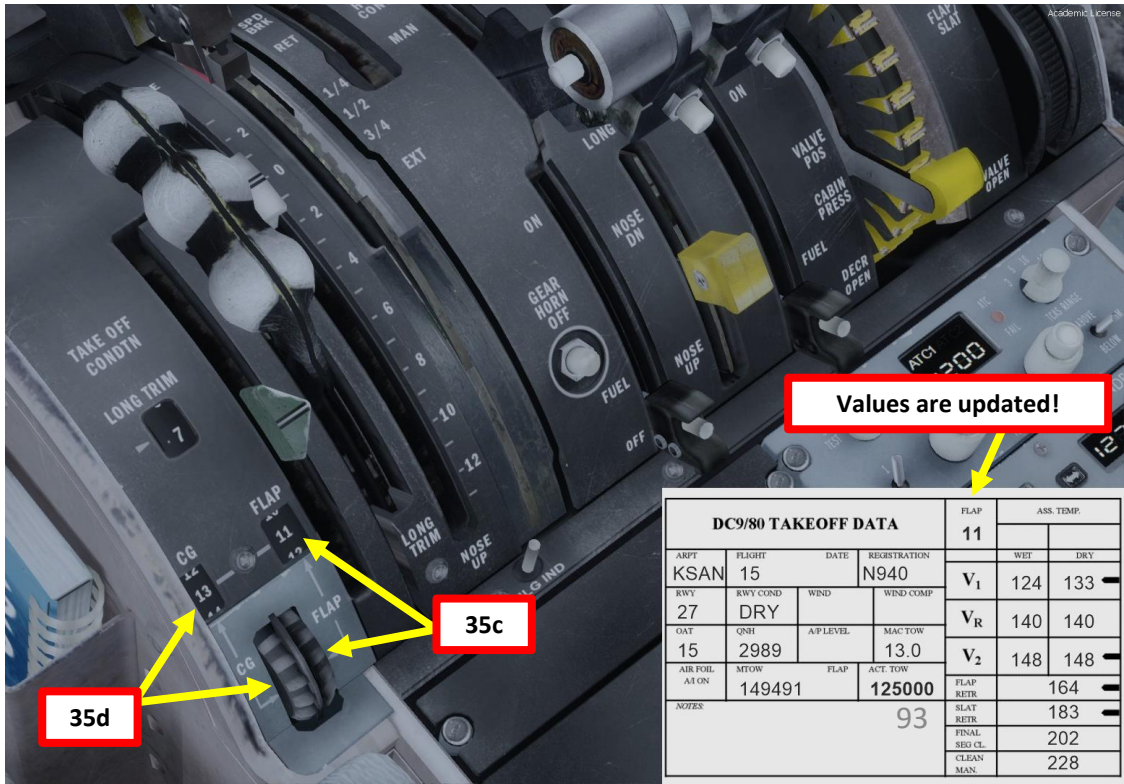
AFMC SETUP – TAKEOFF REF V-SPEEDS

35. Set up Takeoff Reference Data
    a) Press the LSK next to TAKEOFF in the PERF INIT page
    b) Press "LSHIFT+5" to make the TAKEOFF DATA 2D panel appear and click on ACT TOW field to set its value to the GROSS WT (Gross Weight) displayed on TAKEOFF REF page.
    c) Set Flap Takeoff Setting by scrolling the mousewheel on FLAP wheel (we will set it to a Flaps 11 deg takeoff setting)
    d) Set CG position to the value previously determined in the Load Manager (13 % of Mean Aerodynamic Chord) by scrolling the mousewheel on CG wheel

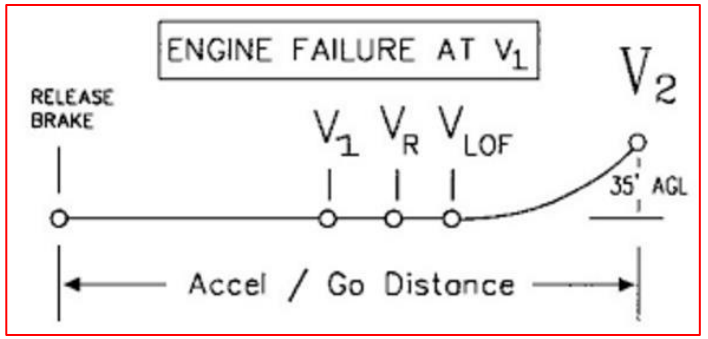


35b **2D PANEL COMMANDS**

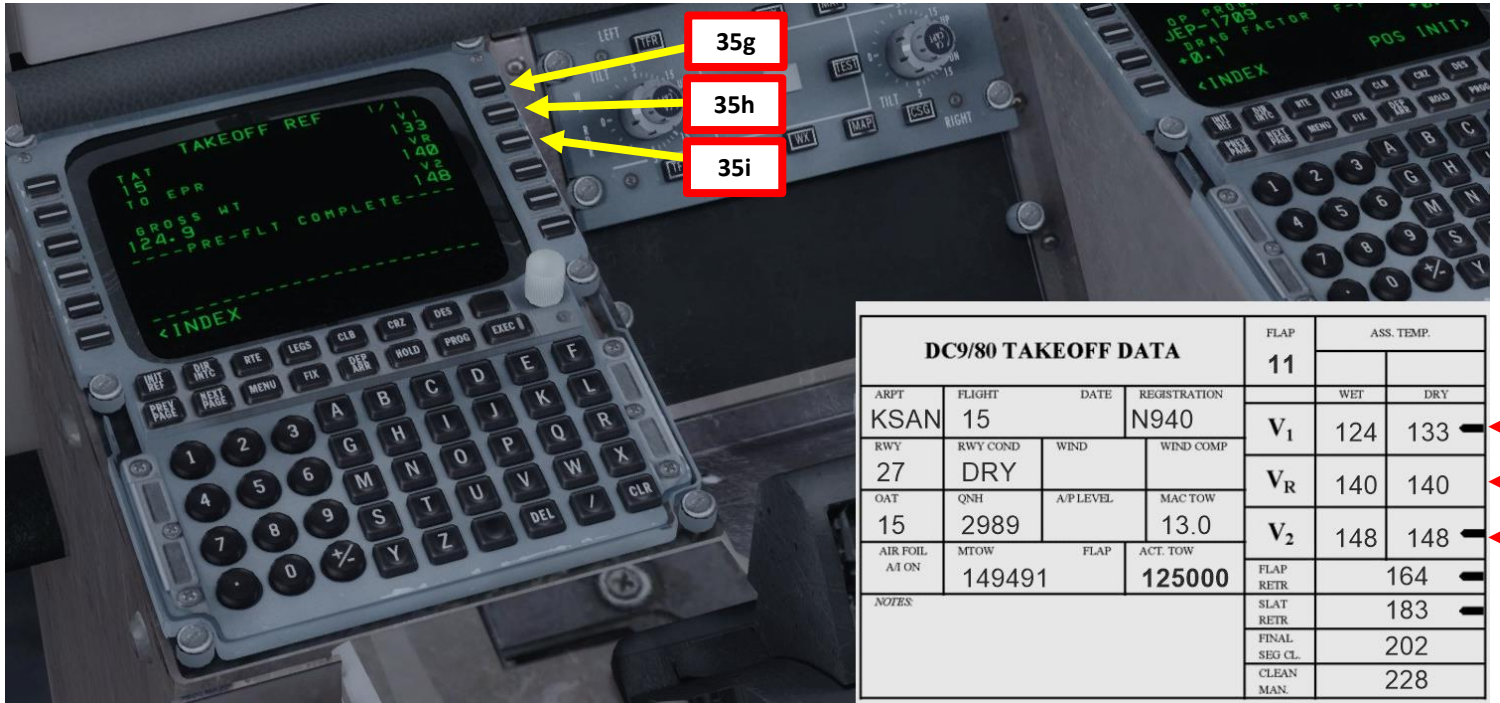
-	View Manager	(SHIFT + 1)
-	FMS CDU 1	(SHIFT + 2)
-	Zoomed CM1 PFD	(SHIFT + 3)
-	Zoomed CM1 ND	(SHIFT + 4)
-	Speed Charts	(SHIFT + 5)
-	Ground/Crew Comm	(SHIFT + 6)
-	Flight Documents	(SHIFT + 7)



AFMC SETUP – TAKEOFF REF V-SPEEDS



35. Set up Takeoff Reference Data
    - e) Wait for a few seconds for the TAKEOFF DATA sheet to update. 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).
    - **f) V1 Speed is 133 kts**
      VR Speed is 140 kts
      V2 Speed is 148 kts
    - g) Type "133" in the MCDU keypad and click the LSK next to V1
    - h) Type "140" in the MCDU keypad and click the LSK next to VR
    - i) Type "148" in the MCDU keypad and click the LSK next to V2
    - j) Press "LSHIFT+5" again to hide 2D TAKEOFF DATA panel
    - k) Click on the airspeed indicator to set V-Speed bugs on the airspeed indicator



DC9/80 TAKEOFF DATA

ARPT	FLIGHT	DATE	REGISTRATION
KSAN	15		N940

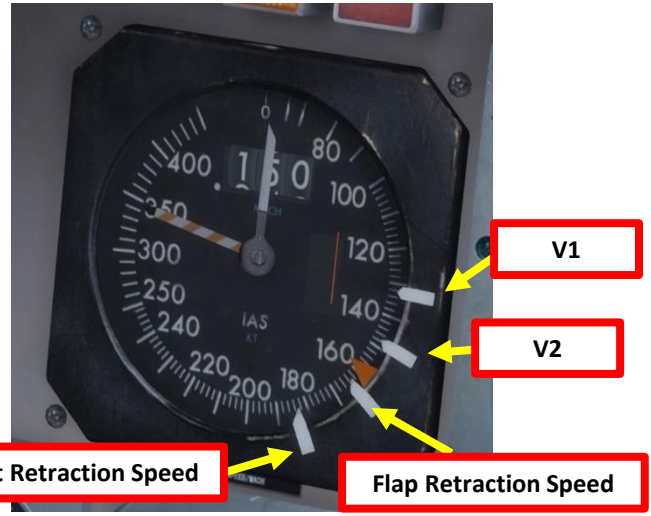
RWY	RWY COND	WIND	WIND COMP
27	DRY		

OAT	QNH	A/P LEVEL	MAC TOW
15	2989		13.0

AIR FOIL A/I ON	MTOW	FLAP	ACT. TOW
	149491		125000

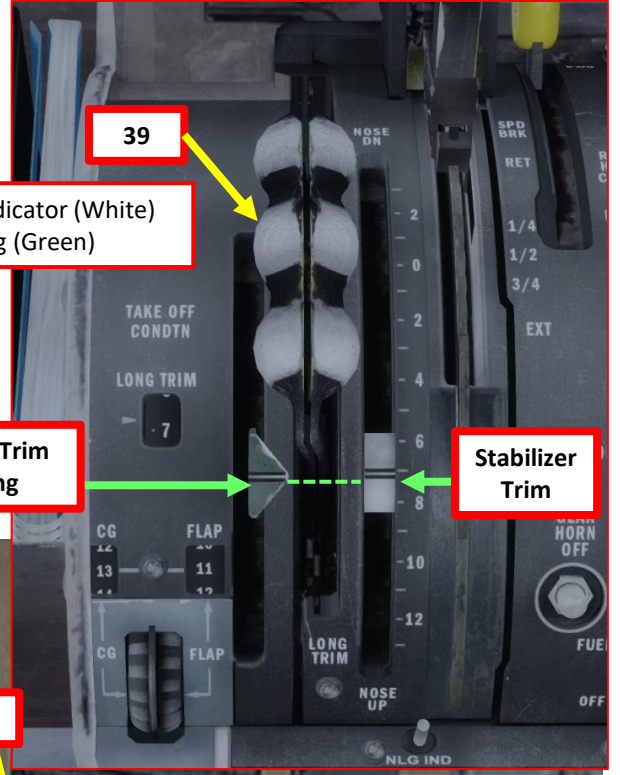
NOTES:

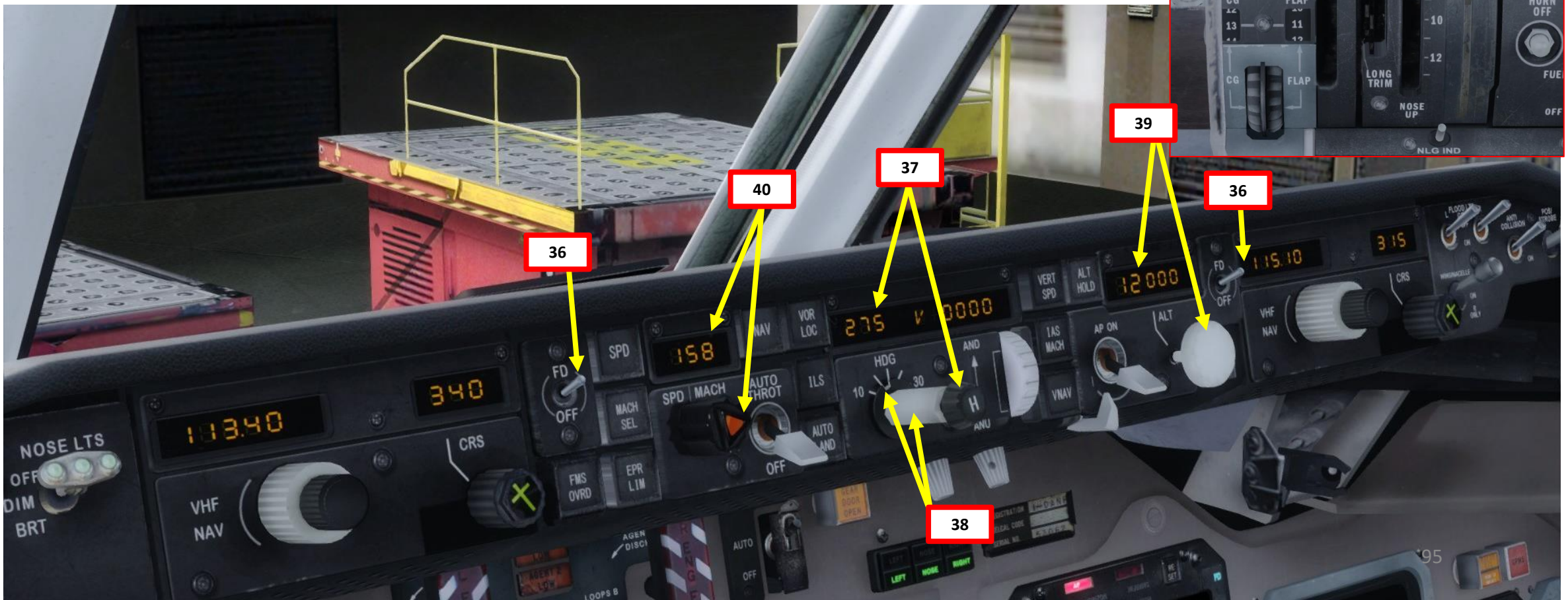
FLAP	ASS. TEMP.	
11		
	WET	DRY
V_1	124	133
V_R	140	140
V_2	148	148
FLAP RETR	164	
SLAT RETR	183	
FINAL SEG CL.	202	
CLEAN MAN.	228	



AUTOPILOT & TAKEOFF TRIM SETUP

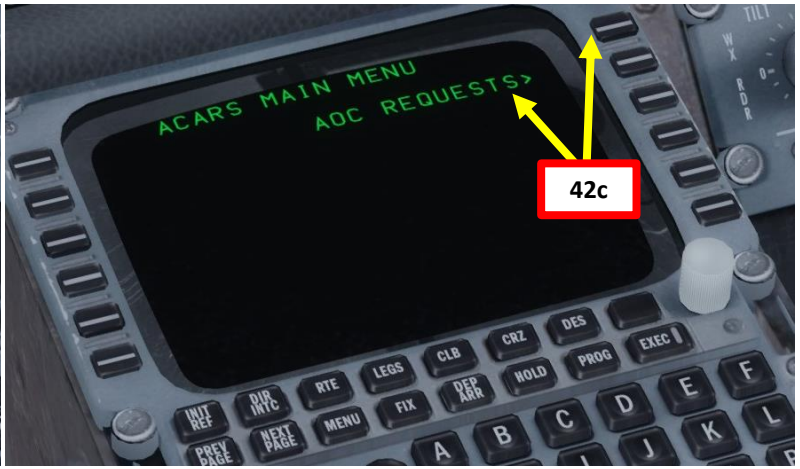
36. Turn on both FD (Flight Director) switches – UP POSITION
37. Set HEADING knob to runway QDM (Magnetic) heading 275 as per KSAN chart (black "H" knob).
38. Set maximum bank angle to 15 degrees (white knob).
39. As per KSAN SID Chart, set Initial Altitude (FL120, or 12,000 ft) on FGCP (Flight Guidance Control Panel) by rotating ALT knob on glareshield until Altitude is set to 12,000 ft. Pull the knob out after setting up the altitude (left click) to arm the autopilot altitude mode.
40. Set SPD/MACH knob to an airspeed of V_2+10 kts. V2 being 148 kts, the speed setting will be 158 kts.
41. The green takeoff trim reference was already set based on CG and Flap setting. Use either the LONG TRIM lever or the Stabilizer Pitch Trim on your yoke to match the white trim indicator with the green takeoff trim reference indicator. The Takeoff Stabilizer Trim setting should be set to 0.7.

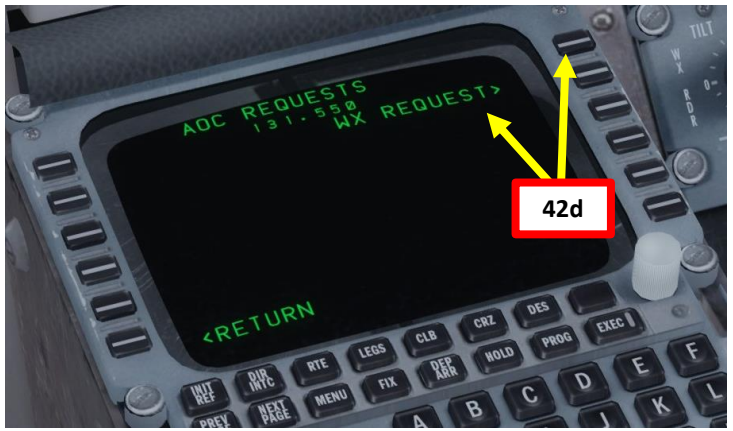




ALTIMETER SETTING

42. **OPTIONAL**: If you have a weather add-on such as Active Sky, you can get a direct weather report from the ACARS (Aircraft Communication Addressing and Reporting System) page of your AFMC to get the altimeter setting.
    a) Click the MENU button on the MCDU
    b) Press the LSK next to ACARS
    c) Select AOC REQUESTS
    d) Select WX REQUESTS
    e) Select SEND
    f) Wait a few seconds for the Weather Report to appear for both KSAN and KPHX
    g) The altimeter setting for KSAN is 30.02 inches of Hg
    h) The altimeter setting for KPHX is 29.92 inches of Hg

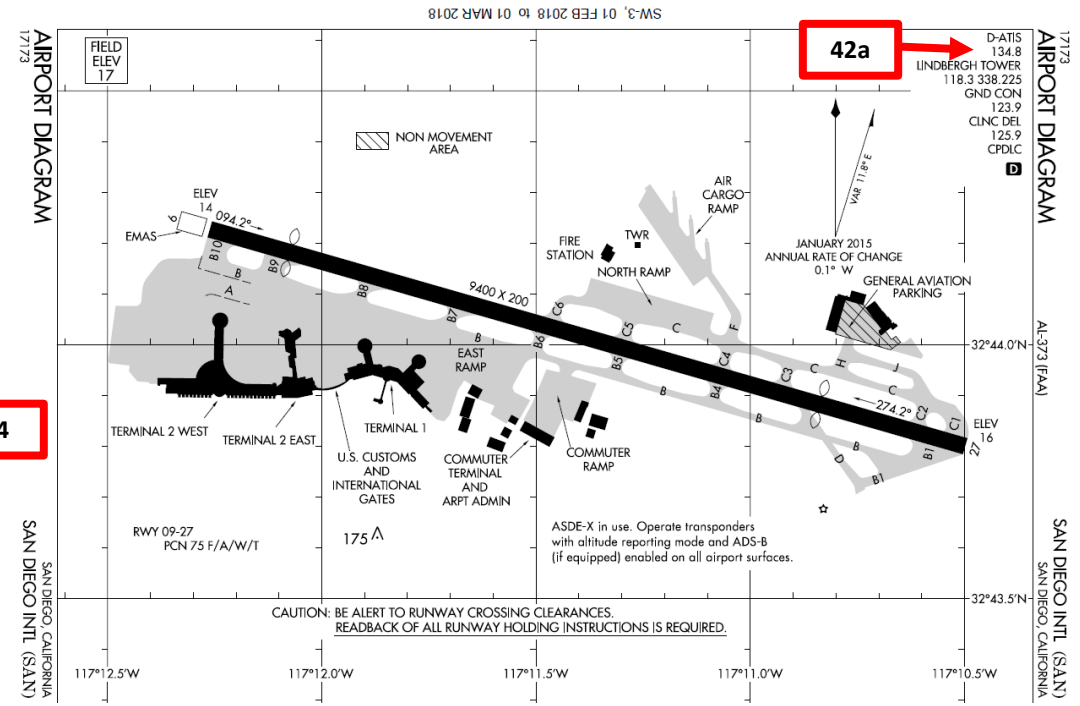


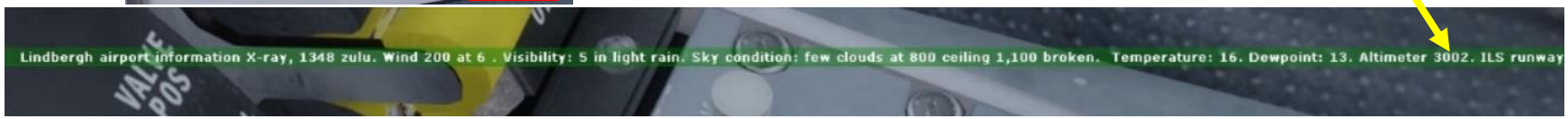


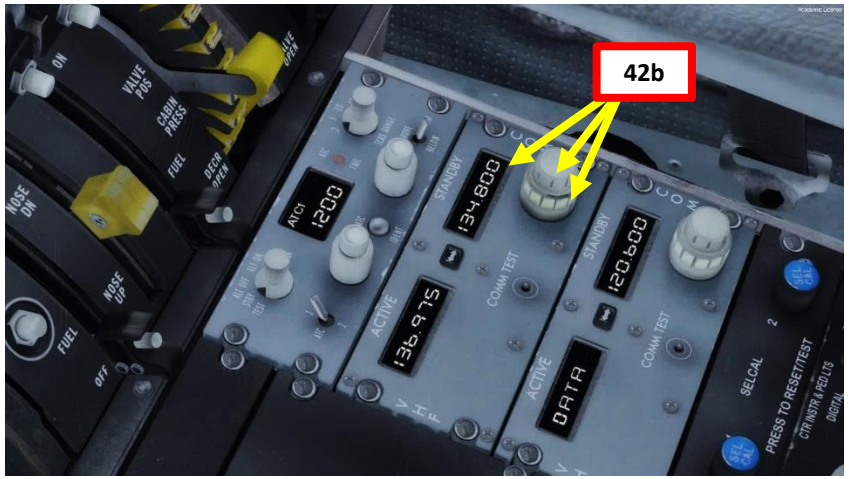
If no weather add-on is installed, you will not be able to receive a weather report. In that case, you will have to use the method explained in the next page.

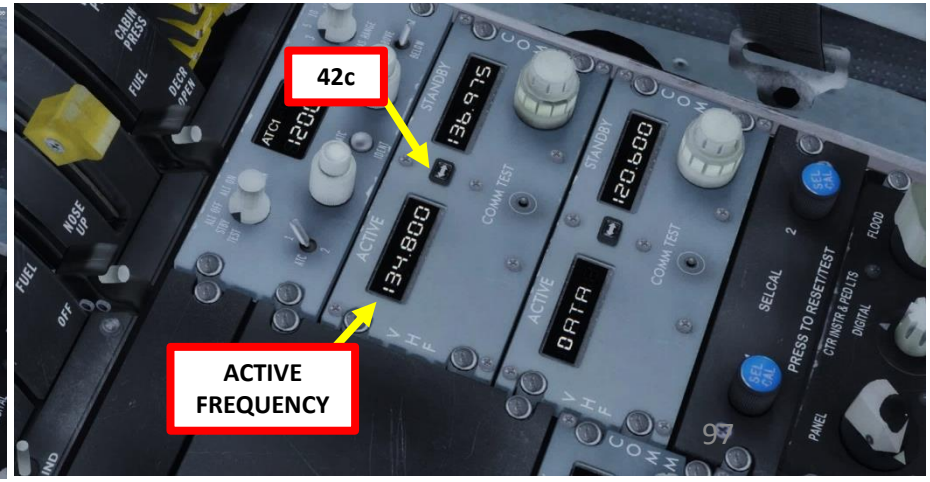
ALTIMETER SETTING

42. If you have no weather add-on installed, you can consult the KSAN ATIS system via the radio to get the altimeter setting.
    a) Consult the KSAN chart and find the San Diego ATIS Frequency (134.800).
    b) Set VHF-1 STANDBY radio frequency ATIS frequency (134.800)
    c) Click on the Transfer button to set the ATIS frequency to the ACTIVE frequency.
    d) You should receive the ATIS automated report on the radio for Lindbergh Field. The reported altimeter setting is 30.02 inches of Hg.
    e) You can click on the Transfer button to set the ATIS frequency back to the STANDBY frequency once you have the information you need.
43. Set altimeter setting to 3002 (30.02 inches of mercury) by rotating the altimeter knob.
44. Left click and hold the ADI (Attitude Director Indicator) until it is fully uncaged and level.



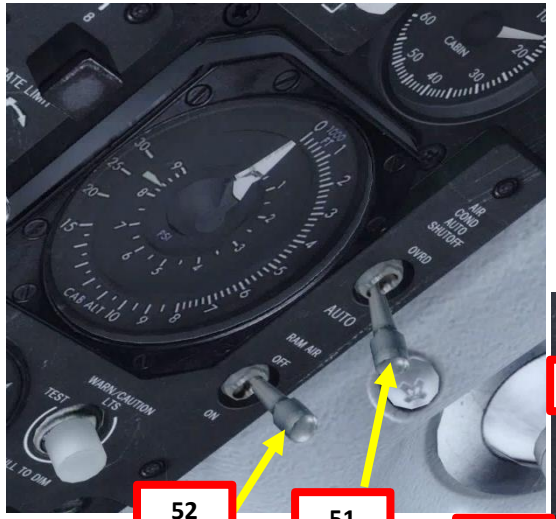


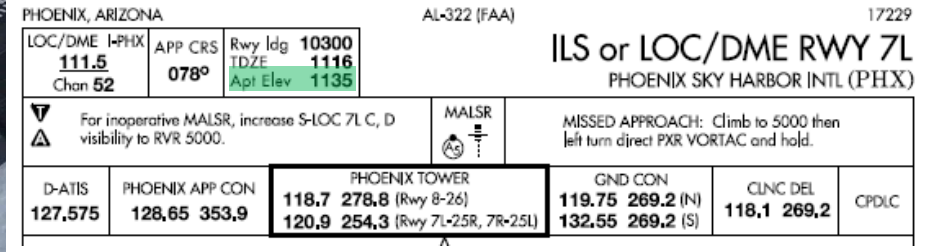




CABIN PRESSURE

43. Set CKPT TEMP selector to AUTO
44. Set CABIN TEMP selector to AUTO
45. Set AIR COND switches to OFF
46. Set Cabin Pressure Pressure switch to PRIMARY
47. Press the TRANSFER LOCKOUT button
48. Set Landing Altitude to the Phoenix Airport elevation (1135 ft)
49. Leave the Landing Barometric Pressure setting as is for now. We will consult the Phoenix ATIS to get a more accurate setting once we are on approach.
50. Set Radio Rack to FAN
51. Set Air Cond Auto-Shutoff – AUTO
52. Set Ram Air – As Required (OFF)




PHOENIX, ARIZONA — AL-322 (FAA) — 17229

ILS or LOC/DME RWY 7L
PHOENIX SKY HARBOR INTL (PHX)

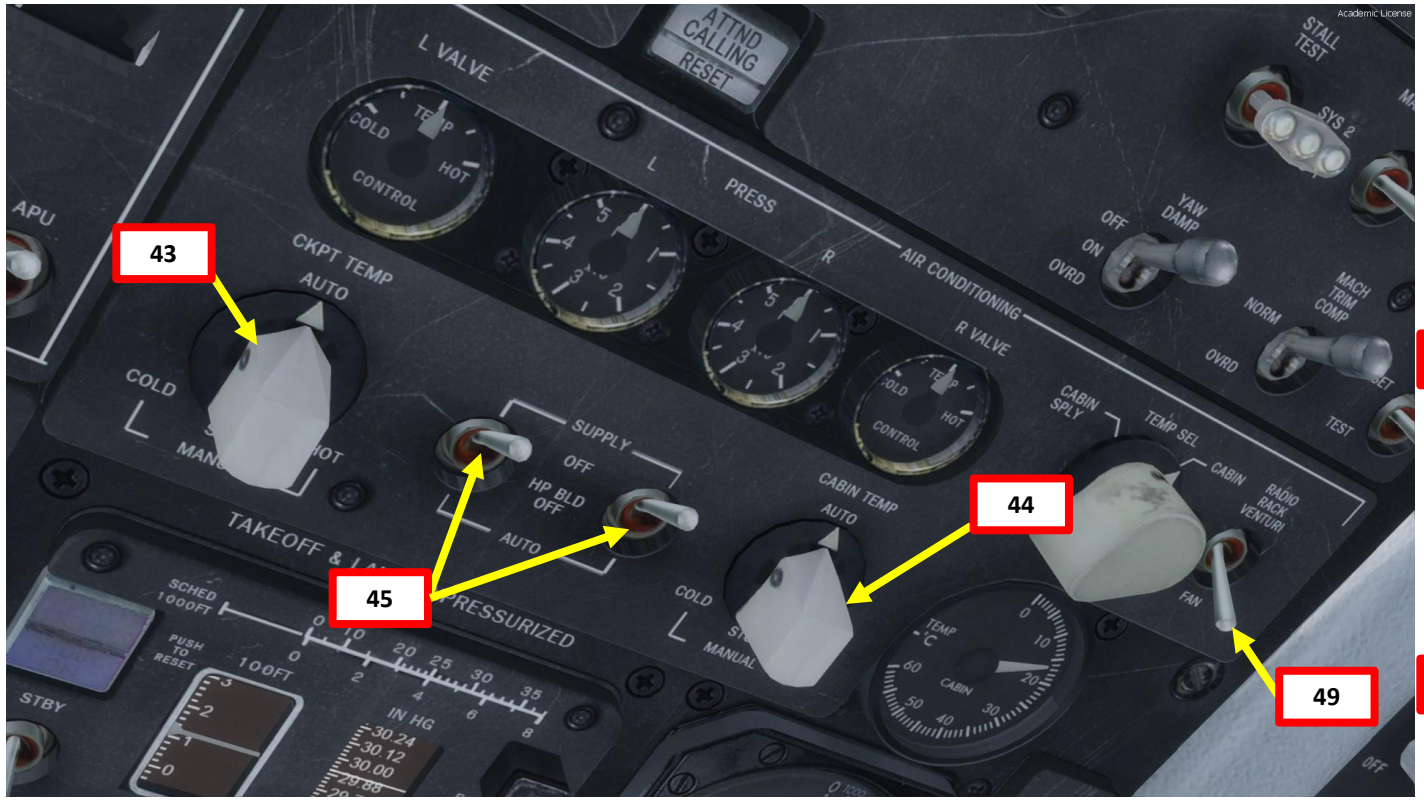
LOC/DME I-PHX	APP CRS	Rwy Idg / TDZE / Apt Elev
111.5 Chan 52	078°	10300 / 1116 / 1135

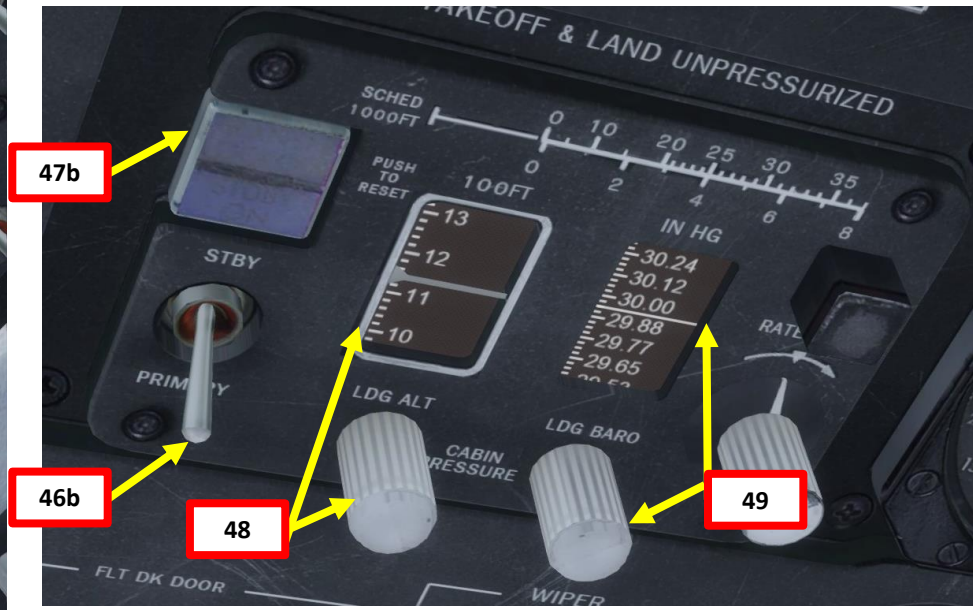
For inoperative MALSR, increase S-LOC 7L C, D visibility to RVR 5000.

MALSR

MISSED APPROACH: Climb to 5000 then left turn direct PXR VORTAC and hold.

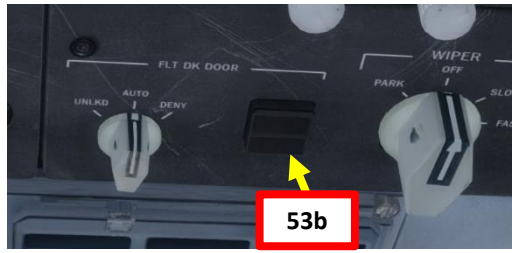
D-ATIS	PHOENIX APP CON	PHOENIX TOWER	GND CON	CLNC DEL	CPDLC
127.575	128.65 353.9	118.7 278.8 (Rwy 8-26) 120.9 254.3 (Rwy 7L-25R, 7R-25L)	119.75 269.2 (N) 132.55 269.2 (S)	118.1 269.2	

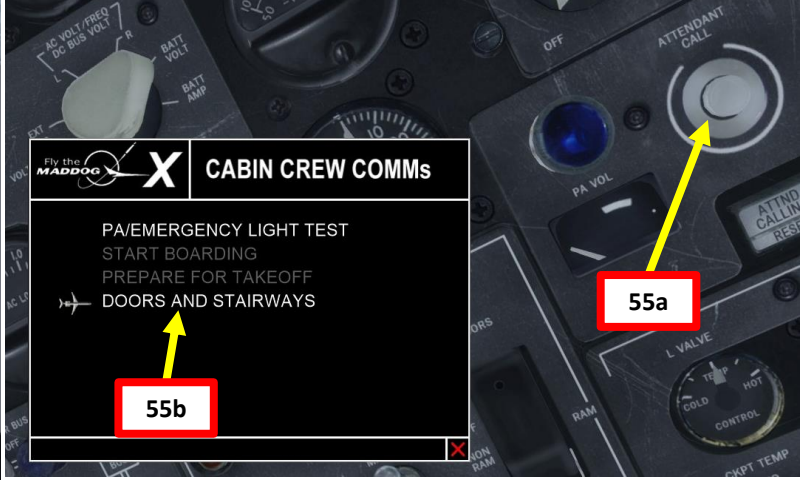


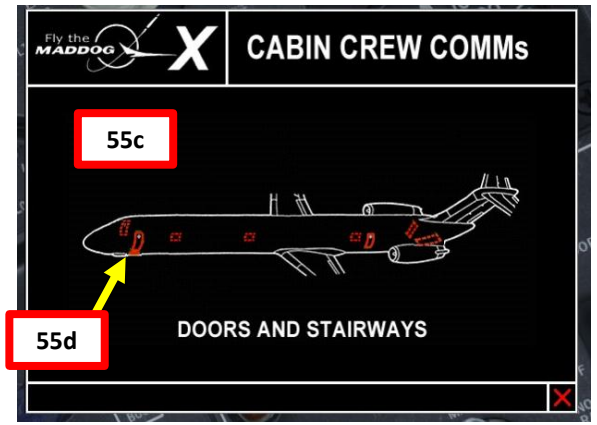


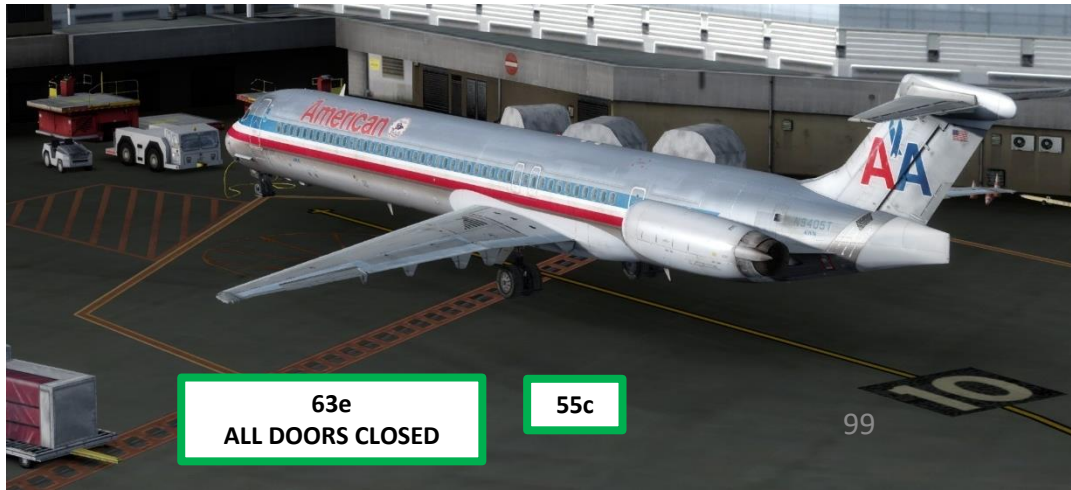
DOORS

53. Set Flight Deck Door Switch to DENY, then to AUTO to lock it. The AUTO UNLK caution should extinguish.
54. Set Auxiliary Hydraulic Pump switch – ON (UP)
    - Note: the aft door is hydraulically powered
55. Close any door that is still open
    a) Right click on the ATTENDANT CALL button
    b) Select DOORS AND STAIRWAYS menu
    c) Opened doors will be displayed in red
    d) Click on red icons to close their respective doors
    e) When closed, all door icons should be in green



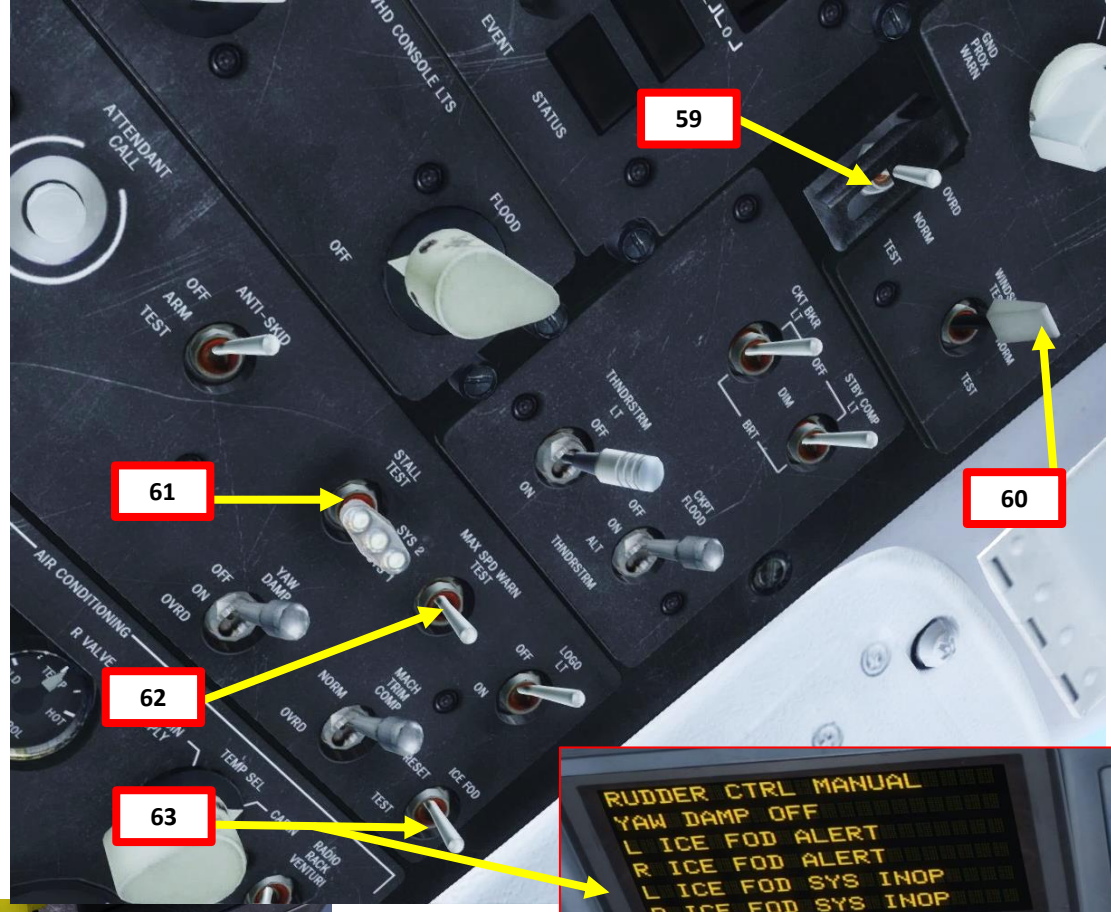


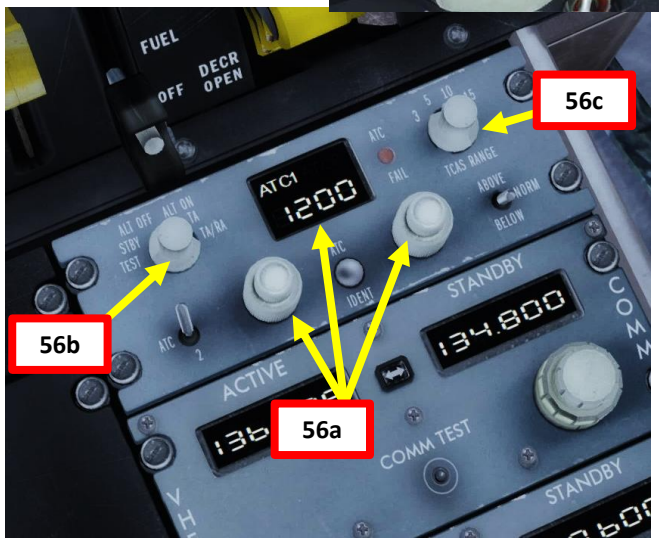




TCAS, WEATHER RADAR & BUILT-IN TESTS

56. Power up the TCAS (Traffic & Collision Avoidance System)
    a) Set TCAS frequency to 1200 (or as specified by ATC)
    b) Set TCAS Mode to TA/RA
    c) Set TCAS range to 5 nm
57. Power up the Weather Radar by pressing the PWR button
58. Press and hold the TEST switches for primary displays. Horrible, horrible noises should be audible until you release the switch.
59. Set the Ground Proximity Warning switch to TEST, and verify that you hear « Glide Slope – Pull Up – Terrain! ». Set switch back to NORM.
60. Set the Windshear Protection System switch to TEST, and verify that you hear the « Head wind, shear! » warning. Set switch back to NORM.
61. Set the Stall Warning System Test switch to SYS1/SYS2, and verify that you hear the « Stall! » warning. Set switch back to NORM.
62. Set the Max Speed Warning System switch to TEST, and verify that you hear the « Overspeed! » warning. Set switch back to NORM.
63. Set the Ice FOD (Foreign Object Damage) Detection System switch to TEST, and verify that you see ICE FOD warnings. Set switch back to RESET.





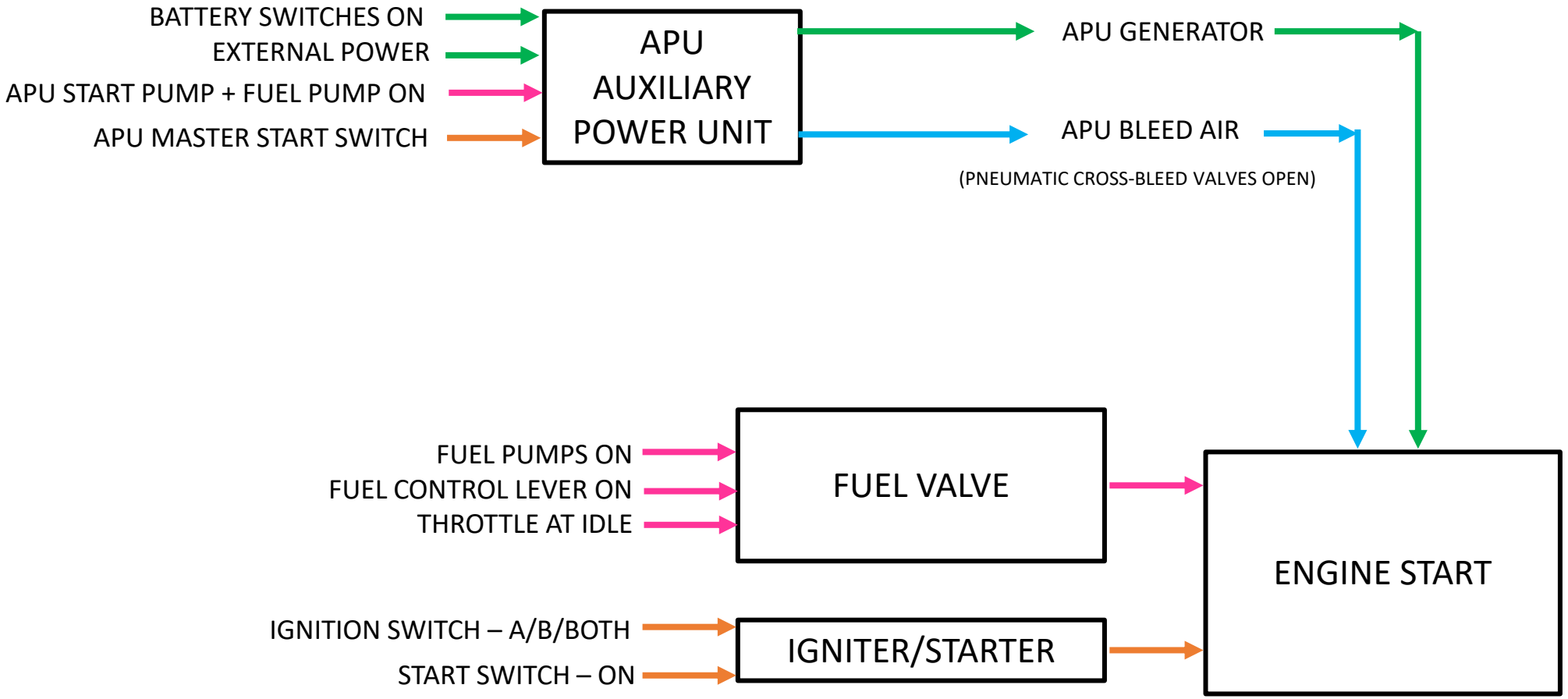
ENGINE START-UP

- APU AUXILIARY POWER UNIT
  - → APU GENERATOR
  - → APU BLEED AIR
- GROUND POWER CART → EXTERNAL POWER
- AIR PRESSURE CART → EXTERNAL AIR
- ENGINE (RUNNING)
  - → ENGINE GENERATOR (ENGINE CROSS-START)
  - → ENGINE BLEED (ENGINE CROSS-START)
- FUEL PUMPS → FUEL PUMPS ON
- THROTTLE POSITION → THROTTLE AT IDLE
- FUEL CONTROL LEVER POSITION → FUEL CONTROL LEVER ON (FWD)
- IGNITION SWITCH → IGNITION SWITCH – CHANNEL A/CHANNEL B/BOTH
- STARTER SWITCH → STARTER SWITCH – ON

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

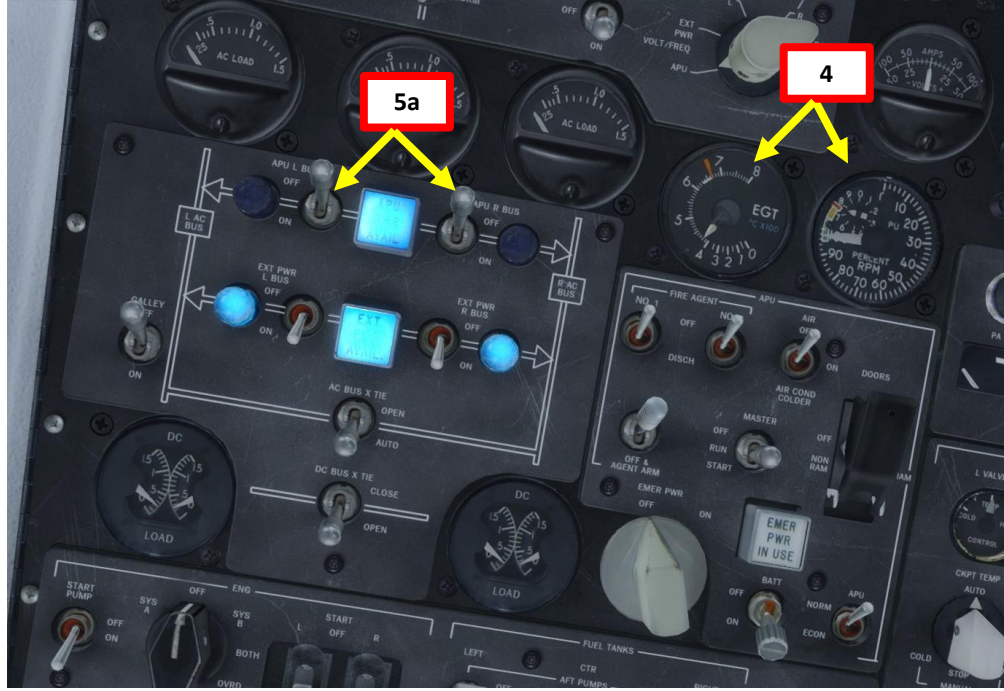
ENGINE START-UP

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



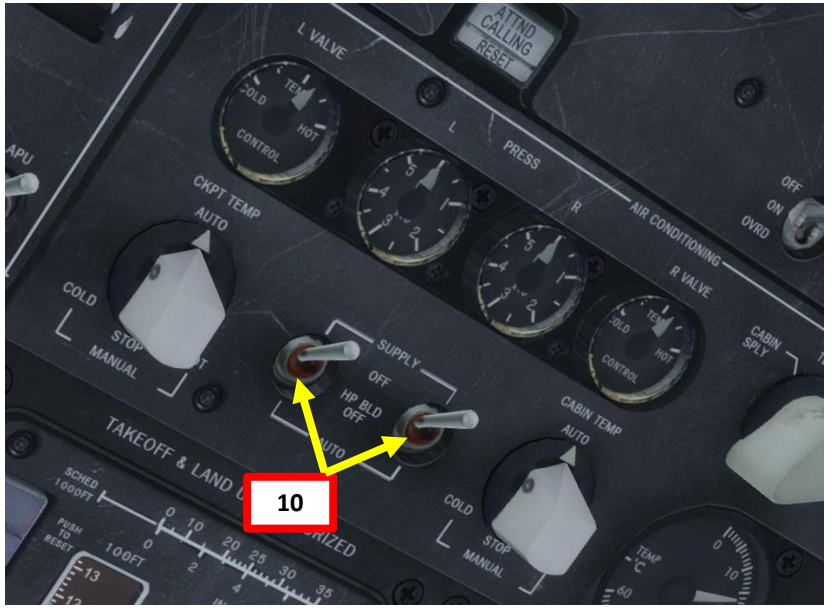
APU (AUXILIARY POWER UNIT) START

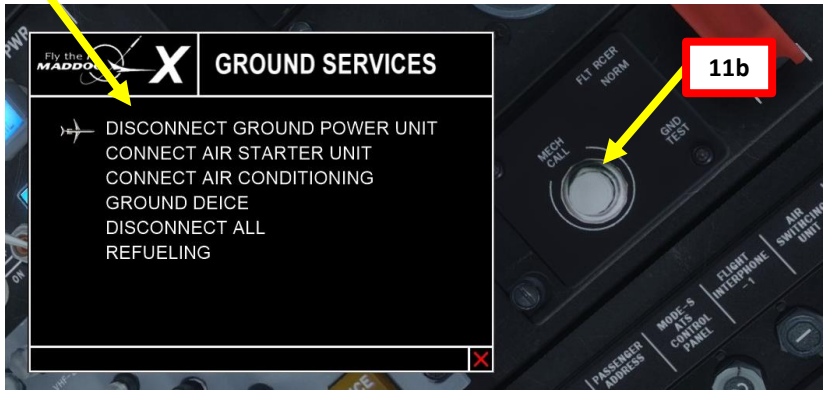
1. Set Right Aft Fuel Pump Switch – ON (DOWN)
2. Set Start Pump Switch – ON (DOWN)
3. Set APU Master Switch to START, then to RUN. APU start sequence will begin automatically.
4. Monitor APU RPM and EGT during start sequence to make sure no overspeed or overheating occurs.
5. Once APU start sequence is complete (RPM stabilized at 100 % and EGT near 420 deg C), set APU L GEN and APU R GEN switches to ON (DOWN)
6. Set EXT PWR L GEN and EXT PWR R GEN switches OFF (UP)
7. Set Galley Power switch – ON (DOWN)

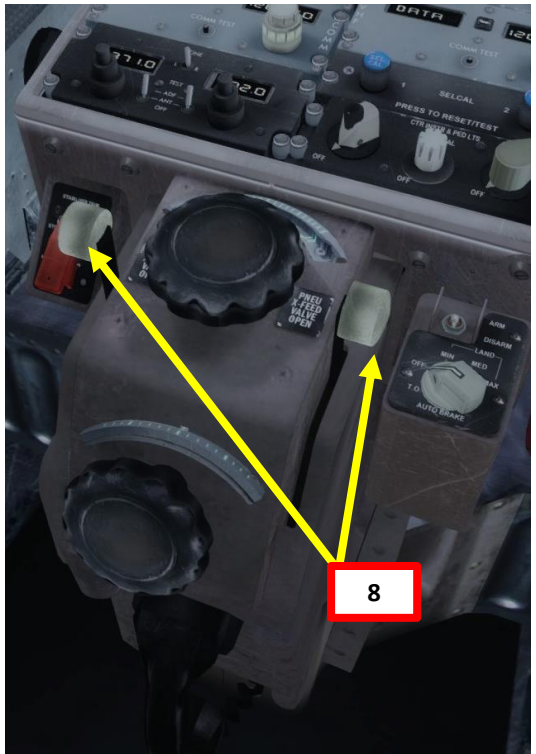


APU (AUXILIARY POWER UNIT) START

8. Set both left and right Pneumatic Cross-Feed Valve Levers - OPEN (UP)
9. Set APU Air switch – ON (MIDDLE position)
10. Set Left and Right Air Conditioning Supply switches – OFF This is to make sure maximum APU bleed air pressure is available for engine start since the engine has a pneumatic starter.
11. Set EXT PWR L BUS and EXT PWR R BUS switches to OFF (UP). Then, right click on the MECH CALL button to contact ground crew and select "DISCONNECT GROUND POWER UNIT" to disconnect ground power. The EXT PWR AVAIL light should extinguish.



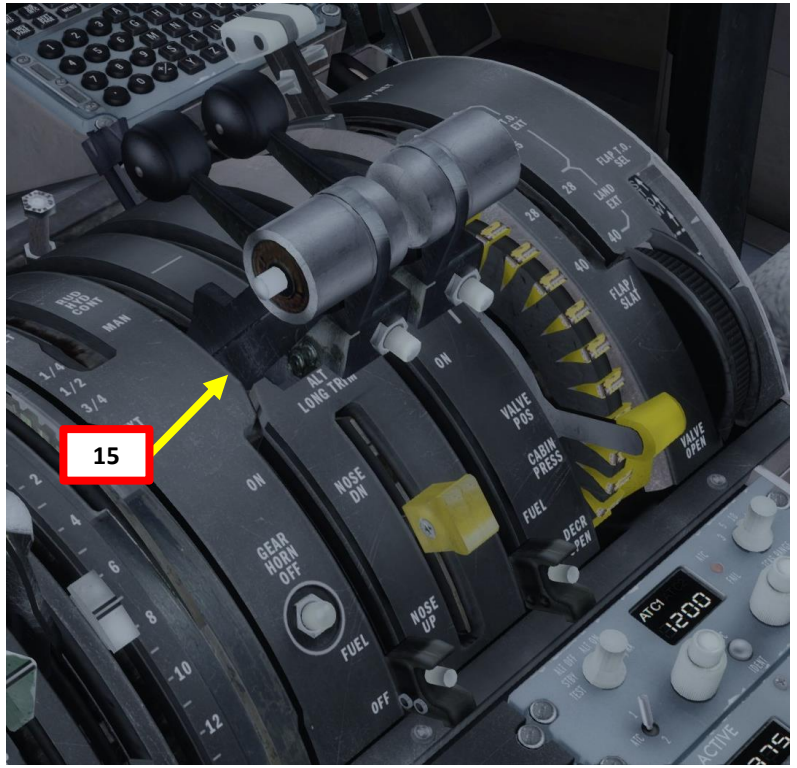


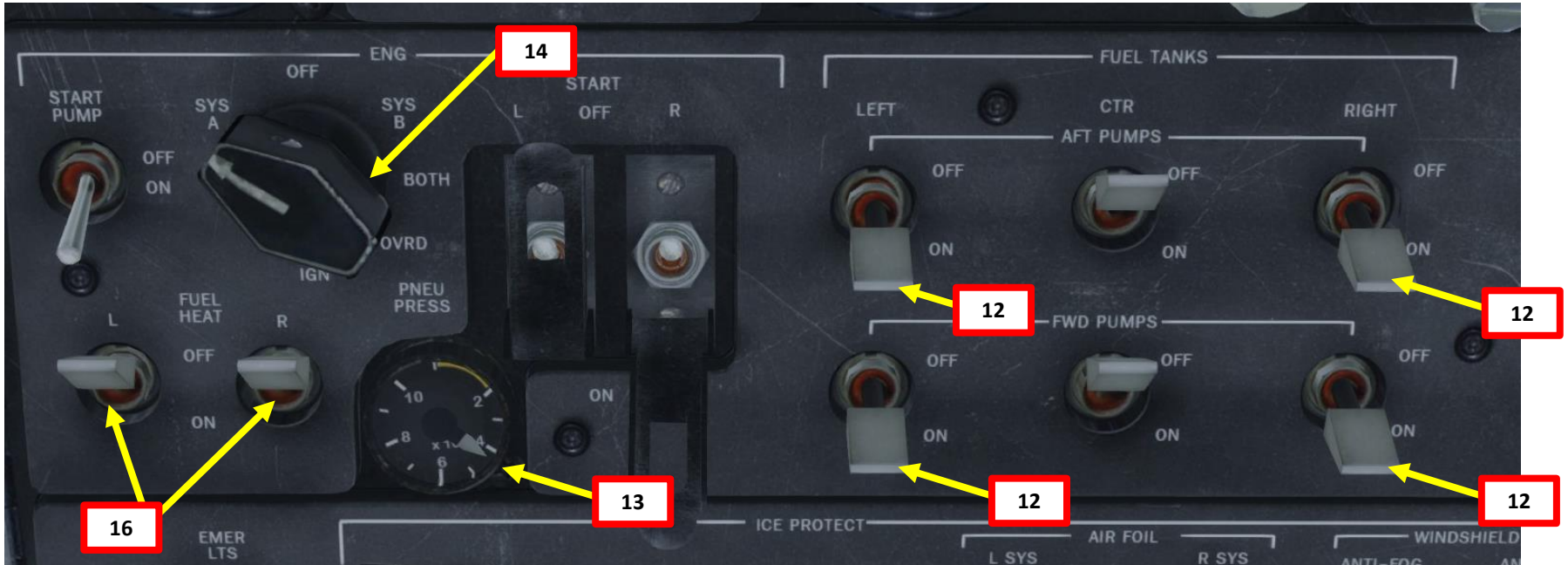


ENGINE START-UP

12. Set LEFT AFT, LEFT FWD, RIGHT AFT and RIGHT FWD Fuel Pump switches ON (DOWN). Center pumps can be left to OFF since we don't have fuel loaded in those tanks.
13. Verify that you have at least 36 psi of air pressure available. Failed starts can occur if you leave the AIR COND switches ON for instance.
14. Set Ignition switch to either SYS A or SYS B.
15. Set throttle to IDLE (fully aft)
16. For winter conditions (if fuel temperature is lower than 0 deg C), set both Left and Right FUEL HEAT switches to ON. The switches will automatically reset to OFF. These switches control a bleed air shutoff valve and the valve will automatically close after 1 min.

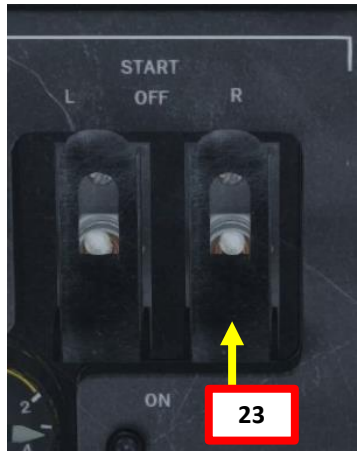
    The MD-82 has a real-life problem with water condensation in the fuel tanks. Water condensation contaminates jet fuel, which then freezes and blocks the fuel filters during engine start-up.

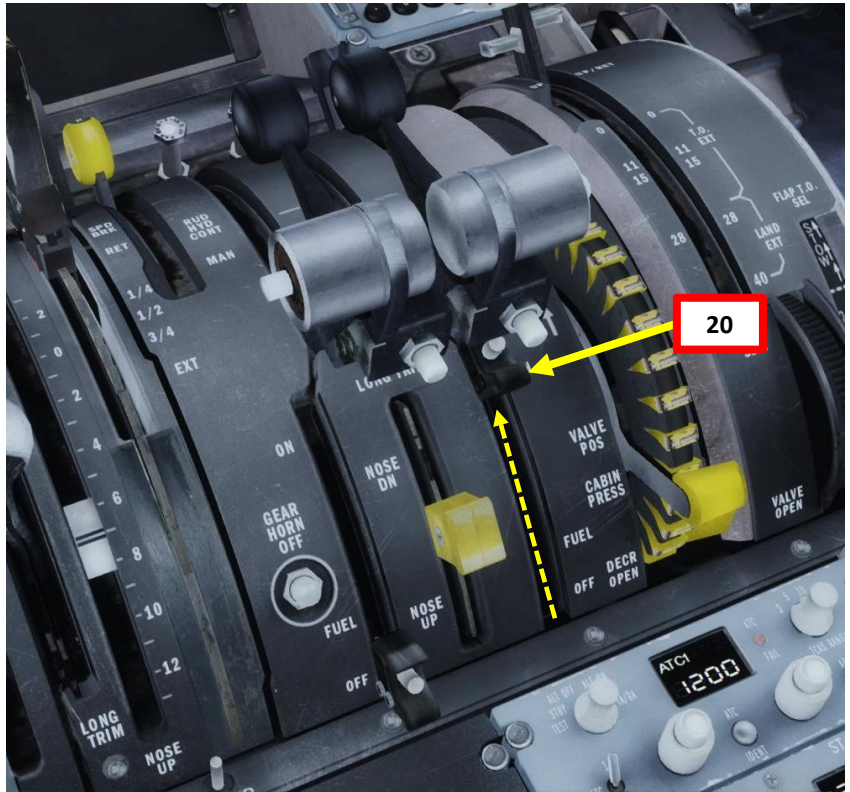


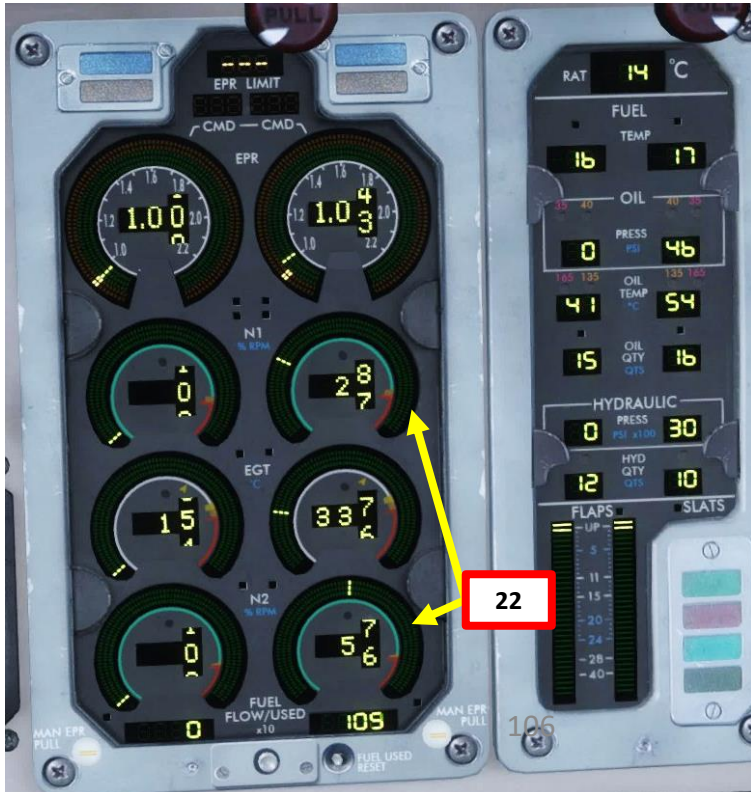


ENGINE START-UP

17. Flip right starter switch safety guard and hold the starter switch ON (DOWN)
18. Confirm that the R START VALVE OPEN caution on the warning panel
19. Wait for N2 to rise up to approx. 20 %
20. Set Right Fuel Lever ON (FWD)
21. At 40 % N2, right engine generator will kick in
22. Wait until right engine parameters stabilize to approx. 25 % N1 and 55 % N2.
23. Set right starter switch OFF and put back the safety guard.

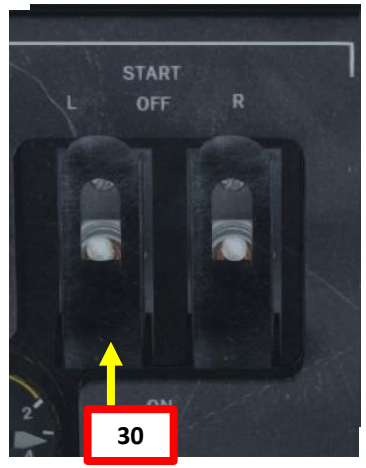


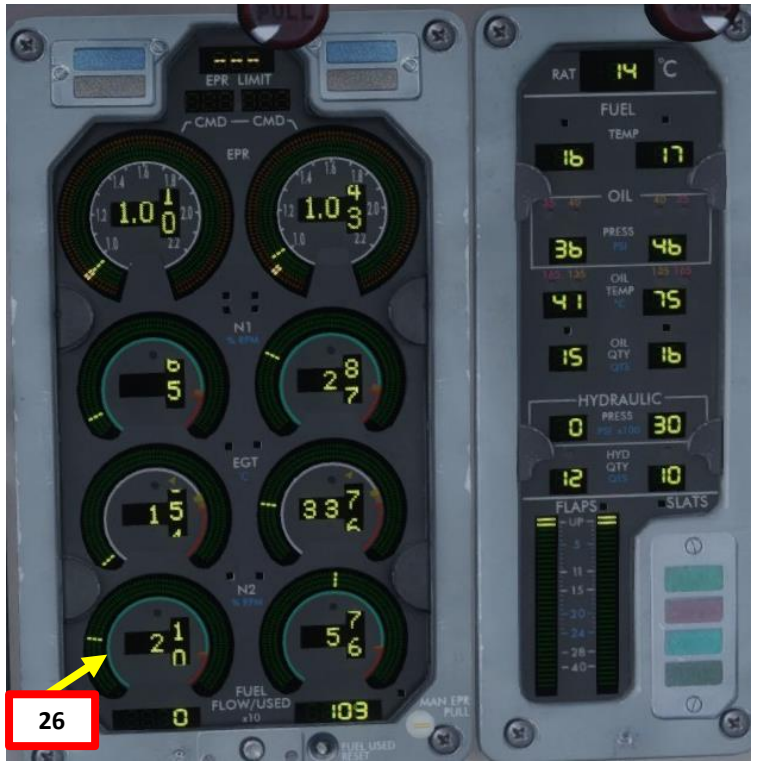


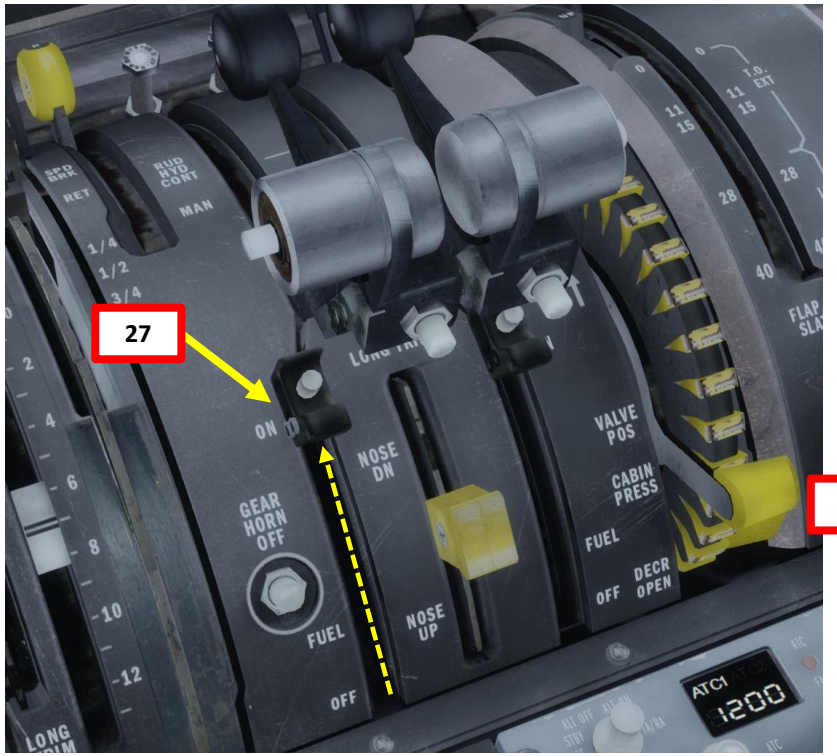


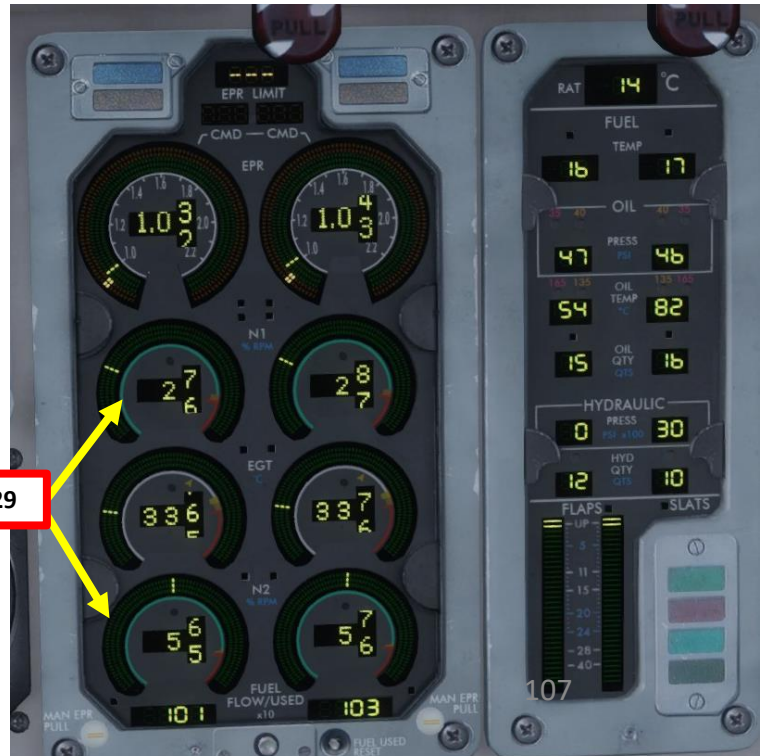
ENGINE START-UP

24. Flip left starter switch safety guard and hold the starter switch ON (DOWN)
25. Confirm that the L START VALVE OPEN caution on the warning panel
26. Wait for N2 to rise up to approx. 20 %
27. Set Left Fuel Lever ON (FWD)
28. At 40 % N2, left engine generator will kick in
29. Wait until left engine parameters stabilize to approx. 25 % N1 and 55 % N2.
30. Set left starter switch OFF and put back the safety guard.



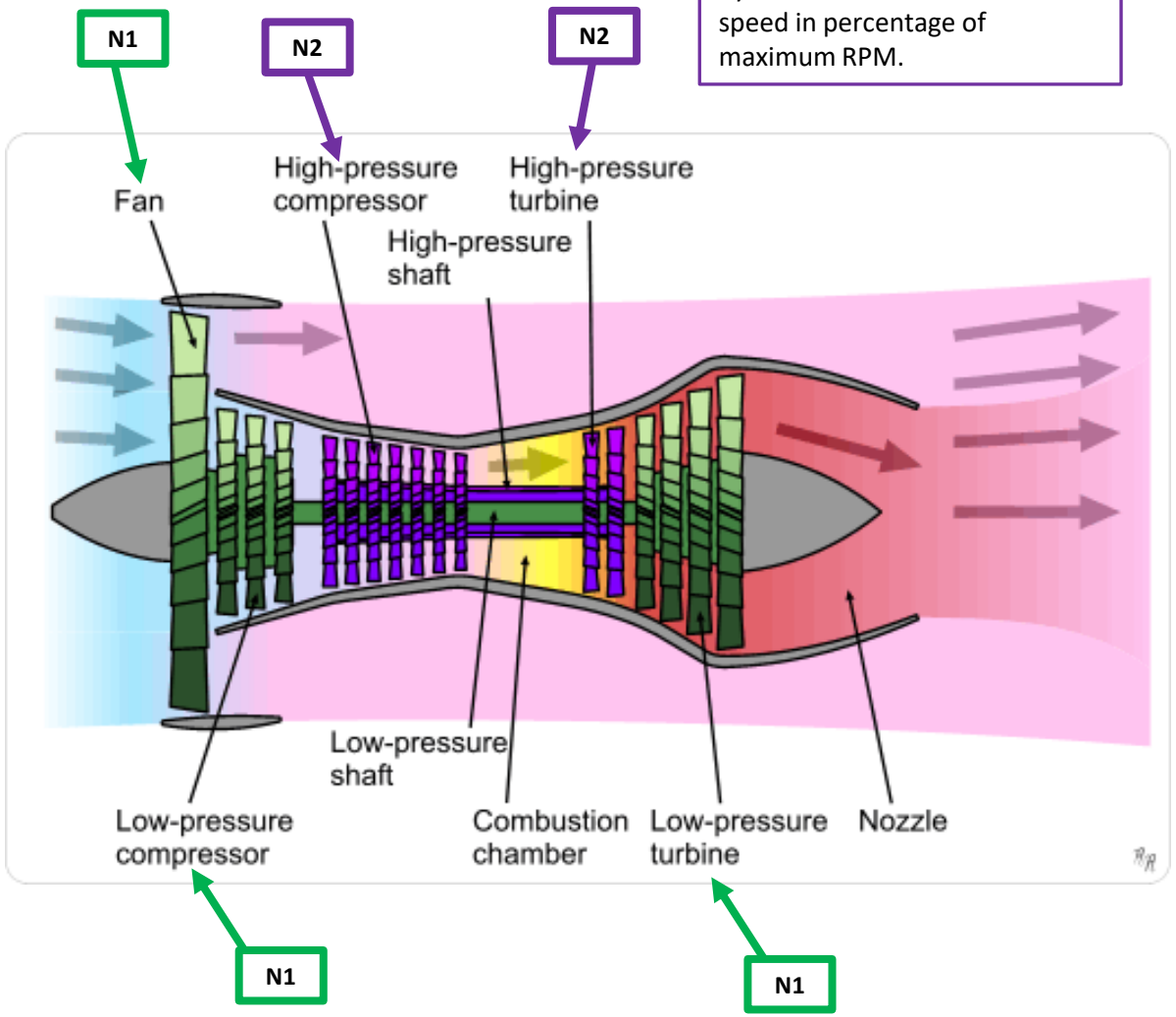


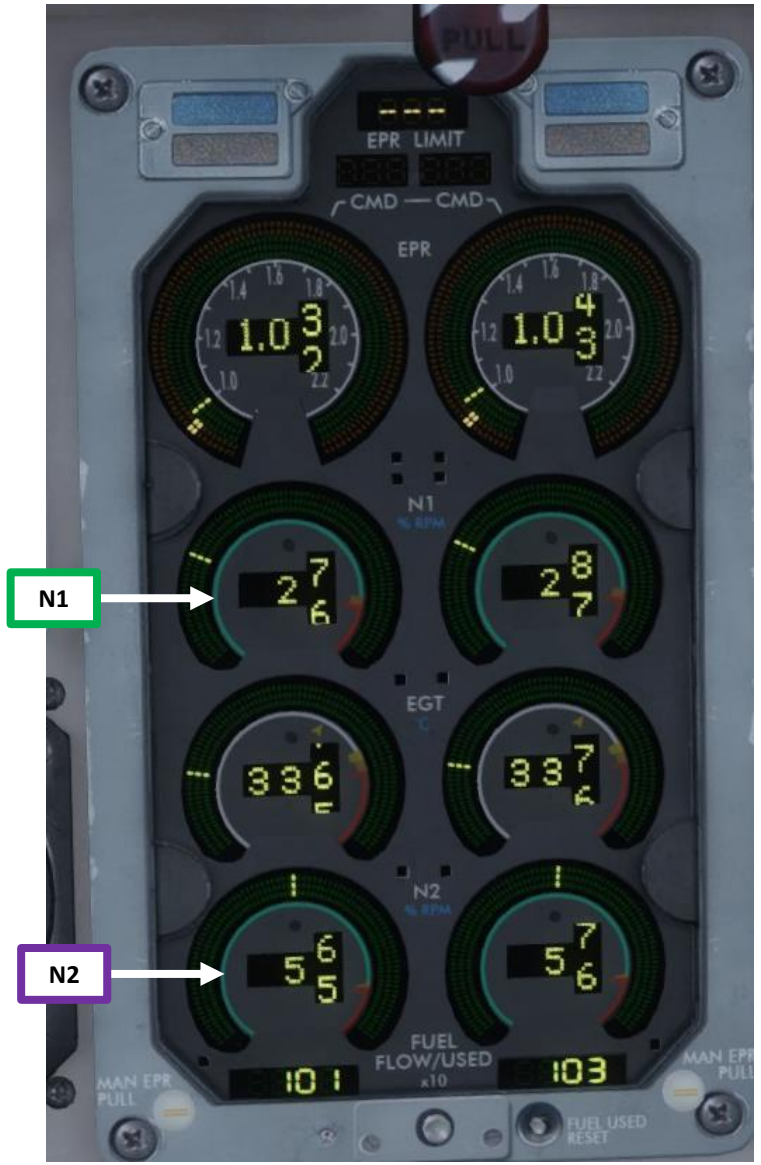




ENGINE START-UP

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

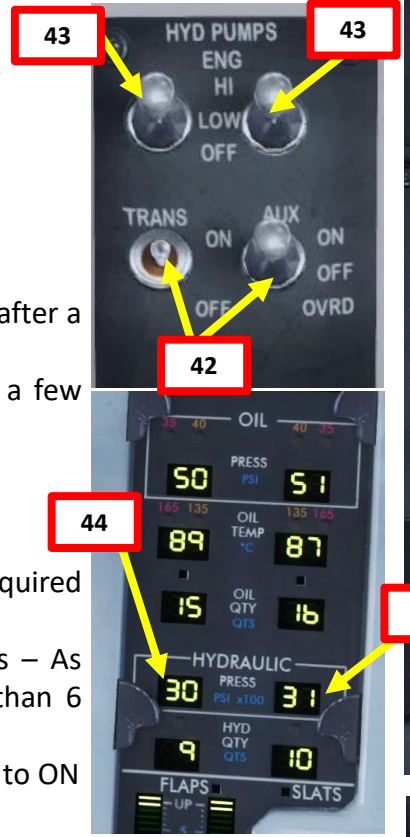


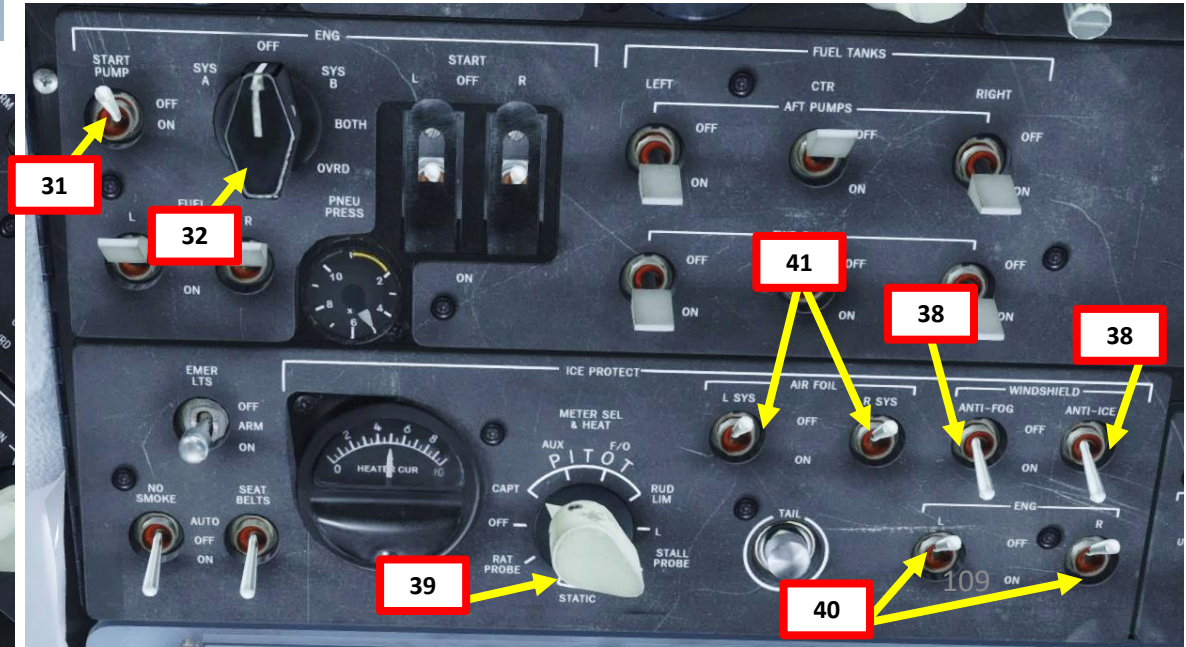


Fan, low-pressure compressor and low-pressure turbine are driven by the same shaft. This is N1 speed in percentage of maximum RPM.

COMPLETE PRE-FLIGHT

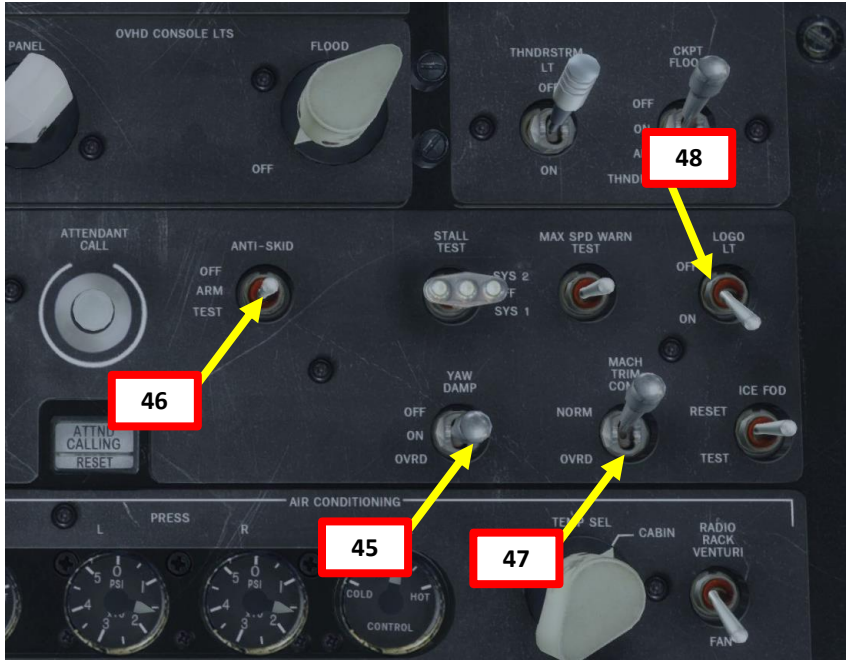
31. Set Start Pump Switch – OFF (UP)
32. Set Ignition switch – OFF
33. Set APU L BUS and APU R BUS switches OFF (UP)
34. Set APU Air switch – OFF (UP)
35. Set APU Master switch – OFF (UP) APU will shut down after a cooldown of 60 sec.
36. Set Left Air Conditioning Supply switch – AUTO (wait a few seconds for air pressure to build up)
37. Set Right Air Conditioning Supply switch – AUTO
38. Set Windshield Anti-Fog & Anti-Ice switches – ON
39. Set Heater Selector to PITOT - CAPT
40. Set Left and Right Engine Anti-Ice switches – As Required (OFF since outside temperature is greater than 6 deg C)
41. Set Air Foil L SYS and Air Foil R SYS Anti-Ice switches – As Required (OFF since outside temperature is greater than 6 deg C)
42. Verify that AUX & Transfer Hydraulic Pump switch is set to ON
43. Set both engine-driven Hydraulic Pump switches – HI
44. Verify that hydraulic pressure is approx. 3000 psi

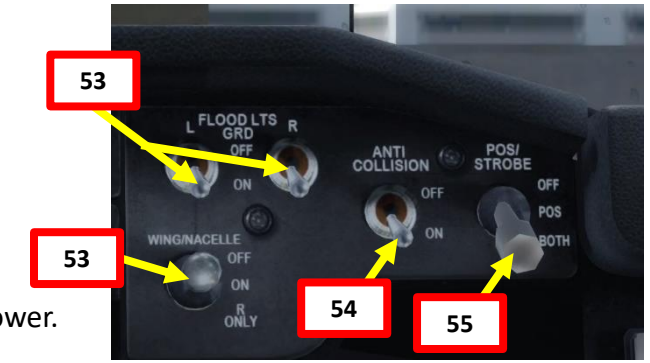


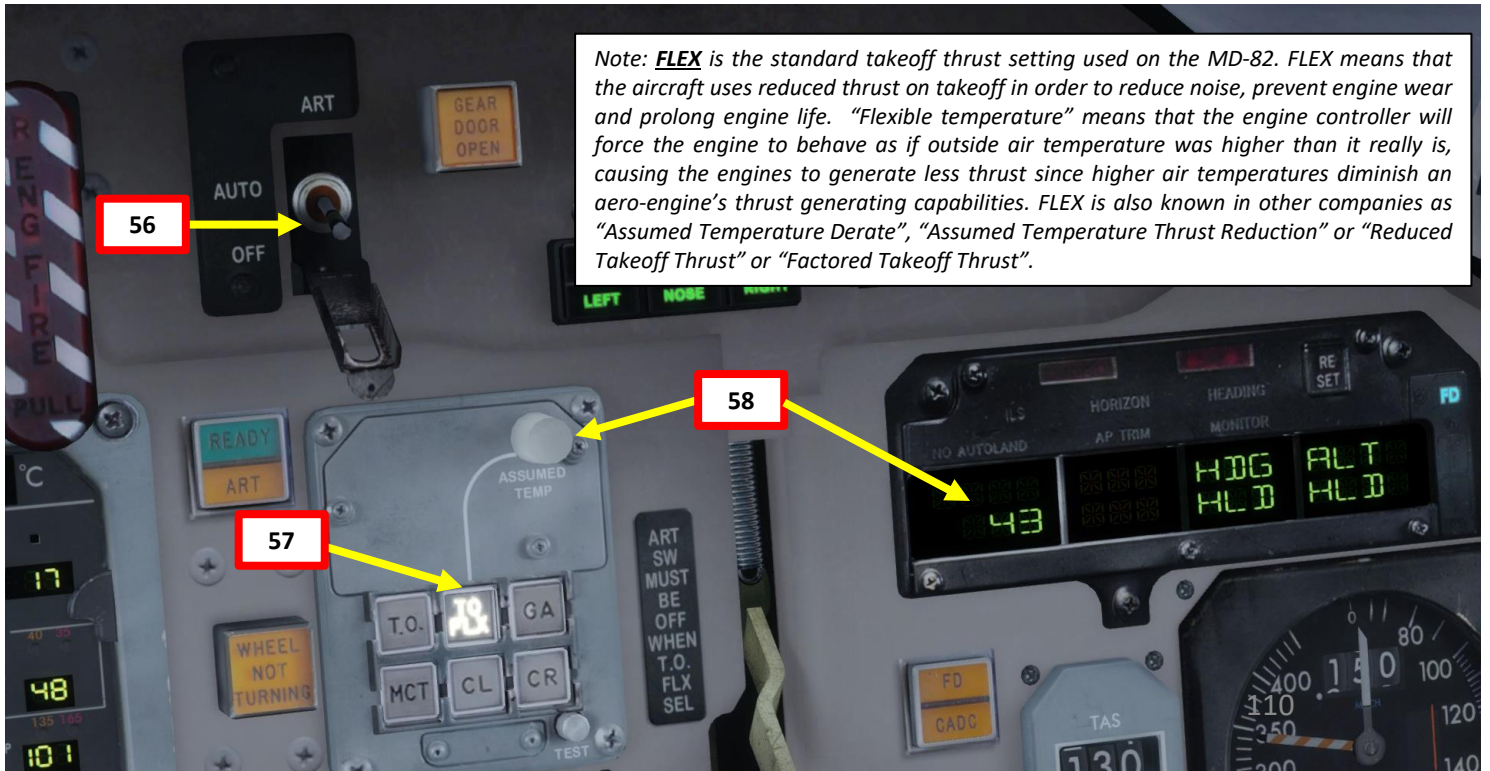


COMPLETE PRE-FLIGHT

45. Set Yaw Damper switch – ON
46. Set Anti-Skid switch – ARM
47. Set Mach Trim Compensator switch – NORM
48. Set Logo Light switch – ON
49. Set Emergency Lights Switch – ARM
50. Set NO SMOKING switch – ON
51. Set SEAT BELTS switch – ON
52. Set Nose Lights to BRT and Wing Landing Lights to EXT ON
53. Set Left & Right Ground Flood Light switches – ON
54. Set Anti-Collision Lights switch – ON
55. Set POS/STROBE light switch – BOTH
56. Set ART (Automatic Reserve Thrust) switch –
    OFF if using FLEX takeoff power /AUTO if using full takeoff power.
57. Press the TO FLX thrust rating mode to arm it
58. Set assumed temperature to 43 degrees (ballpark figure for reduced thrust for noise abatement)





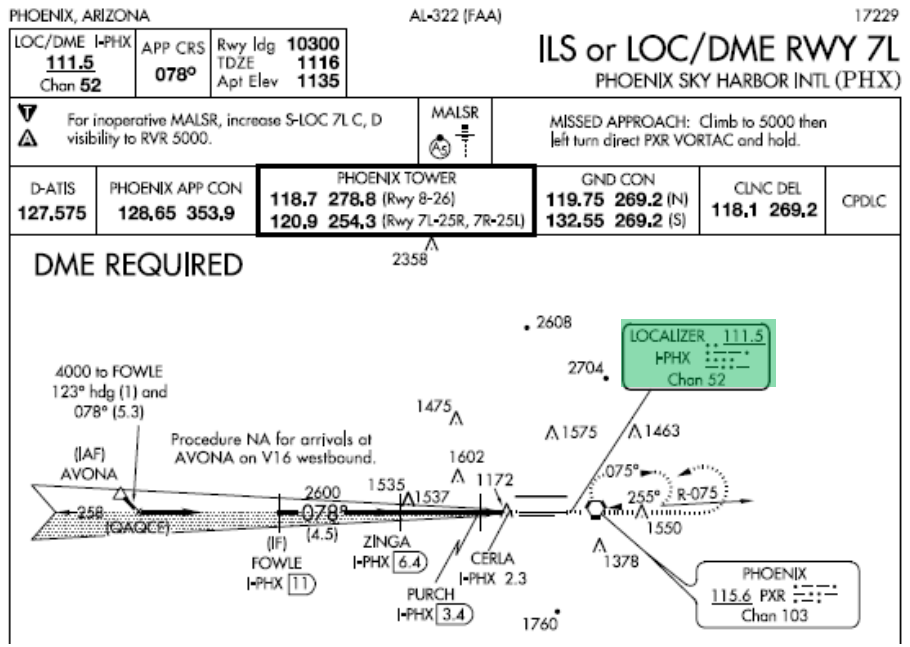


*Note: **FLEX** is the standard takeoff thrust setting used on the MD-82. FLEX means that the aircraft uses reduced thrust on takeoff in order to reduce noise, prevent engine wear and prolong engine life. "Flexible temperature" means that the engine controller will force the engine to behave as if outside air temperature was higher than it really is, causing the engines to generate less thrust since higher air temperatures diminish an aero-engine's thrust generating capabilities. FLEX is also known in other companies as "Assumed Temperature Derate", "Assumed Temperature Thrust Reduction" or "Reduced Takeoff Thrust" or "Factored Takeoff Thrust".*

COMPLETE PRE-FLIGHT

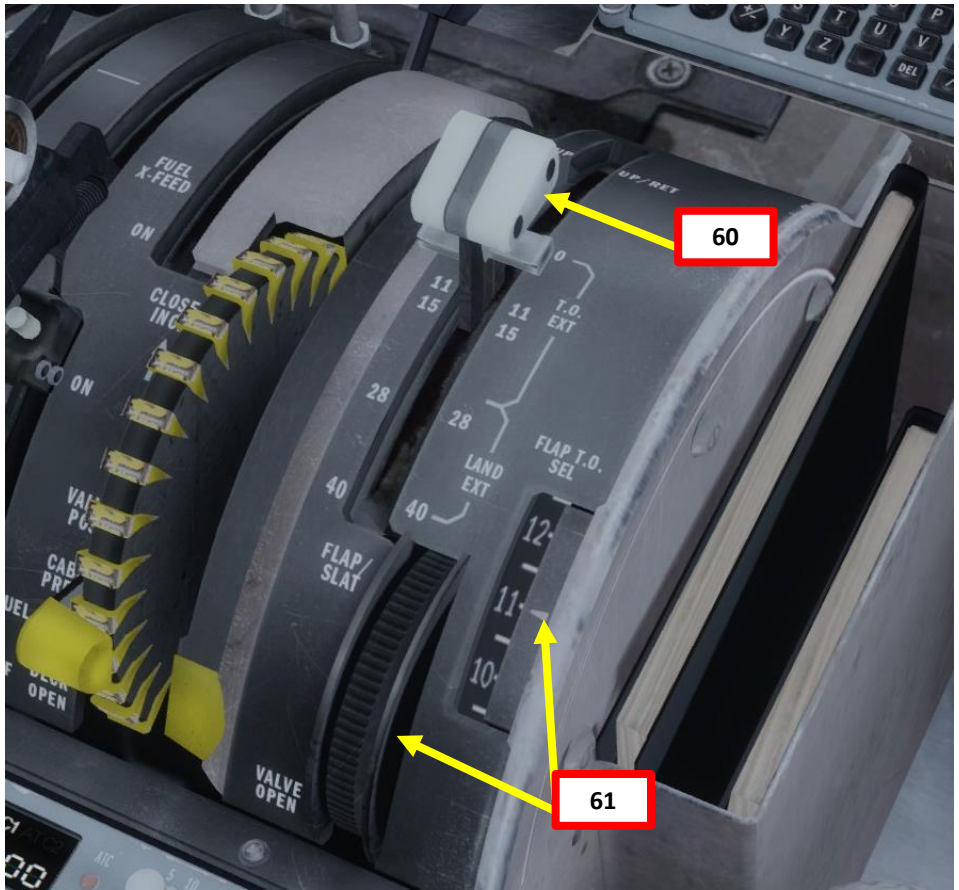
59. Perform AUTOLAND system test (if you intend to use the Autoland system on landing), make sure to perform the Pre-flight Autoland Test.
    a) Make sure that both FD (Flight Director) switches are ON (UP)
    b) Set both VHF NAV knobs to valid ILS or VOR frequencies: we will take the PHX localizer frequency 111.5 and set on both VHF NAV knobs.
    c) Press the AUTO LAND button to start the pre-flight test
    d) FMA will display AUTO LND-PRE-FLT-TEST for the duration of the test
    e) NO AUTOLAND indication will flash for the duration of the test
    f) After approximately 50 seconds, flight mode annunciator goes blank or reverts to previous display and NO AUTOLAND legend light goes out indicating a valid test.

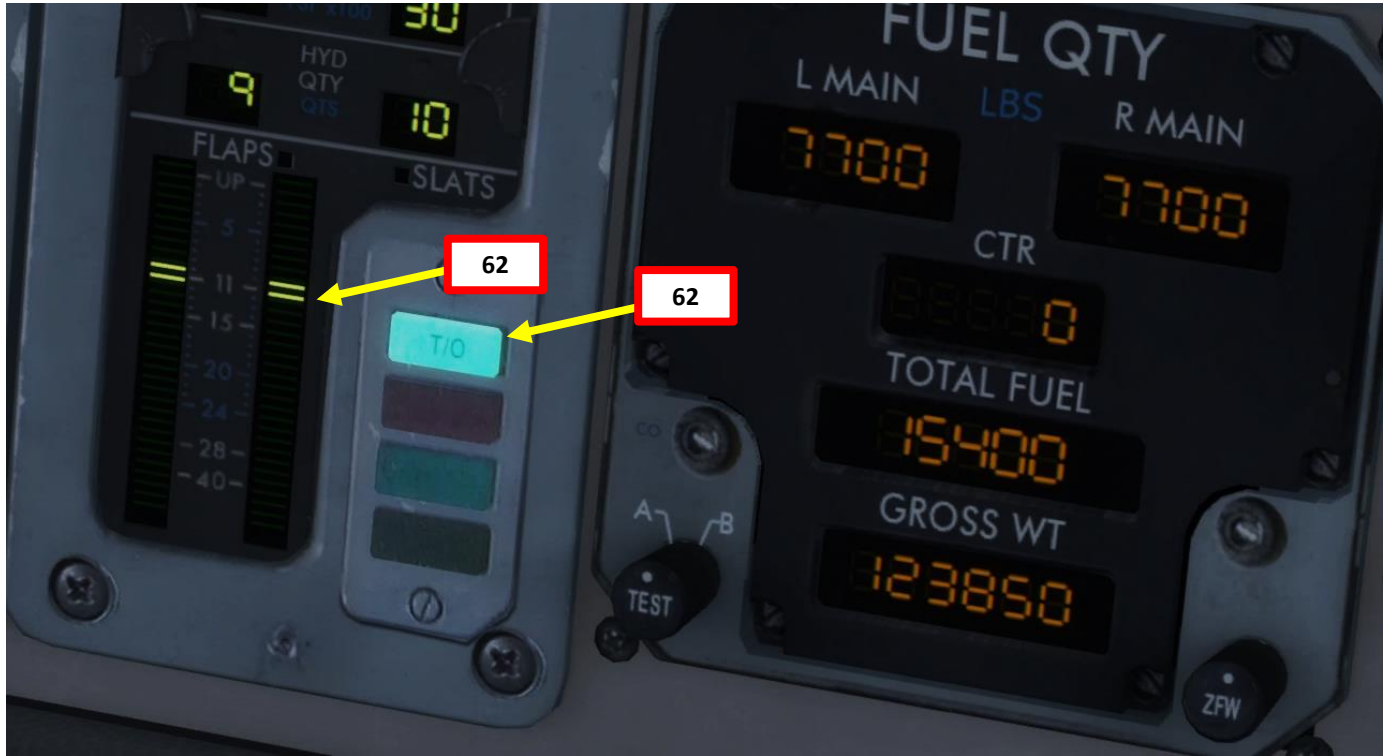
    This is important to do this test if you intend to use the Autoland since the mode will not be immediately active if you press the AUTO LAND button and forgot to make that test. In fact, you may not be able to activate that mode at all.



COMPLETE PRE-FLIGHT

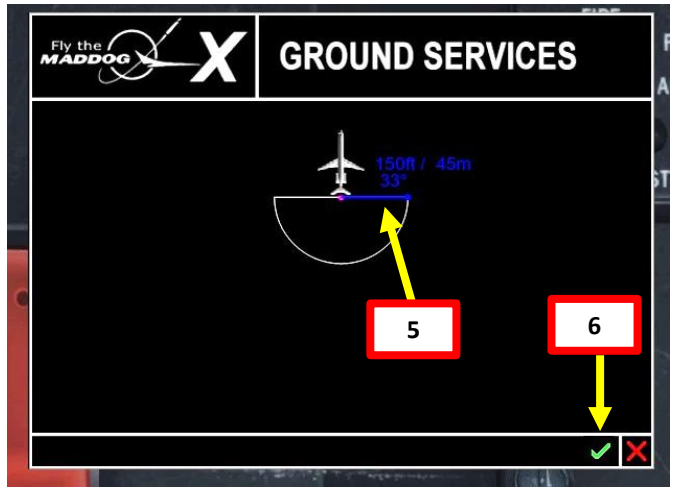
60. Set flaps lever to 11-15 T.O. EXT detent
61. We intend to takeoff with flaps at 11 degrees. Set Flap/Slat wheel to a Flap T.O. SEL indication of 11 deg.
62. Verify that flaps are at 11 deg and that the T/O indication is illuminated.
63. Verify that no error messages are indicated on the overheat EOAP (Electronic Overheat Annunciator Panel)

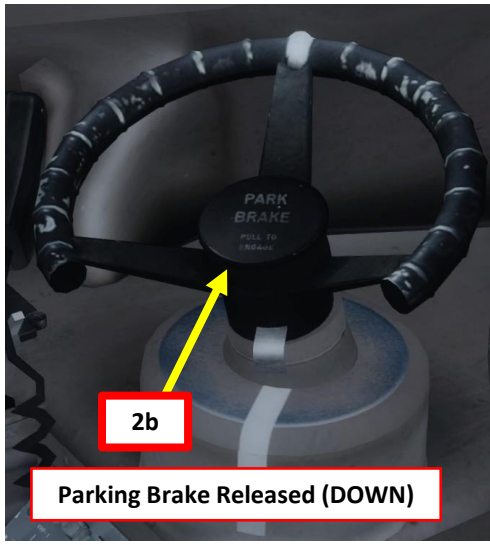




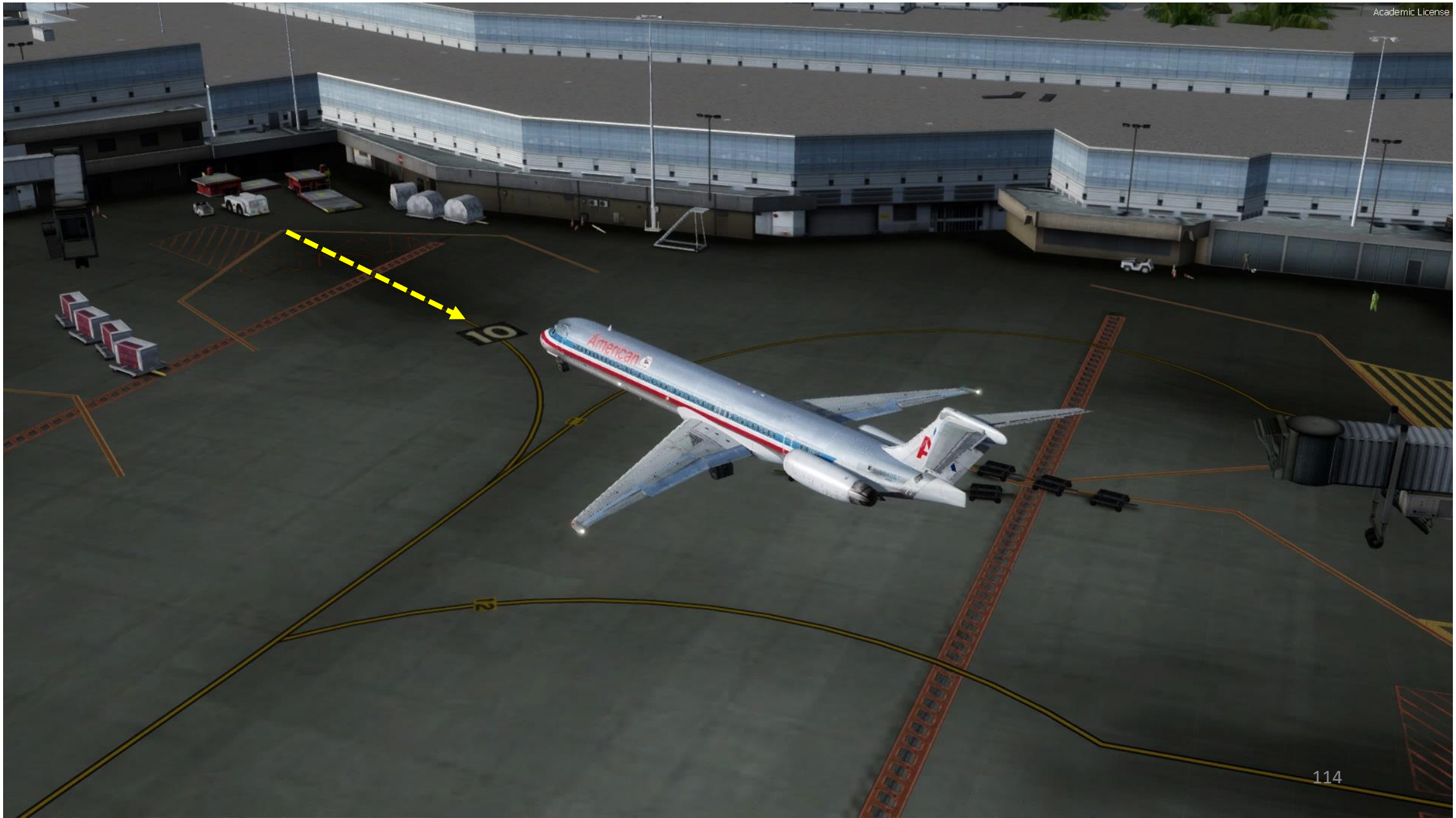
PUSHBACK

1. Verify that Anti-Skid switch is ARMED
2. Make sure parking brake is released (DOWN)
3. Right-click on the MECH CALL button to contact ground crew personnel
4. Select PUSHBACK menu
5. Set desired pushback orientation (distance and angle)
6. Click the green checkmark to start pushback.
7. Alternatively, you can simply use “LSHIFT+P” to start and stop pushback procedure since we are in a very tight spot.





PUSHBACK

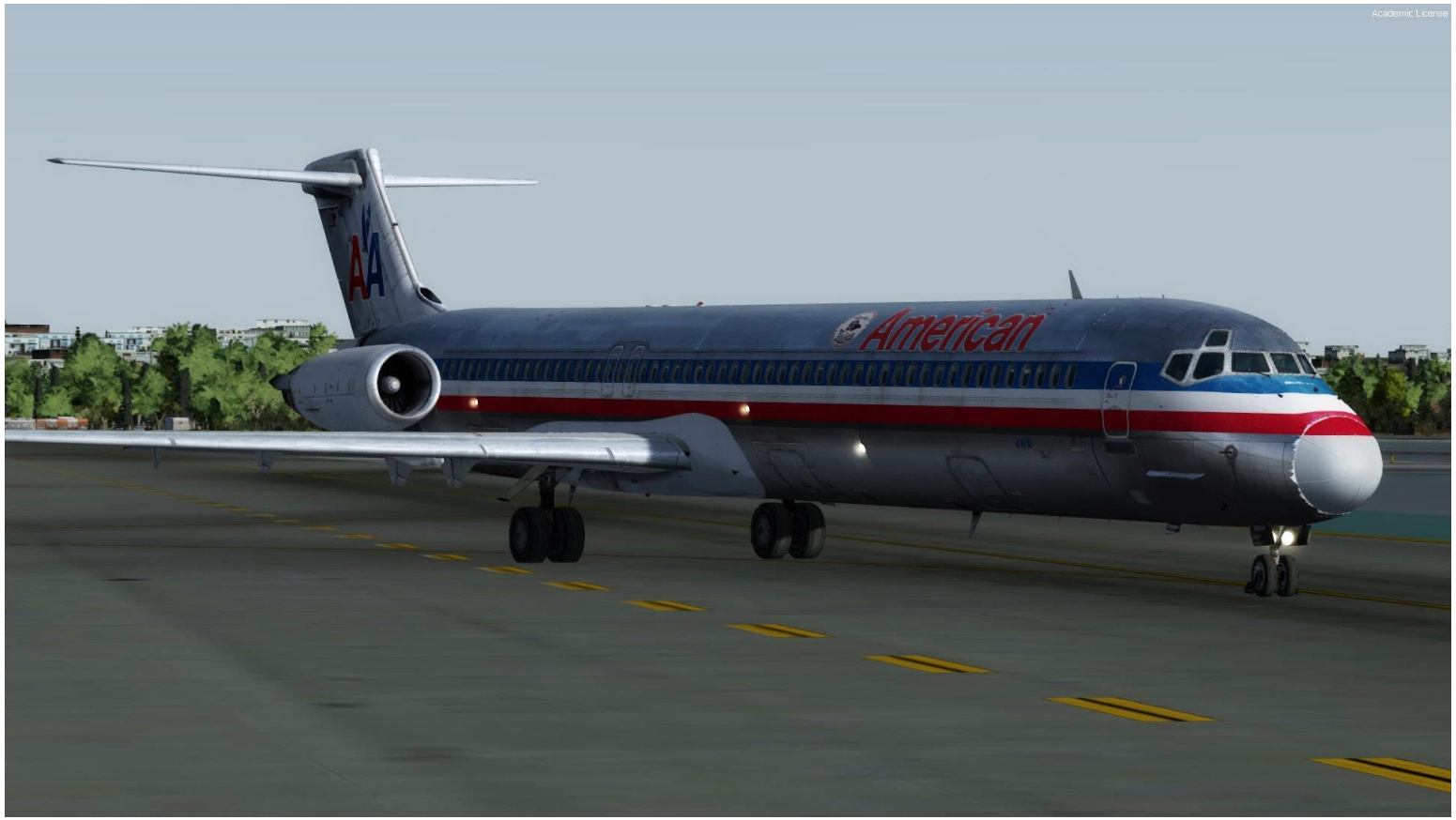


TAXI

The MD-82 is steered on the ground by using a Nose Gear Steering Wheel (Tiller).

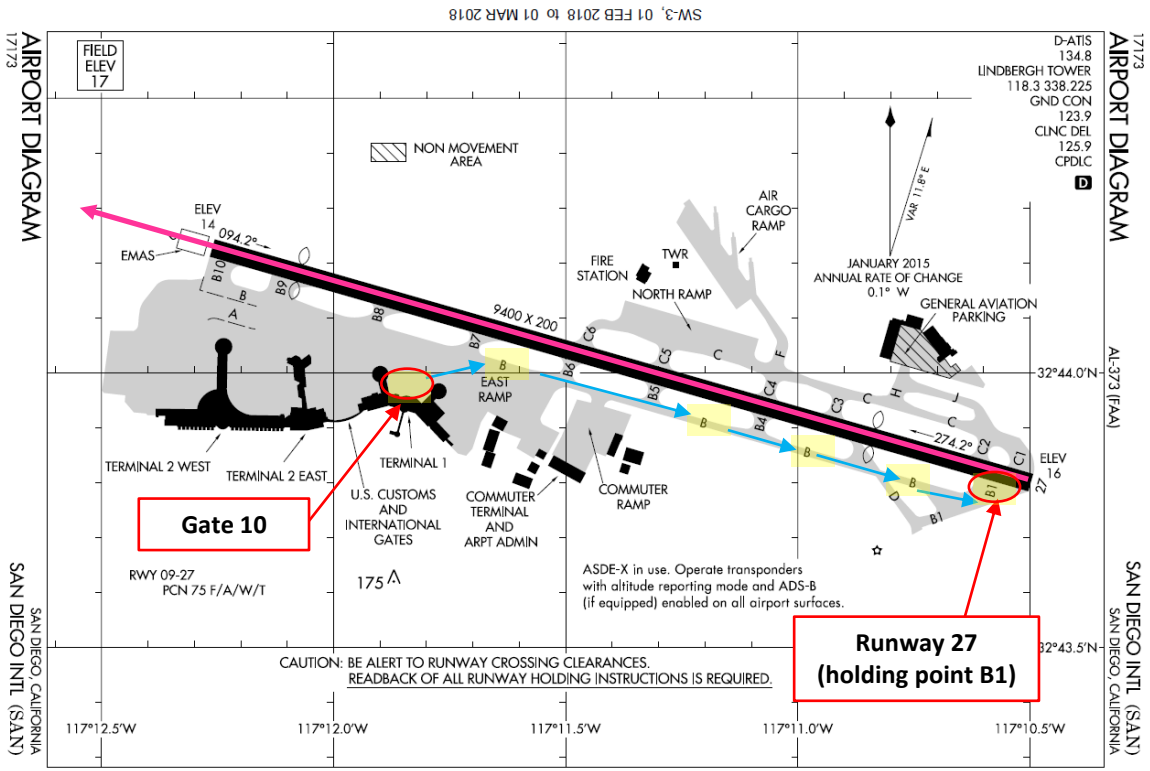
However, in FSX or Prepar3d you cannot map a joystick axis to your nosegear steering wheel: it's a limitation of the sim itself. In order to steer the aircraft, Leonardo mapped the tiller axis directly on the rudder axis. If you move your rudder pedals while on the ground, the aircraft will have its full steering range as if you were using the tiller.

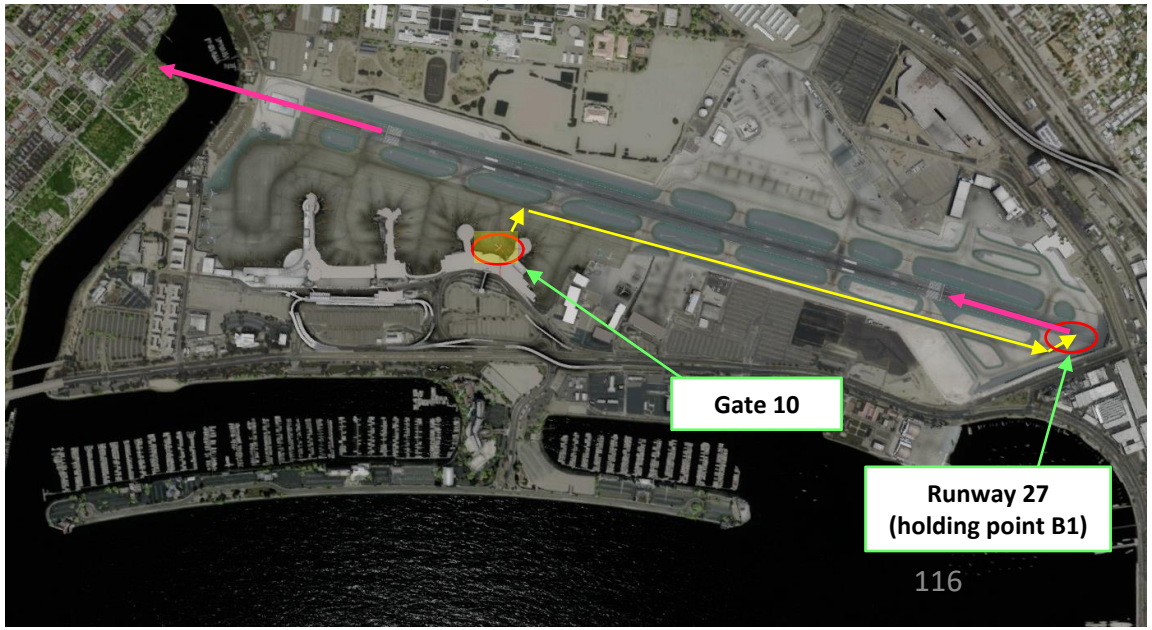
Nose Gear Steering Wheel
Used to steer aircraft on the ground



TAXI

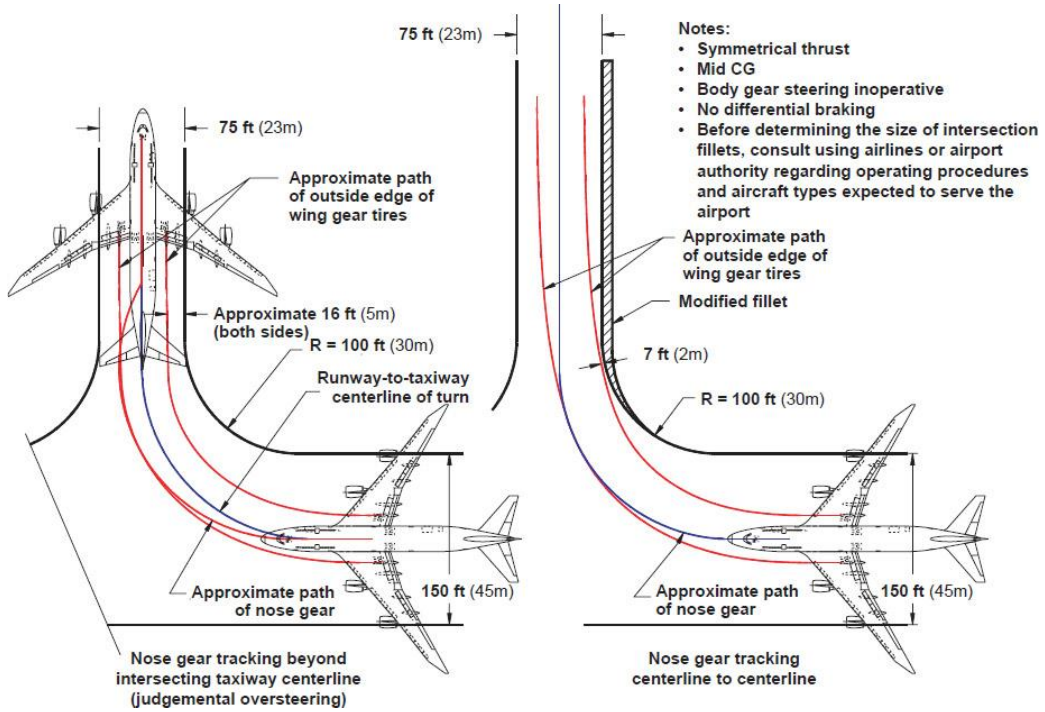
- Our Flight Number for today will be AAL119 and we spawned at gate 10.
- After we performed pushback from gate 10, we would typically contact the tower for guidance by saying « AAL119, requesting taxi. »
- The tower would then grant you taxi clearance by saying « AAL119, taxi to holding position B1 Runway 27 via taxiway Bravo (B).
- This means that we will follow the B line, then turn left to the holding point B1… and then hold there until we get our clearance for takeoff.
- Make sure parking brake is released (DOWN)
- Throttle up to an EPR (Engine Pressure Ratio) of 1.2 to initiate taxi. Once you are moving, you can throttle back to IDLE thrust; it should be enough for taxi.
- Maintain taxi speed below 30 kts and reduce to 10 kts for sharp turns



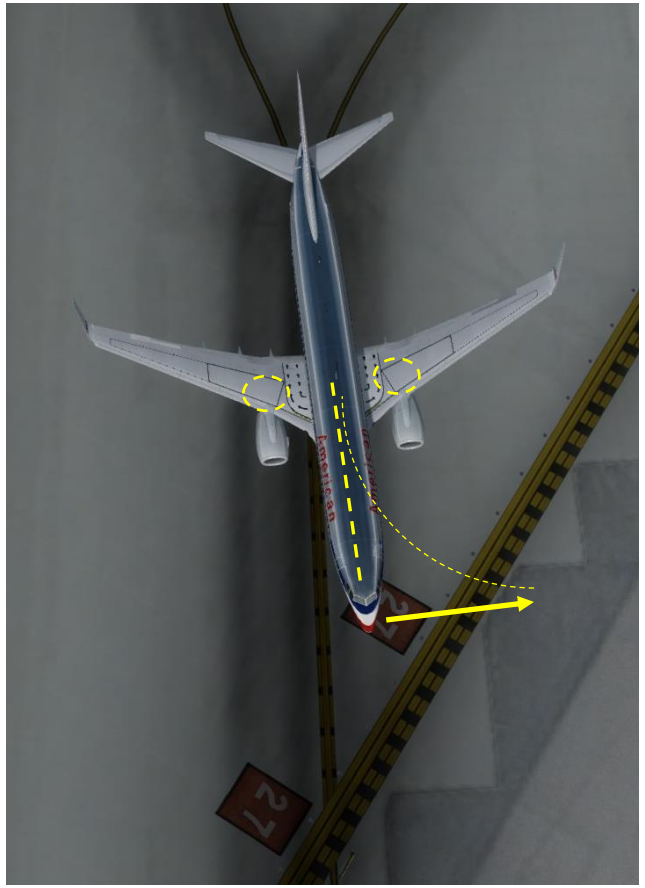


TAXI

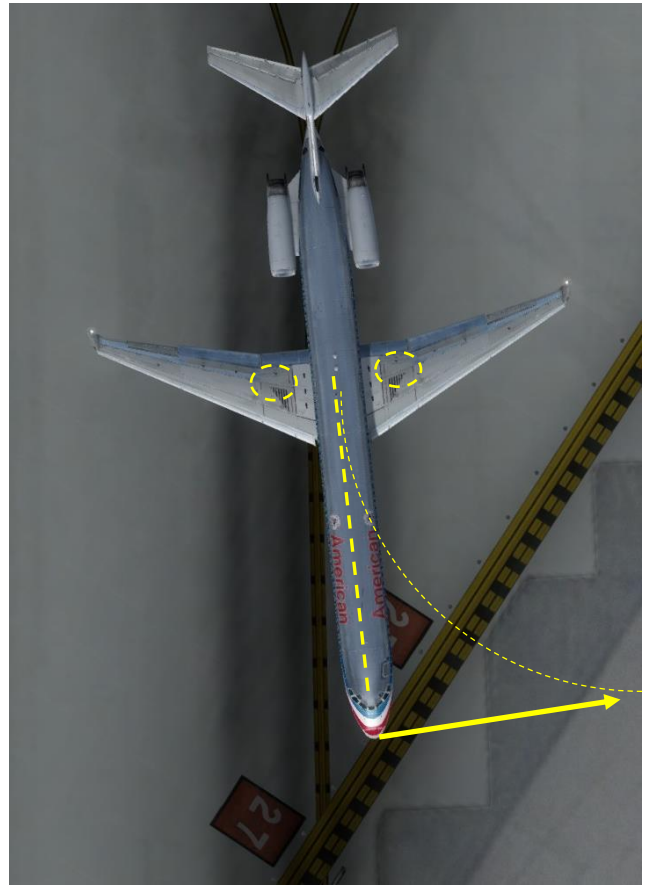
- Make sure that you make sharp turns by oversteering (nose gear follows outside the taxiway line radius). Compared to a Boeing 737, you will have to make larger turns since the main landing gears are much further aft in the MD-82.



Boeing 737-800



McDonnell Douglas MD-82

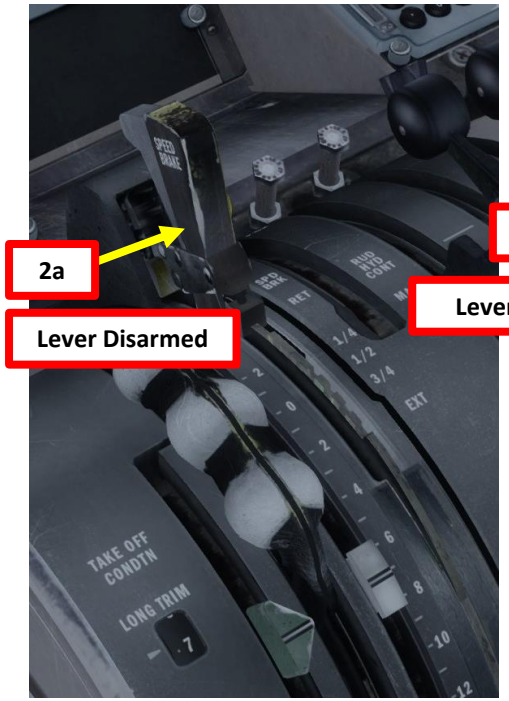


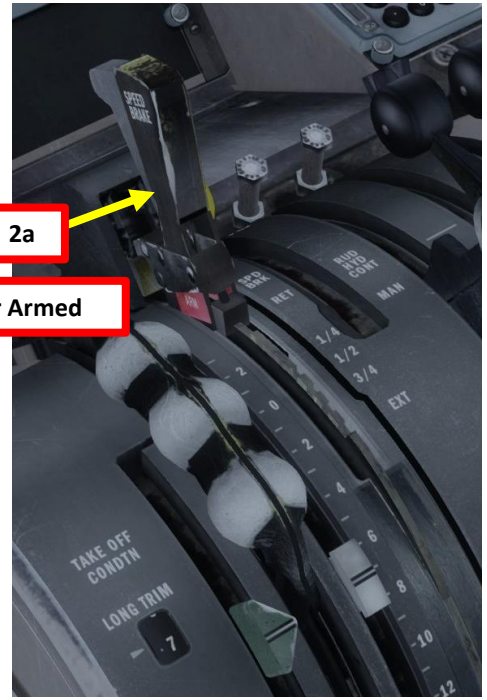

Academic License
B ← B1
Check signs to follow the taxi route towards the holding point (B1)
WING LDG LTS
RE
EXT
OFF
EXT ON
NOSE LTS
OFF
DIM
B
113.40
VHF
NAV


Academic License
American
B1 27

TAKEOFF

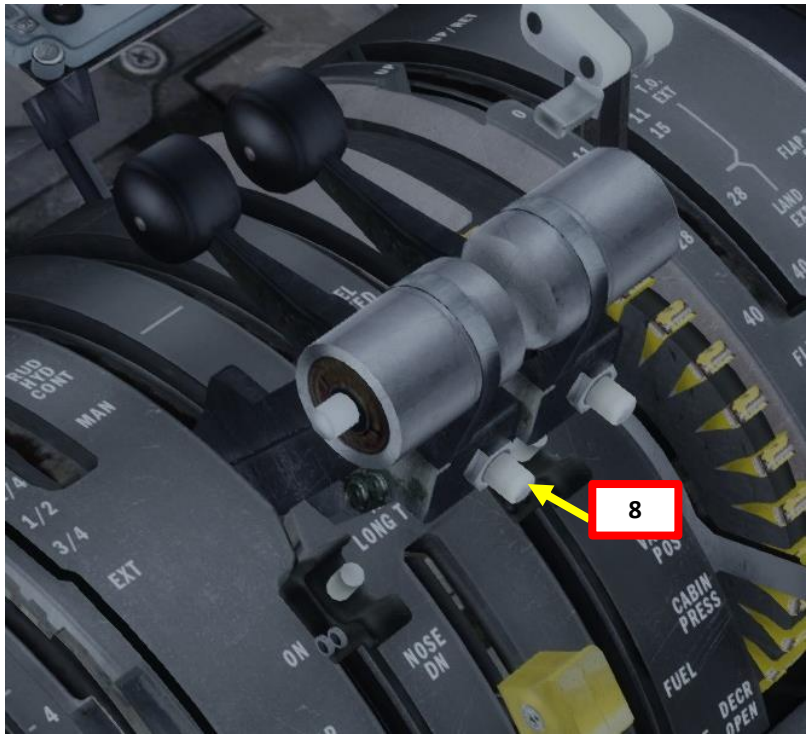
1. Line up on the runway
2. Arm Spoilers: Set Speed Brake Lever – Armed (UP)
3. Set Auto-Brake Switch – T.O. (Takeoff)
4. Set Auto-Brake Arming Switch – ARM
5. Release parking brake and hold wheel brakes
6. Throttle up quickly to Maximum power then back to IDLE and confirm that you have no aural (audio) warning. This means that you are now in proper takeoff configuration.





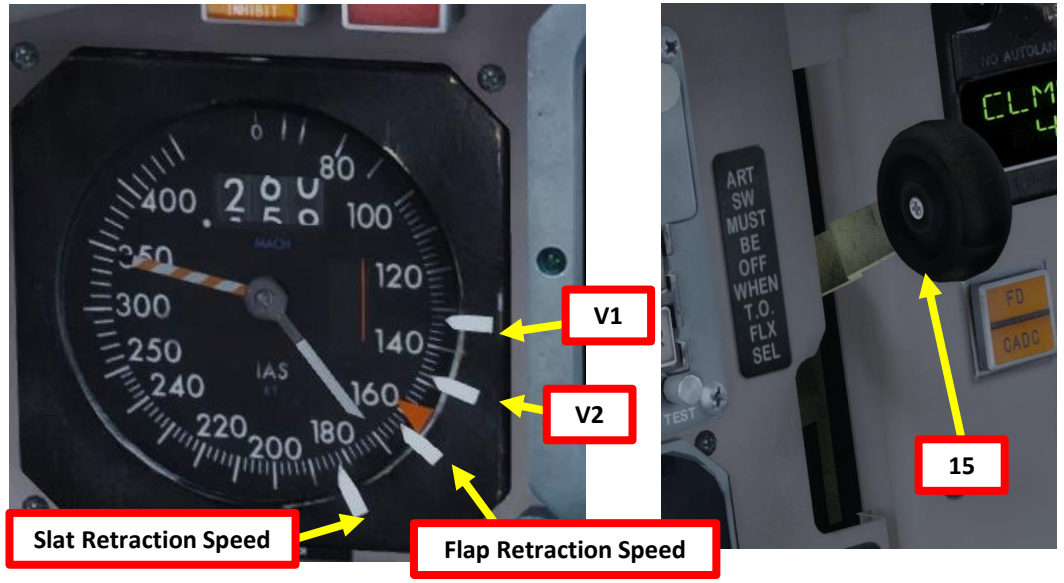
TAKEOFF

7. Verify that the ALT autopilot mode is armed (you should see the target altitude in orange on the FMA (Flight Mode Annunciator) panel. If ALT mode is not armed, left click on the ALT knob to pull it and arm it.
8. Press the TOGA button on the throttle to arm autothrottle system.
9. Hold brakes and throttle up to an EPR of at least 1.4
10. Once engines are stabilized, set the AUTOTHROTTLE switch to ON to activate automatic thrust. Electrical servo motor will be powered and will automatically move the throttle in the required **takeoff thrust** position (above an EPR of 1.4).
11. First Officer should be saying « Takeoff Thrust Set »
12. Release brakes and accelerate



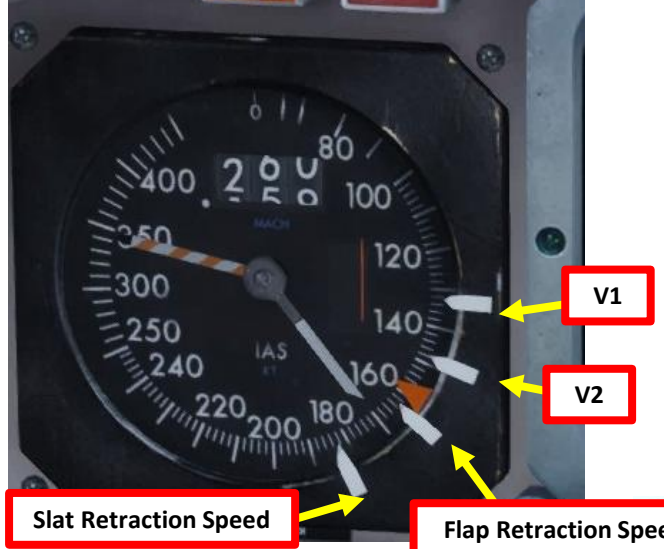
TAKEOFF

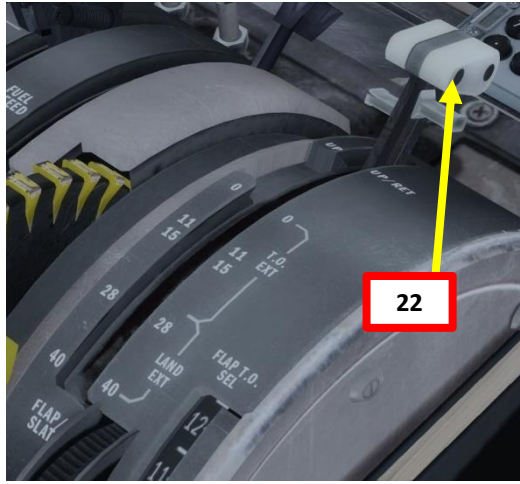
13. As you speed up to 60 kts, the FMA will display « CLMP » (Clamped), which means the electrical servo motor of the autothrottle system is unpowered and will not move the throttle anymore, allowing you to move it if need be.
    - *In other words, this means that the throttles can only be moved by YOU and will be not be actuated by the autothrottle. If the autothrust system has set the throttle position an EPR of 1.4 by itself, the throttle should stay there, but you you can still move the throttle in case of a rejected takeoff or if you exceed decision speed (V1) and are forced to throttle to max power in order to not crash at the end of the runway. The autothrottles will remain in CLMP until EPR / LIM is selected on the flight guidance panel or GA, MCT, CL, or CR are selected to the TRI (Thrust Rating Indicator).*
14. Once you reach V1 (Decision Speed, 133 kts), start a gentle rotation.
15. Once you hear the First Officer say « Positive Rate », retract landing gear



TAKEOFF

16. At 400 ft, arm NAV (Navigation) Autopilot Mode
17. Set ART (Automatic Reserve Thrust) to AUTO
18. Select Climb Thrust Power Rating
19. Arm VNAV (Vertical Navigation) Autopilot Mode
20. Make sure you are following the Flight Director lines before engaging autopilot
21. Engage autopilot: set Autopilot Switch – ON
22. Once you reach Flap Retraction Speed, set Flaps Lever – UP/RET
23. Once you reach Slat Retraction Speed, set Speed Brake Lever – Disarmed (DOWN)

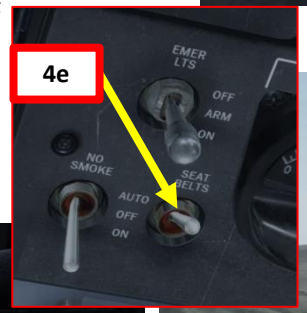


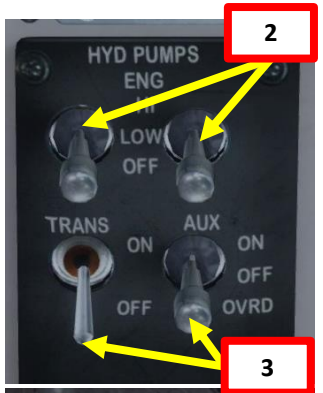


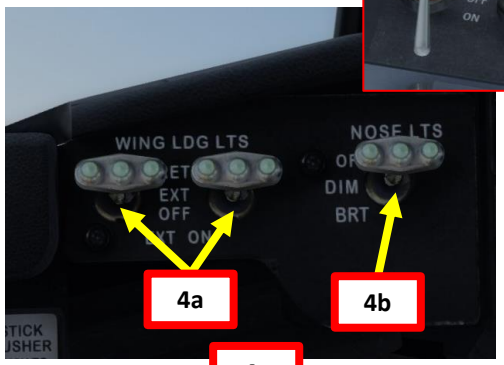
TAKEOFF

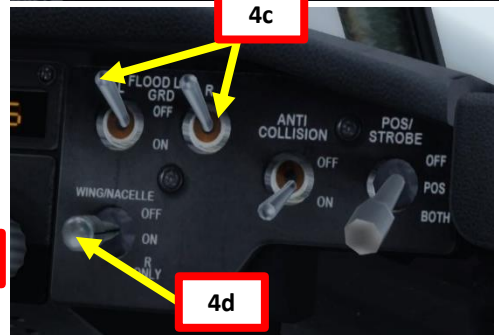
CLIMB

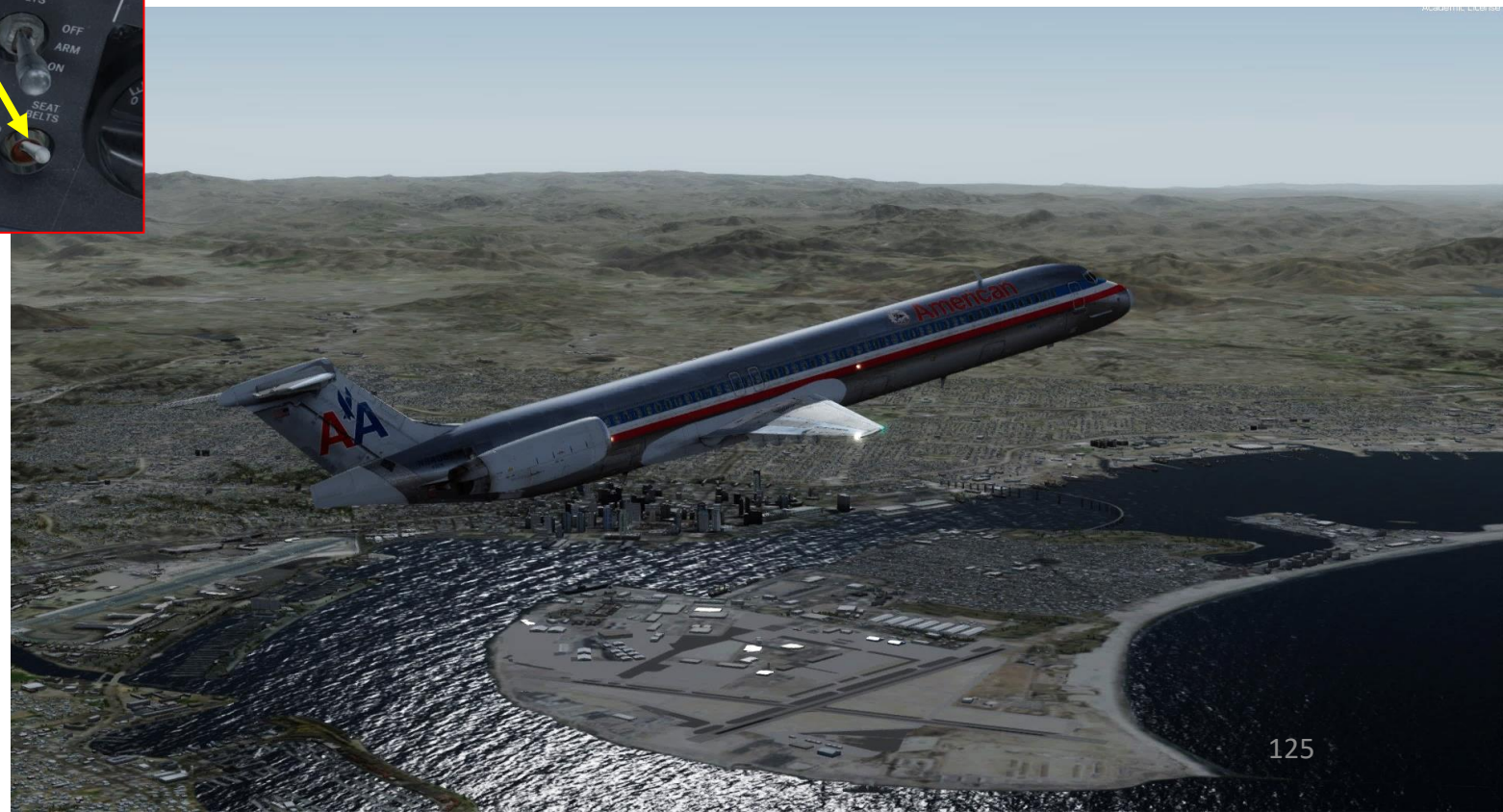
1. Always make sure that the Selected Heading Line is lined up with pink line on the Navigation Display by rotating the HDG knob.
2. Set Engine-Driven Hydraulic Pump switches – LOW
3. Set Transfer Pump and Aux Hydraulic Pump switches – OFF
4. When reaching 10,000 ft:
    a) Set Wing Landing Lights – RET (Retracted)
    b) Set Nose Lights – OFF
    c) Set Ground Flood Lights Switches – OFF
    d) Set Wing/Nacelle Lights Switch – OFF
    e) Seat Belts Light Switch - AUTO
5. Set Autobrake switch - OFF





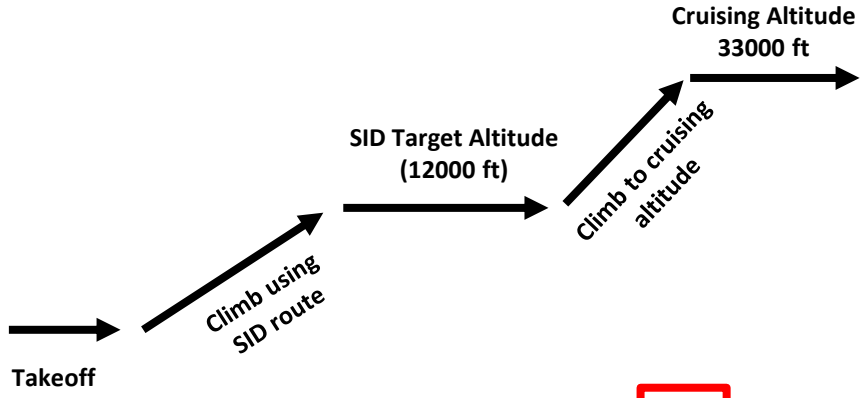






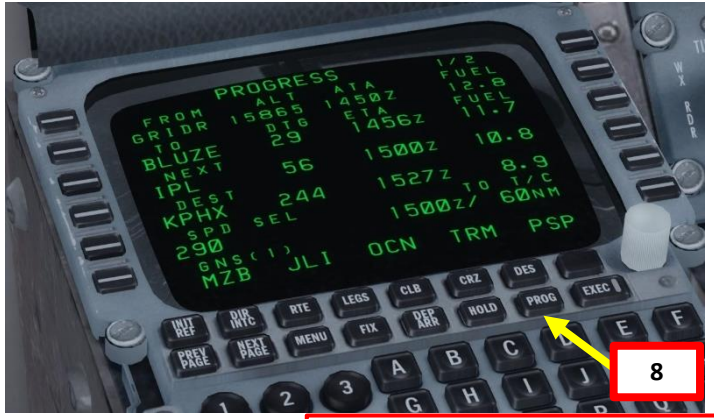
CLIMB

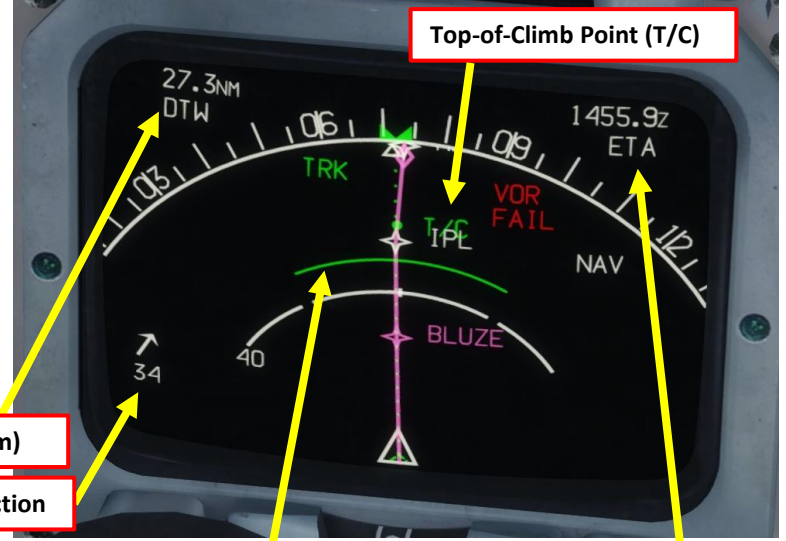
6. Once you are approaching the JORRJ waypoint, you should have levelled off to 12000 ft by now. Set Autopilot Altitude target to 33000 ft (cruising altitude) and left-click switch to pull it and arm the ALT mode. When ALT mode is armed, you should see “330” in orange on the FMA.
7. You can, if you want, control your vertical speed in multiple ways:
    a) You can set the pitch wheel and set the VERT SPD mode. 2000 ft/min is a good value.
    b) Alternatively, you can let the Flight Management Computer control the climb rate for you by setting the VNAV mode with the VNAV button.



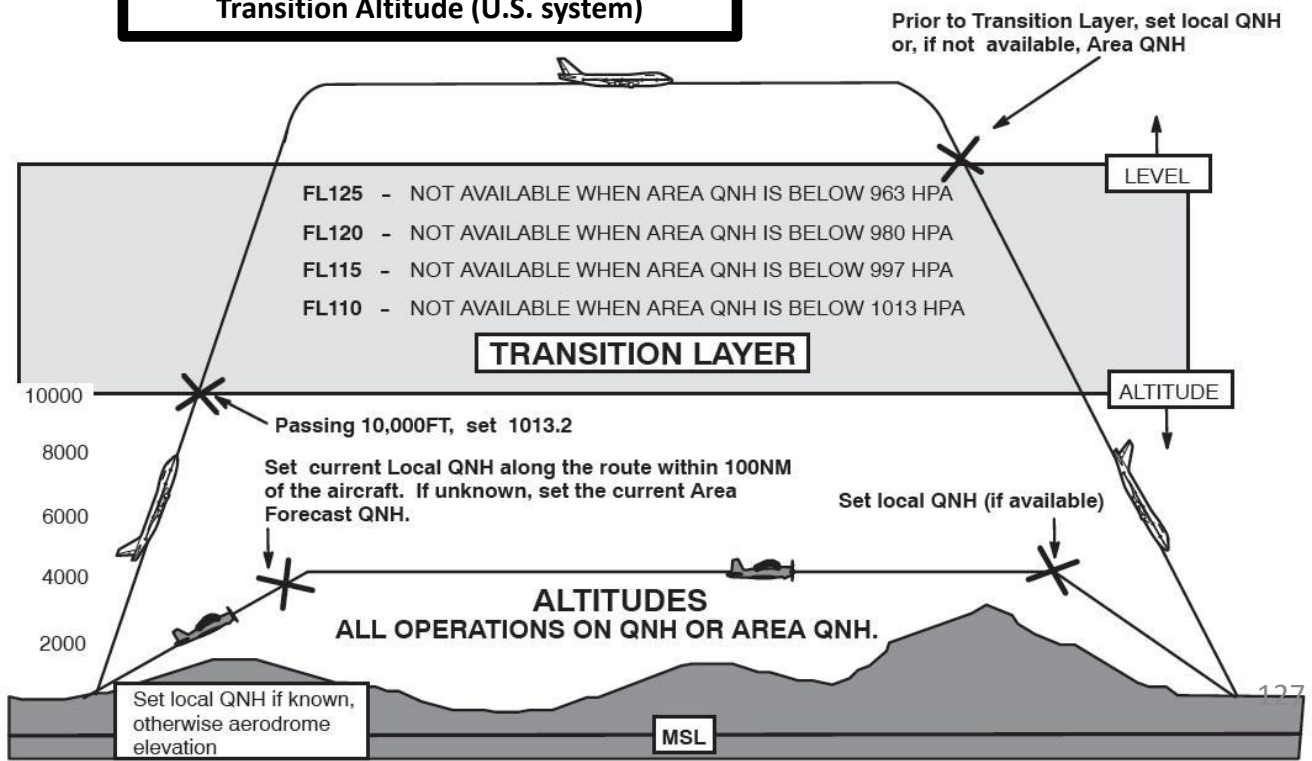
CLIMB

8. Press the PROG button on the AFMC to access the progress page. You can monitor your progress from there.
9. When you reach your cruising ceiling (33,000 ft), the autopilot will automatically set itself in the Altitude Hold mode. The Top of Climb is indicated on the ND (Navigation Display) by a T/C symbol.
10. Once you pass transition altitude (3000 ft in Europe, 18000 ft in the US), adjust altimeter setting to standard barometric pressure (29.92 in Hg). Do it SLOWLY or your autopilot will start freaking out since you are changing his pressure reference. Using STANDARD pressure is done in order to use flight levels as a reference. This means you will be using a standard barometric pressure of 29.92 in Hg, which is also used by other aircraft in the airspace instead of a local one given by an Air Traffic Controller. If pilots don't use a "standard" barometric pressure, different aircraft may collide in flight since they don't use the same pressure to define their current altitude. This is why higher altitudes are defined as "flight levels" (i.e. FL330 would be 33000 ft).





Transition Altitude (U.S. system)



CLIMB

CRUISE

1. When reaching the top of climb, the autopilot will start levelling off (yellow light will illuminate).
2. Once levelled off to 33000 ft, the vertical autopilot mode will switch to VNAV LVL.
3. Select Cruise Thrust Power Rating (CR)
4. The autothrottle mode will switch from FMS EPR (autothrottle wants to maintain a specific Engine Pressure Ratio) to FMS SPD (autothrottle wants to maintain a specific airspeed).

Introduction to Autopilot

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

Now, why am I saying this? Because *some* people's knowledge of the autopilot system is summed up in "hit NAV 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.

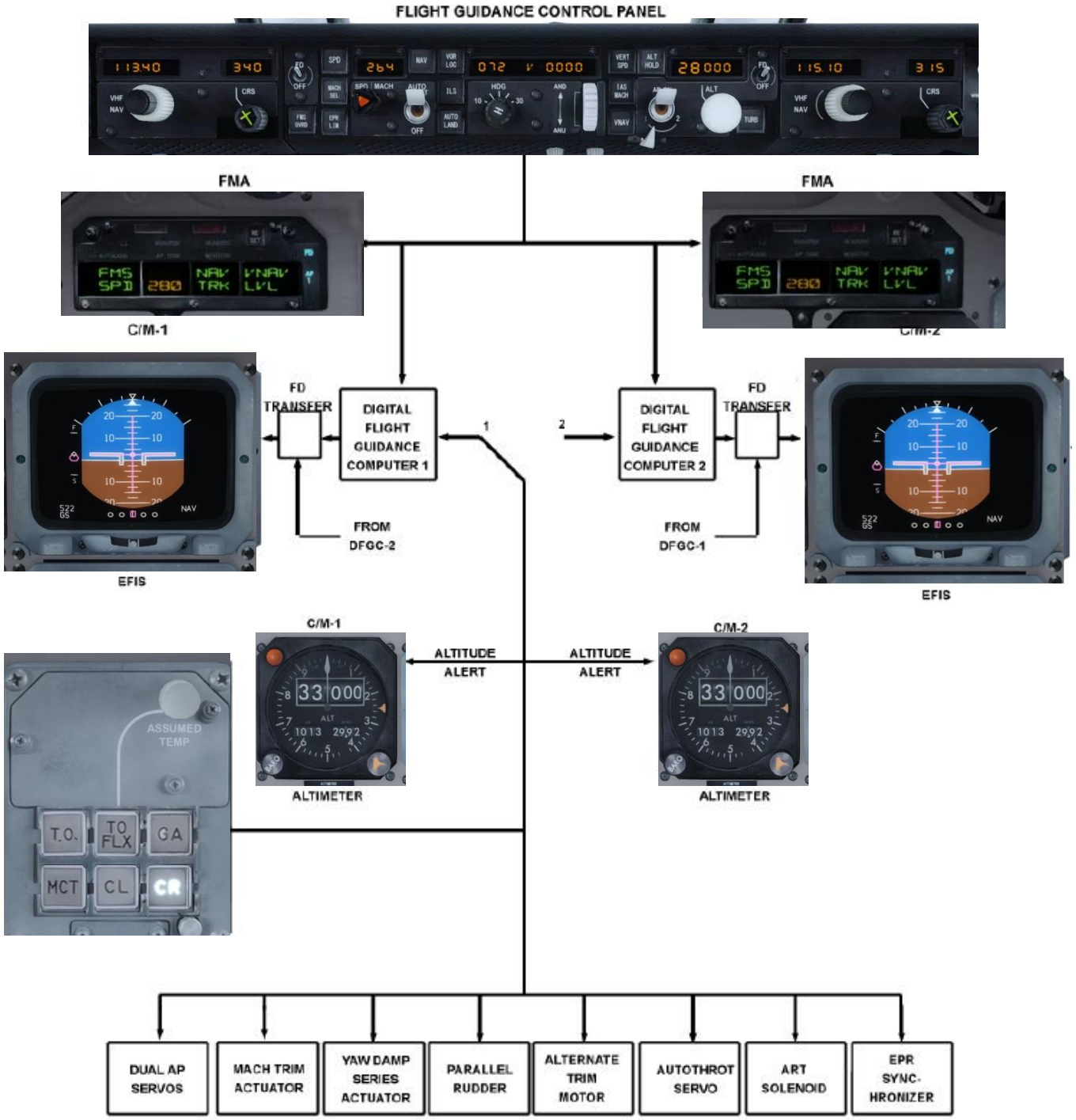
FGS: Flight Guidance System

The FGS provides several major functions: the flight director (FD) provides lateral and vertical guidance to fly the aircraft. Two Digital Flight Guidance Computers (DFGC 1 and 2) and Performance Management System (PMS) provide data input for the FGS functions.

DFGC 1 and 2 receive inputs from the digital Central Air Data Computers (CADC), VHF navigation systems, compass systems, vertical gyros, radio altimeters, dual three-axis accelerometer, dual lateral accelerometer, performance management computer, and sensors of other airplane systems and functions.

A Flight Guidance Control Panel (FGCP) is provided for selection of desired FGS modes of operations by the Captain and First Officer. DFGC 1 or 2, as selected, provides data inputs for the following integrated FGS functions:

- Autopilot (AP)
- Stability augmentation (Mach Trim Compensation / Yaw Damper)
- Flight Director (FD)
- Speed Control (SC)
- Autothrottle System (ATS)
- Thrust Rating Computer (TRC)
- Automatic Reserve Thrust (ART)
- Altitude alert


FLIGHT GUIDANCE CONTROL PANEL
FMA
FMA
C/M-1
C/M-2
FD TRANSFER
DIGITAL FLIGHT GUIDANCE COMPUTER 1
DIGITAL FLIGHT GUIDANCE COMPUTER 2
FD TRANSFER
FROM DFGC-2
FROM DFGC-1
EFIS
EFIS
C/M-1
C/M-2
ALTITUDE ALERT
ALTITUDE ALERT
ALTIMETER
ALTIMETER
ASSUMED TEMP
T.O.
TO FLX
GA
MCT
CL
CR
DUAL AP SERVOS
MACH TRIM ACTUATOR
YAW DAMP SERIES ACTUATOR
PARALLEL RUDDER
ALTERNATE TRIM MOTOR
AUTOTHROT SERVO
ART SOLENOID
EPR SYNC-HRONIZER

Button	Description
IAS MACH	Vertical autopilot changes aircraft attitude to hold indicated airspeed
VERT SPD	Vertical autopilot changes aircraft attitude to hold vertical speed
VNAV	Vertical autopilot changes aircraft attitude to follow vertical navigation path determined by the FMS
ALT HOLD	Vertical autopilot changes aircraft attitude to fly to target altitude
HDG	Lateral autopilot tracks selected heading
NAV	Lateral autopilot tracks navigation flight plan determined by the FMS
VOR LOC	Lateral autopilot arms DFGS to capture and track a selected VOR or LOC course.
ILS	Lateral and vertical autopilots track localizer and glide slope targets for approach
AUTOLAND	Lateral and vertical autopilots arm FGS to establish AUTO LAND mode when both localizer and glideslope are being tracked.
AP	Engages/Disengages Autopilot
AUTOTHROTTLE	Engages/Disengages Autothrottle

Button	Description
SPD	Autothrottle system will adjust thrust to maintain desired indicated airspeed (kts).
MACH SEL	Autothrottle system will adjust thrust to maintain desired Mach number airspeed.
EPR LIM	Autothrottle system will adjust thrust to maintain desired Engine Pressure Ratio (EPR), which is used as a thrust reference unit.
FMS OVRD	Autothrottle system will override the Flight Management System and adjust thrust to maintain desired SPD/MACH when VNAV FMS mode is engaged.

Knobs	Description
COURSE	Sets ILS course
HDG	Sets autopilot heading for HDG mode (black knob) and bank angle limit (white knob)
VHF NAV	Selects which navigation frequency to track
ALT	Sets target altitude
AUTOPILOT PITCH THUMBWHEEL (NOSE DN/ NOSE UP)	Sets autopilot pitch attitude (which can be used by other flight guidance modes to specify what climb or descent rate you want to use)

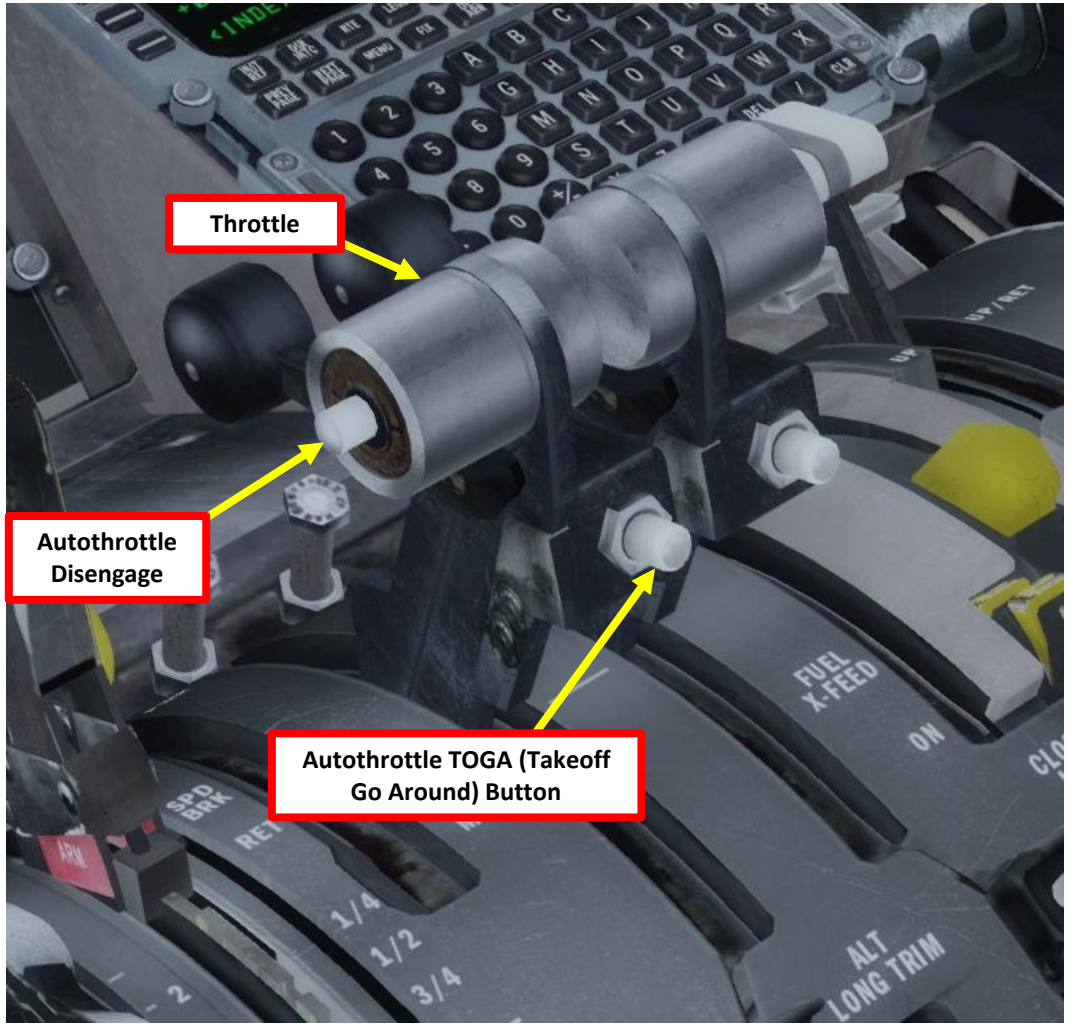
VERTICAL MODE
LATERAL MODE
VERTICAL & LATERAL MODE
AUTO-THROTTLE MODE

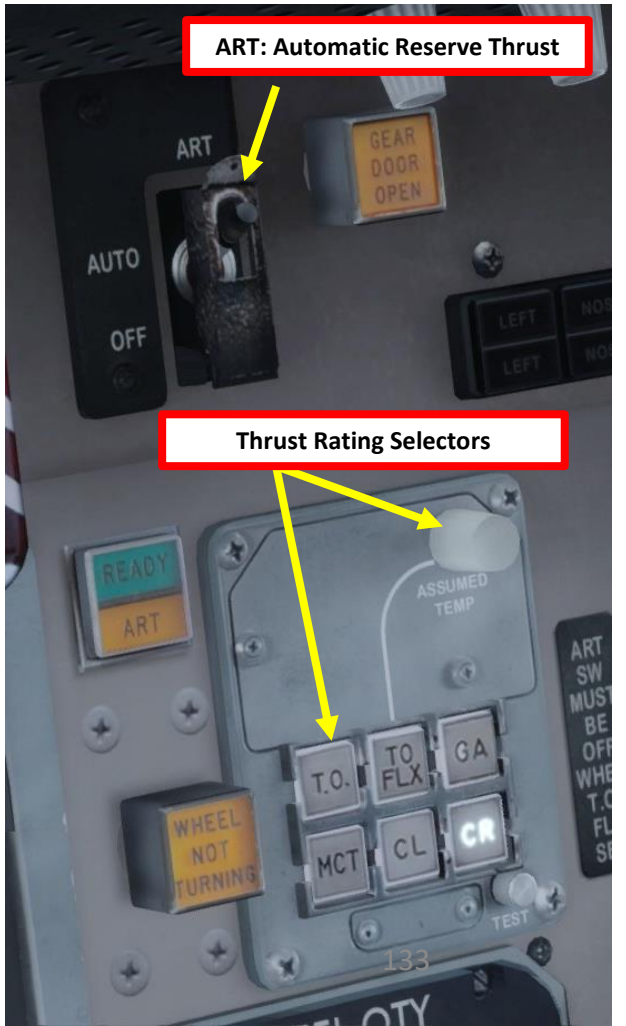
Automatic Thrust & ART

The ATS (Automatic Thrust System), also known as the "Autothrottle" system, is a system that will automatically move the throttle for you in order to set your desired thrust rating and autothrottle mode. Autothrottle modes determine whether engine power is set to maintain a desired speed in reference to airspeed (SPD), Mach number (MACH) or the Engine Pressure Ratio (EPR). If an EPR mode is selected, thrust rating selectors will determine what this EPR limit is set to:

- T.O. = Takeoff
- MCT = Max Continuous Thrust
- CL = Climb
- CR = Cruise
- GA = Go Around
- TO FLEX = Flexible Temperature Takeoff

The ART (Automatic Reserve Thrust) is a system that is only active when you lose an engine during flight, takeoff or landing. The ART is a fancy way of saying that the remaining engine will automatically increase power in order to maximize thrust and (hopefully) prevent you from crashing.





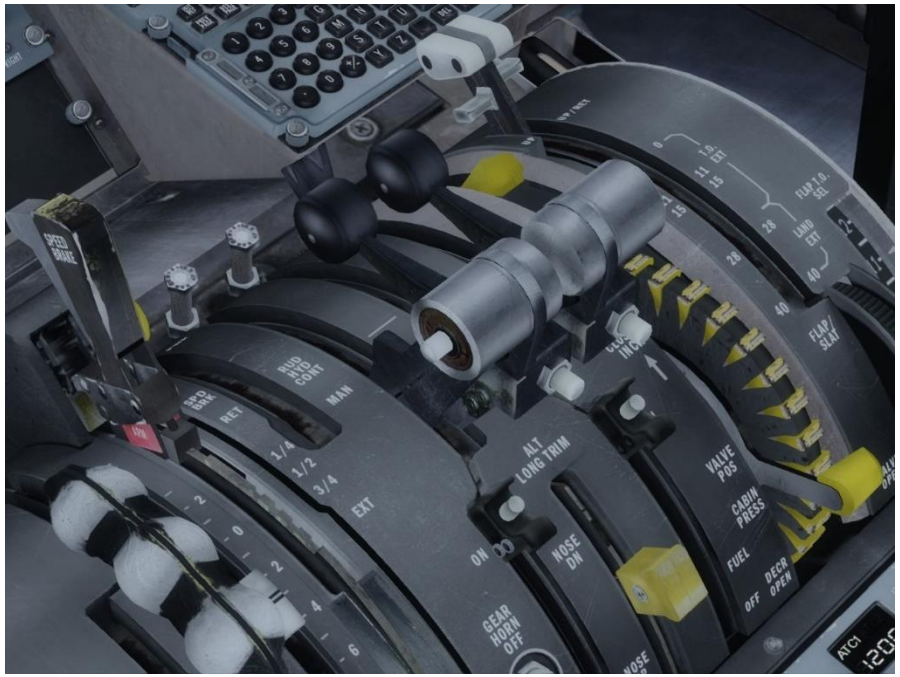
Automatic Thrust - What is CLMP (Clamped) Mode?

People often wonder what the “CLMP” (or CLAMPED) autothrust mode means when you see it on the Flight Mode Annunciator. Typically, CLMP mode is engaged during the takeoff and descent phases.

What is CLAMPED? Simply put, the throttles are electrically actuated when autothrust is engaged. If you try to move them by yourself, you will not be able to since electrical servos have control of the levers. CLAMP mode de-activates the electrical servos (“clamping” them in the unlocked position), unlocking the throttles and allowing you to move them during takeoff and descent.

Now… why would anyone want the autothrust to be deactivated? Well, mainly for safety reasons.

During Takeoff, the autothrottle will engage CLMP mode when you reach 60 knots. What if you have an engine failure during takeoff and need to abort? What do you do? If you are below the decision speed, you can throttle down, slam the brakes and abort takeoff roll. However, you are above the decision speed, you HAVE to takeoff since you will not have enough runway remaining to brake without crashing. The decision is yours, and that’s how CLAMP mode was designed to be: to give you the choice to either throttle up to maximum power or to throttle down and brake. If the autothrottle did not have that CLAMP mode, the electrical servos would simply leave the throttles locked in their current “commanded” position without allowing you to move them.

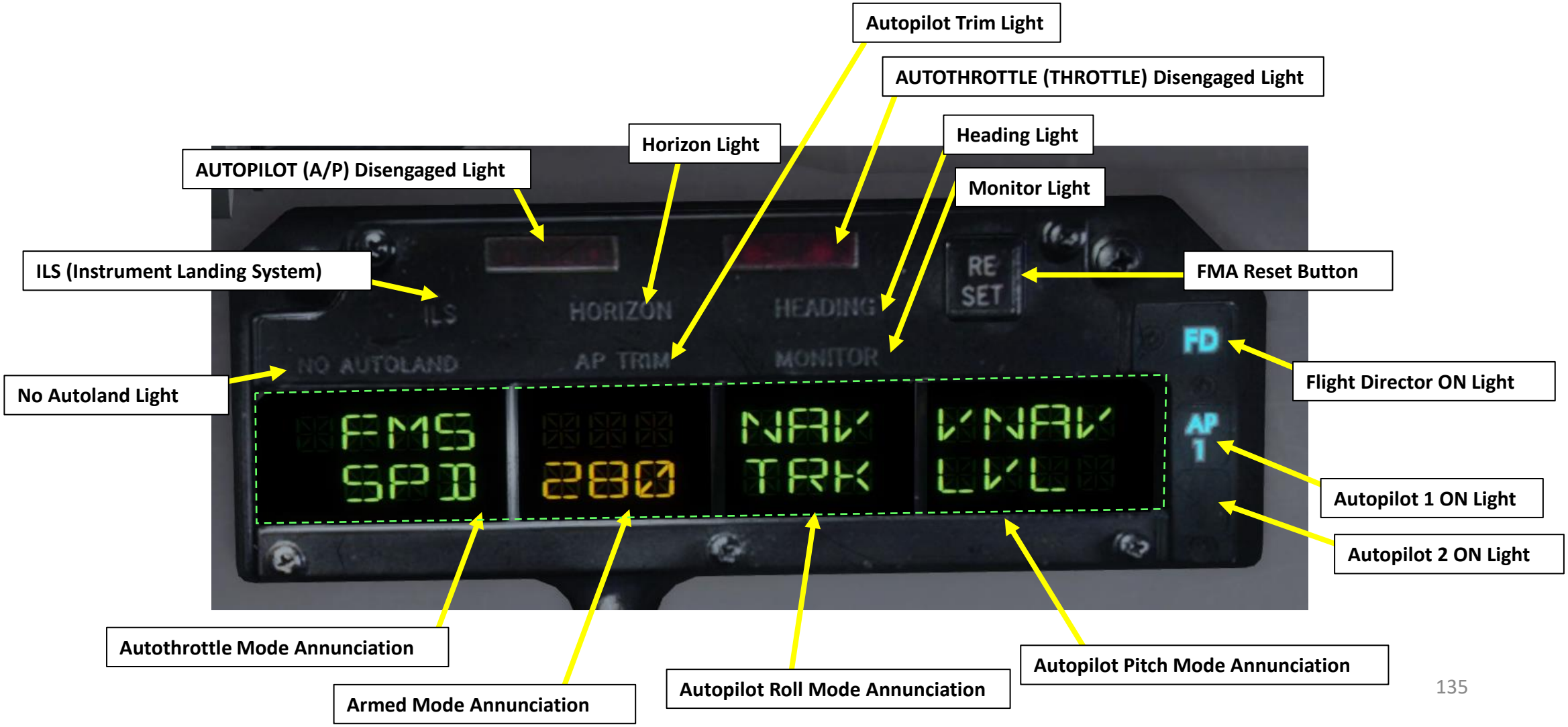


A similar philosophy is used for descent mode if you go in the DESCENT page of the AFMC and activate the DES NOW descent mode, or if you activate the IAS (speed) autothrottle mode, which is basically a deviation of the VNAV profile programmed by the FMS. These modes are rarely used since they do not facilitate a “smooth” transition from cruise altitude to descent.

FMA (Flight Mode Annunciator)

The FMA displays the status of the autothrottle mode, armed autopilot mode, autopilot roll mode (lateral), autopilot pitch mode (vertical) and autopilot status.

Orange messages indicated that the autopilot mode is ARMED but not ENGAGED.



FMA (Flight Mode Annunciator)

1: Autothrottle Mode		2: Armed Mode	
ALFA SPD: Thrust levers controlled to maintain a safe margin above stall speed.	**EPR 49**: Thrust levers controlled to maintain FLEX takeoff thrust rating with an assumed temperature of 49 deg C.	**ALT**: Altitude preselect armed for automatic capture of selected altitude	**VOR**: VOR mode armed for automatic capture of VOR course.
ATS OFF: VNAV mode selected, autothrottle OFF.	**FLAP/SLAT LIM**: Thrust controlled to prevent exceeding flap/slat limit airspeed	**AUT G/A**: FGS armed for full automatic go-around capability	**VOR ALT**: VOR mode armed for automatic capture of selected ILS for automatic landing
AUTO LND: Autoland preflight ground tests in progress.	**FMS EPR/IDL/SPD**: VNAV selected, thrust levers move to maintain PMS-calculated (Performance Management System) EPR/IDLE/AIRSPEED.	**ILS ALT**: ILS mode armed & altitude preselect armed for automatic capture of selected altitude	**FD G/A**: FGS armed for flight director go-around capability.
CLMP: Clamp Mode: power is removed from ATS (Automatic Thrust System) servo, meaning that thrust levers remain stationary and can be moved by pilot.	**PERF CLB/CRZ/DES**: Performance mode engaged, thrust levers move to maintain PMS-calculated EPR/CRUISE SPEED/DESCENT EPR & SPEED.	**LND**: AUTOLAND mode armed for automatic capture of selected ILS for automatic landing	**20 G/A**: FGS armed for 20-foot automatic go-around capability.
CLMP FMS: VNAV selected, power is removed from ATS servo, meaning thrust levers remain stationary and can be moved by pilot.	**MACH 760**: Thrust levers controlled to maintain Mach 0.760.	**LND ALT**: AUTOLAND mode armed & altitude preselect armed for automatic capture of selected altitude	**AUT W/S**: FGS armed for full automatic wind shear guidance
EPR CL/CR/GA/MCT/TO: Thrust levers controlled to maintain climb, cruise, go around, maximum continuous thrust, or takeoff thrust limit.	**MMO LIM**: ATS automatically limited to not exceed maximum operating Mach number. (MMO)	**LOC ALT**: Localizer mode armed & altitude preselect armed for automatic capture of selected altitude	**FD W/S**: FGS armed for flight director wind shear guidance
LOW LIM: ATS command would require a thrust lever setting lower than the minimum authority limit.	**OVRD XXX**: VNAV Mode engaged & FMS OVERRIDE is selected; throttles maintain speed on SPD/MACH readout.	**MAN G/**A: FGS armed for manual go-around capability	
DFGC PWR: Automatic Power Up Test in progress (2 min after landing)	**OVRD LIM**: VNAV Mode engaged & FMS OVERRIDE is selected & speed above Vmax or below Vmin; throttles main limit speed indicated by speed bug.	**NAV**: FMS NAV mode is armed	
SPD/MACH ATL: ATS throttle command exceeds EPR limit in SPD SEL or MACH SEL mode.	**SPD 310**: Throttle controlled to maintain 310 kts airspeed (SPD/MACH readout)	**PRE**: Auto Land pre-flight test in progress: appears approx. 50 seconds	
WIND SHR: WAGS (Windshear Alert & Guidance System) has detected a tail wind or head wind shear condition.	**VMO LIM**: Thrust is controlled to prevent exceeding maximum operating airspeed (VMO)	**973 UP**: Automatic Power Up Test in progress (2 minutes after landing)	

FMA (Flight Mode Annunciator)

3: Roll Mode		4: Pitch Mode	
ALN: Align mode engaged (maintains runway alignment)	**NAV HLD**: Navigation mode engaged and FMS is in an internal heading hold until the present track intercept the lateral path	ALT CAP: Altitude preselect mode engaged and altitude capture has occurred.	NO FLR: ILS mode engaged and autopilot remains engaged at radio altitude of 100 ft.
AUT LND: AUTOLAND mode engaged	**ROL OUT**: Main gear wheel spin-up has occurs: AP maintains runway localizer alignment with nosewheel steering	ALT HLD: DFGS is providing flight director commands to maintain barometric altitude at which altitude hold mode was engaged.	ROL OUT: Main gear wheel spin-up has occurred. Annunciation remains until autopilot is disengaged
FLT: AUTOLAND mode pre-flight test in progress	**TAK OFF**: Takeoff mode engaged	AUL LDN: AUTOLAND mode engaged	TEST: AUTOLAND pre-flight test in progress
GO RND: Go-around mode engaged	**VOR CAP**: Capture of selected VOR course has occurred	BOX 1/BOX 2: Automatic Power Up Test in progress (2 min after landing)	TAK OFF: Takeoff mode engaged. After liftoff, pitch command bar on PFD will display pitch commands to maintain V2 + 10 kts IAS
HDG HLD: Heading hold engaged	**VOR CRS**: VOR station passage is occurring	FLAR: AUTOLAND mode engaged and flare mode initiated	VNAV CAP: FMS is coupled with DFGS and is in the VNAV capture mode.
HDG SEL: Heading select mode	**VOR TSK**: Airplane is tracking selected VOR course	GO RND: Go-around mode engaged	VNAV CLB: VNAV mode maintains climb pitch attitude calculated by FMS
LOC CAP: LOC, ILS or LAND mode engaged and capture of localizer course has occurred		G/S CAP: ILS or AUTOLAND mode engaged and airplane is capturing glideslope.	VNAV DES: VNAV mode maintains descent pitch attitude calculated by FMS
LOC TRK: LOC, ILS or LAND mode engaged and airplane is tracking localizer course has occurred		G/S TRK: ILS or AUTOLAND mode engaged and airplane is tracking glideslope.	VNAV LVL: altitude level maintained by pitch attitude calculated by FMS
NAV CAP: Navigation mode engaged and FMS is capturing the active lateral path		IAS: IAS (Indicated Airspeed) maintained by pitch attitude	PERF CLB: Climb pitch attitude set by PMS (Power Management System)
NAV TRK: Navigation mode engaged and FMS is tracking the active lateral path		MACH: Mach Number maintained by pitch attitude	PERF CRZ: Cruise pitch attitude set by PMS (Power Management System)
WING LVL: Turbulence mode engaged: roll command bar in PFD will command wings level to maintain heading		SPD LOW: Engaged pitch mode is commanding a pitch attitude that results in an airspeed below the ALFA reference speed.	PERF DES: Descent pitch attitude set by PMS (Power Management System)
TST: Automatic Power-Up test in progress (2 min after landing)		WIND SHR: Wind shear pitch guidance	

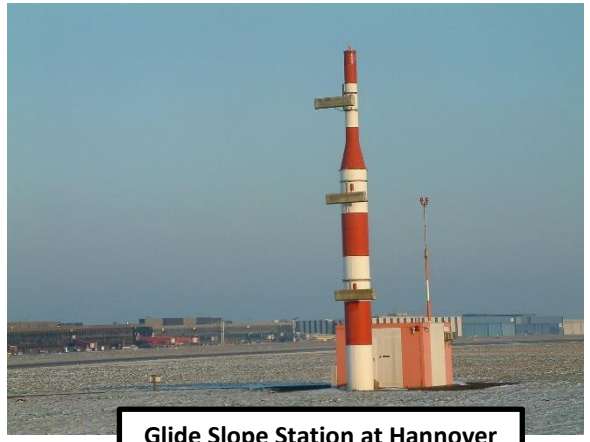
PLANNING DESCENT

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

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

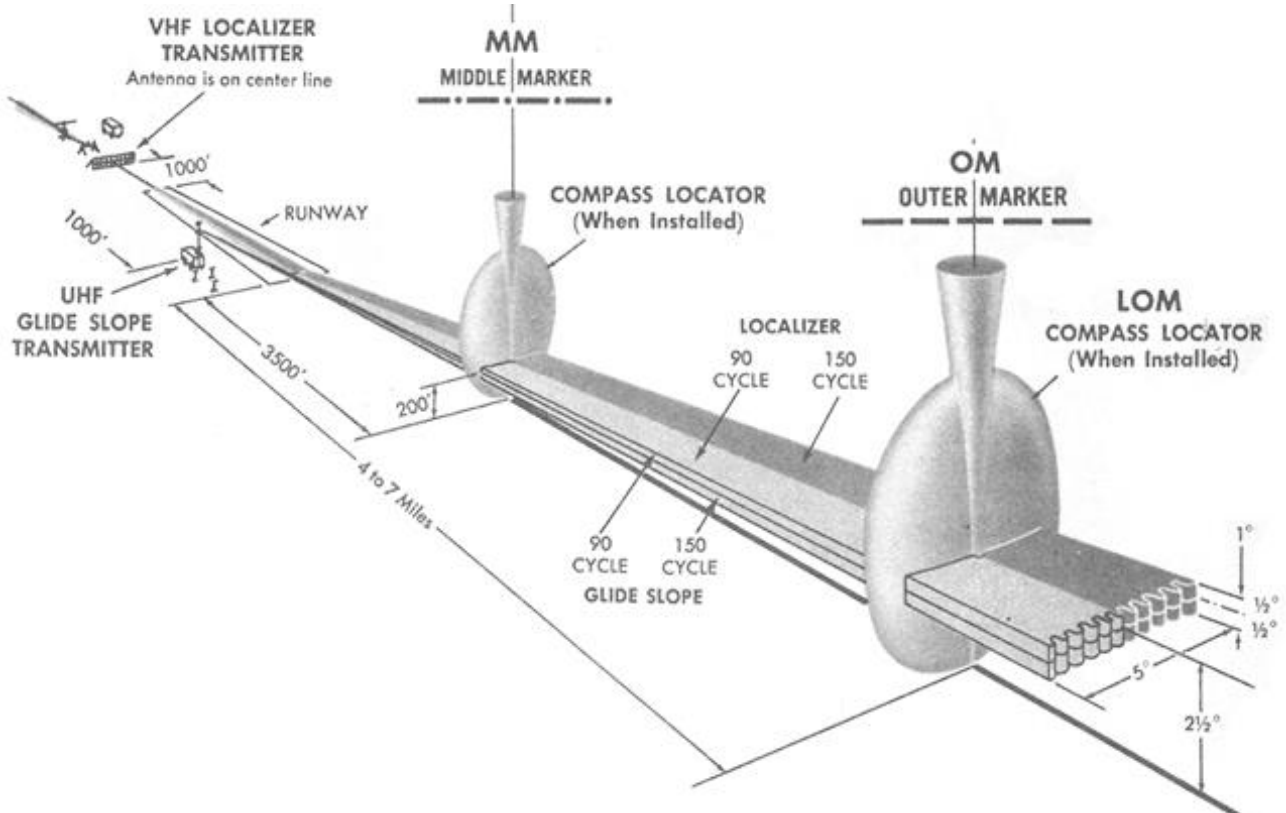
- The Localizer is generally an array of antennas that will give you a lateral reference to the center of the runway.
- The Glide Slope station will help you determine the descent speed you need in order to not smack the runway in a smoldering ball of fire.

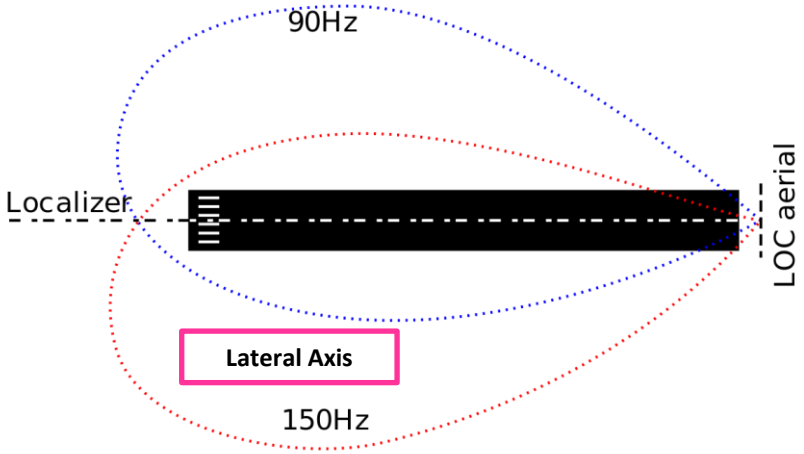
Localizer Array Station at Hannover

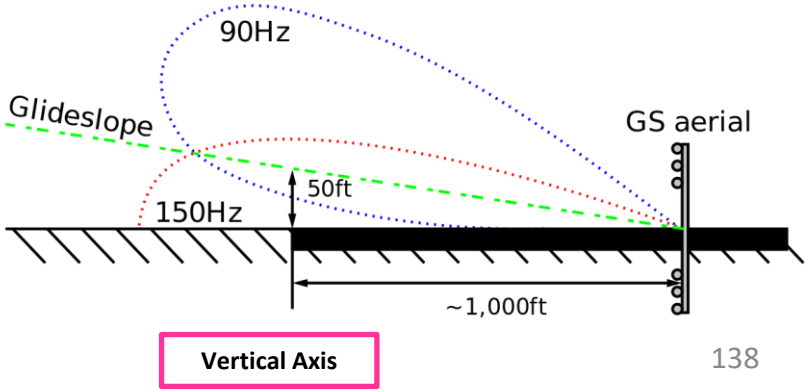


Glide Slope Station at Hannover

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



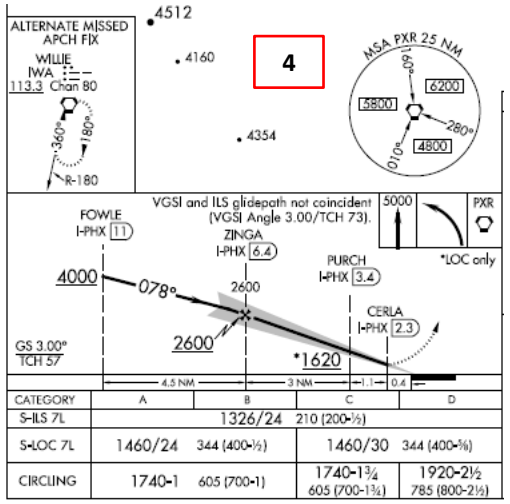


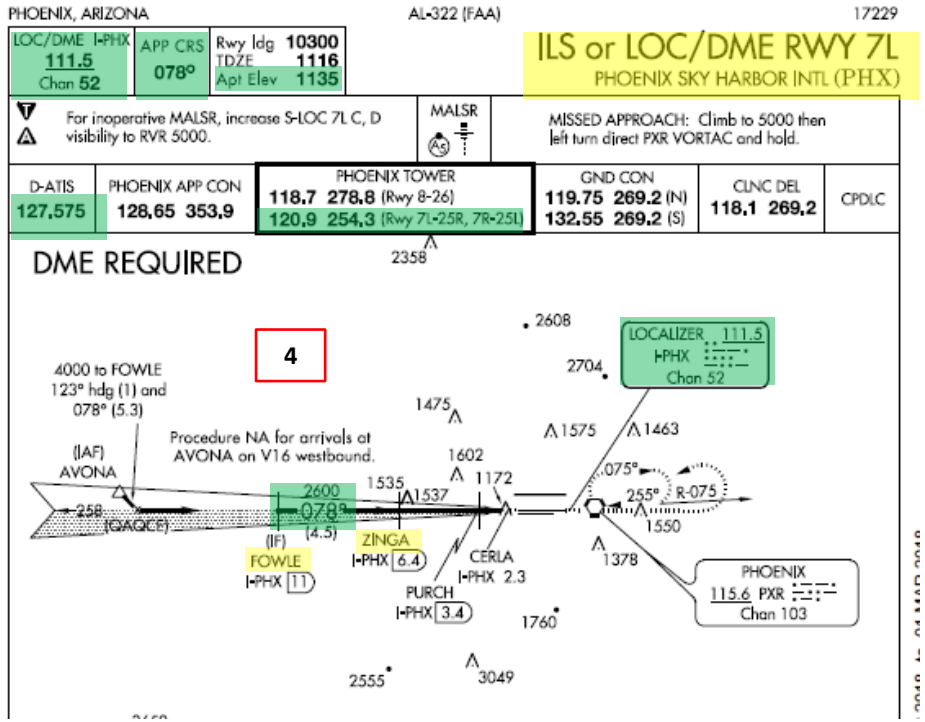


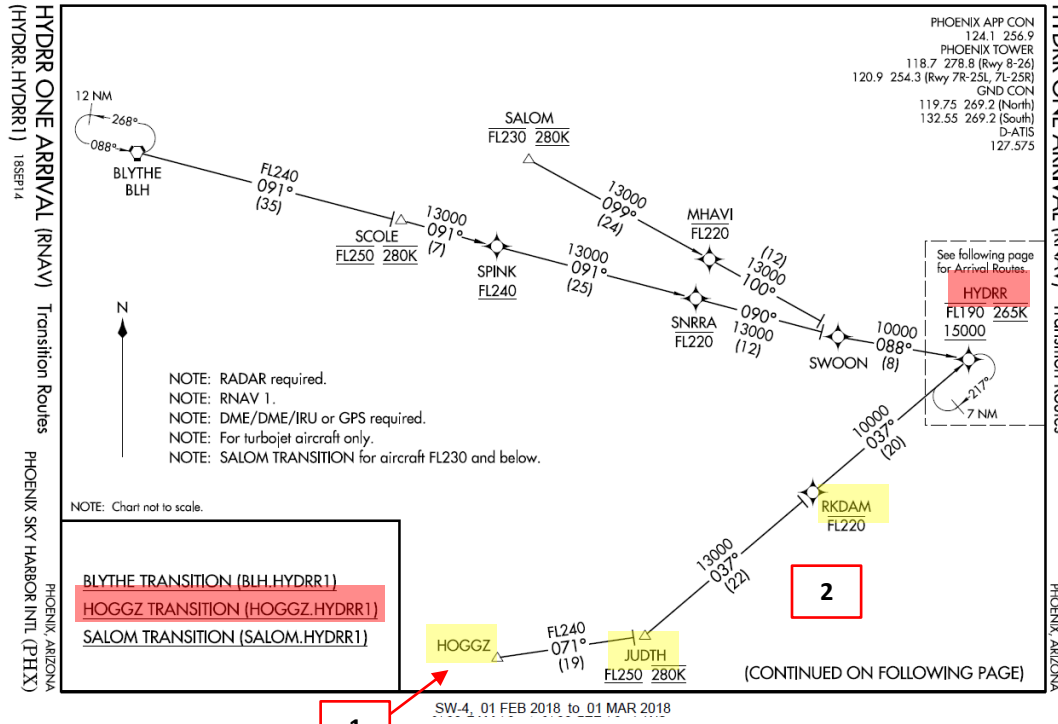
PLANNING THE APPROACH - STAR

These charts are for the STAR (Standard Terminal Arrival Route) from HOGGZ to Phoenix Sky Harbor International Airport (KPHX). We intend to:

1. Come from HOGGZ waypoint
2. Fly from HOGGZ towards the HYDRR ONE arrival route via HOGGZ -> JUDTH -> RKDAM -> HYDRR.
3. Follow the STAR (HYDRR -> GEELA -> PUNNT -> TEICH -> TESLE -> FALGO -> CADOR -> FOWLE)
4. Follow the approach towards the runway, guided by the KPHX airport's ILS (Instrument Landing System) via FOWLE -> ZINGA.
5. Land at Phoenix (KPHX) on **runway 07L** (orientation: 078 Left)







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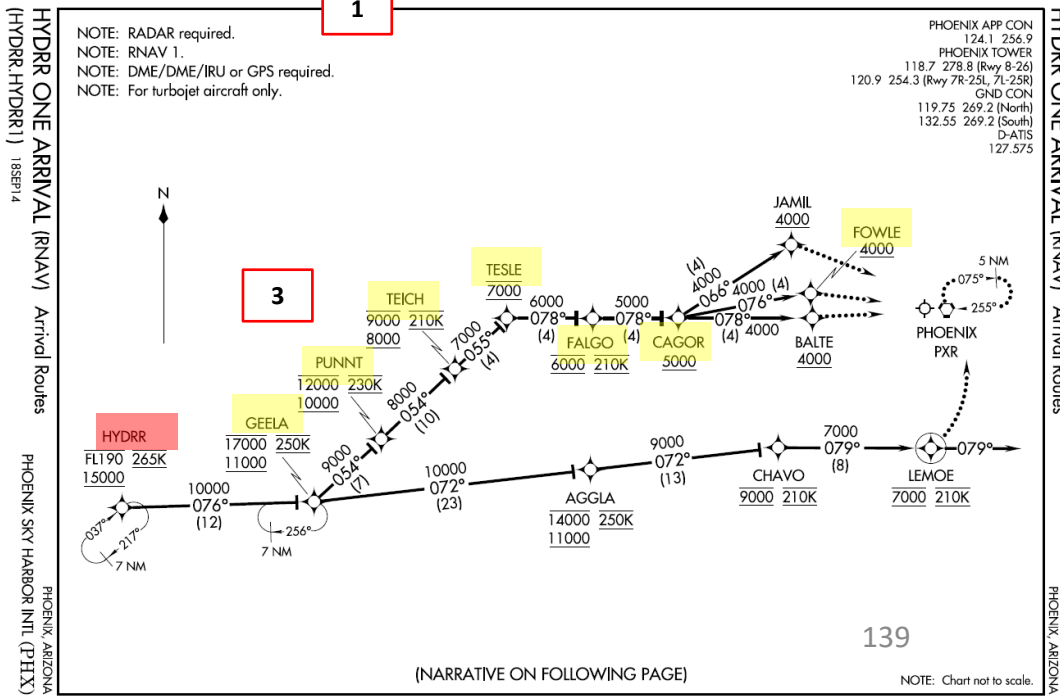


PLANNING DESCENT

Final Approach Course: 078
This is the heading you will take when approaching for final landing.

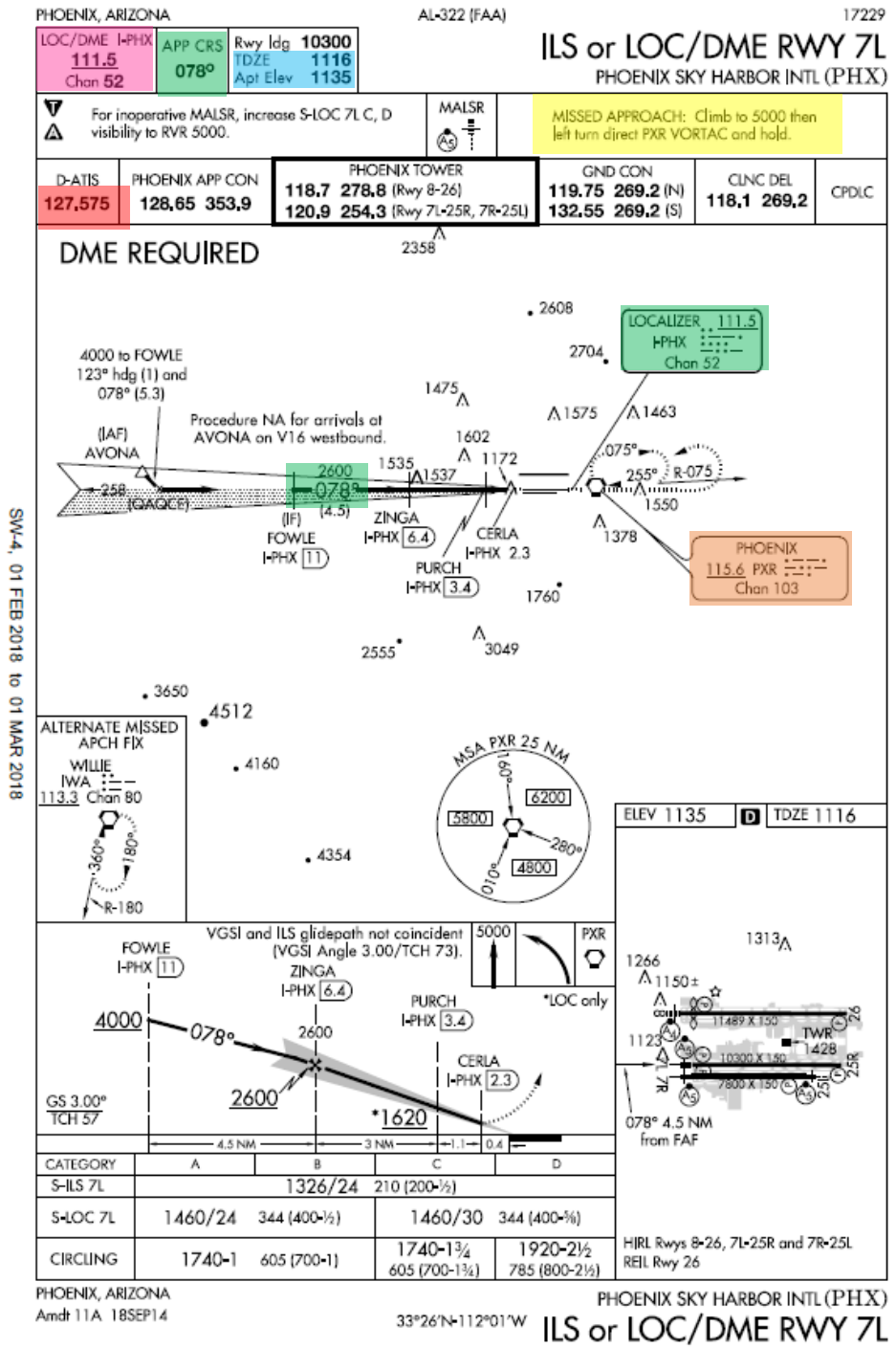
Minimums Decision Height: 200 ft
This is the minimum "decision height" (DH) during landing. If you go lower than 200 ft above ground level, you are committed to land no matter what happens. Above 200 ft, you can still miss your approach and go around. Take note of the Airport Elevation (1135) and the TDZE (Touchdown Zone Elevation) of 1116 ft.

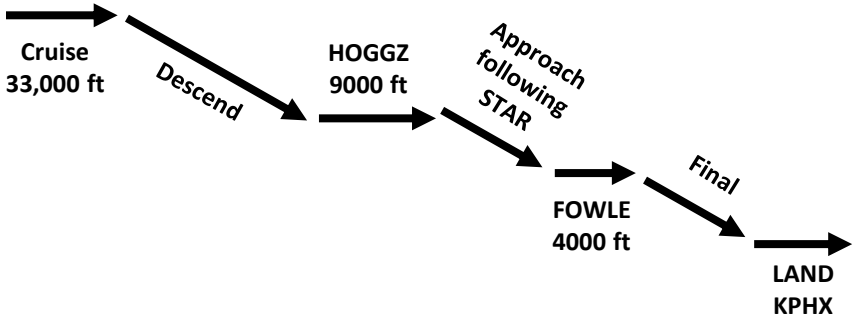
ILS Frequency: 111.5 MHz
This is the ILS system frequency you will track to guide your aircraft for landing.

ATIS Frequency: 127.575
The ATIS (Automatic Terminal Information Service) will provide you valuable information including wind direction and speed, and the altimeter setting required for landing.

Missed Approach Standby Frequency: 115.6 MHz
VOR PXR 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 to 5000 ft then take a left turn, direct to the PXR VOR and hold.

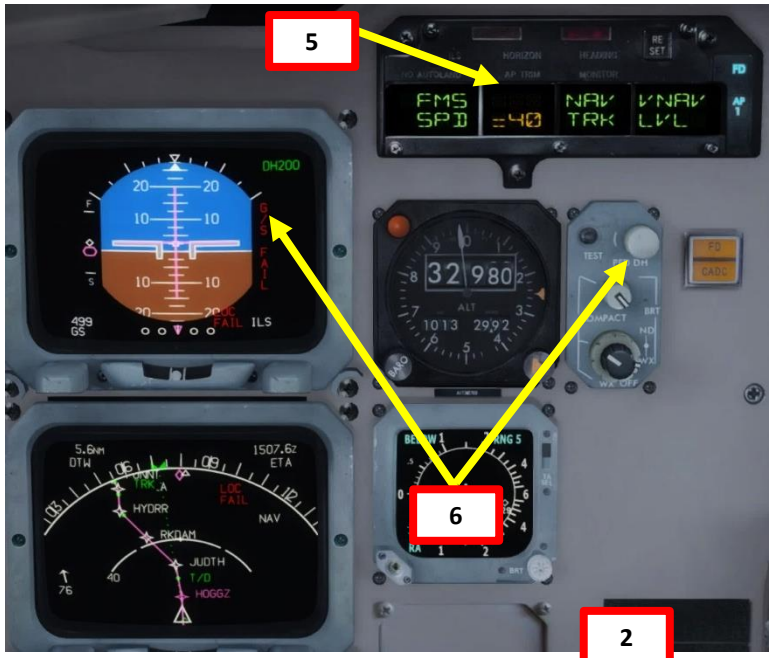




Here is a great link to know how to read these charts properly:
https://community.infinite-flight.com/t/how-to-read-an-approach-chart/8952

PLANNING DESCENT

1. We have already selected in our AFMC our Arrival runway as ILS7L and our arrival STAR "HYDRR1" and our Initial Approach Fix "FOWLE" at the beginning. Normally, we do this before we begin our approach. See the "AFMC SETUP – WAYPOINTS & AIRWAYS" section.
2. On FGCP (Flight Guidance Control Panel), set COURSES to Final Approach Course for runway 7L (078).
3. Set ILS frequency of 111.5 with the left VHF NAV knob
4. Set Missed Approach VOR frequency of 115.6 with the right VHF NAV knob
5. Set target altitude to 4000 ft (FOWLE waypoint altitude restriction) and left click to pull the knob to arm the ALT autopilot mode.
6. Set Decision Height (DH) to 200 ft
7. Press "LSHIFT+5" to make the TAKEOFF DATA 2D panel appear and click on DC9/80 TAKEOFF DATA field to switch to the LANDING DATA 2D panel.
8. Click on the airspeed indicator once to reset the V-speed bugs.
9. **Left click** on the airspeed indicator to set V-speed bugs to landing reference speeds for **flaps 40 deg**. If you want to set V-speed bugs to a landing speed for **flaps 28 deg**, **right click** instead.
10. Press "LSHIFT+5" to hide the LANDING DATA 2D panel.



DC9/80 TAKEOFF DATA

ARPT	FLIGHT	DATE	REGISTRATION
KSAN	-20		N9405T

RWY	RWY COND	WIND	WIND COMP
27	DRY	273/93	

OAT	QNH	A/P LEVEL	MAC TOW
-20	775		13.0

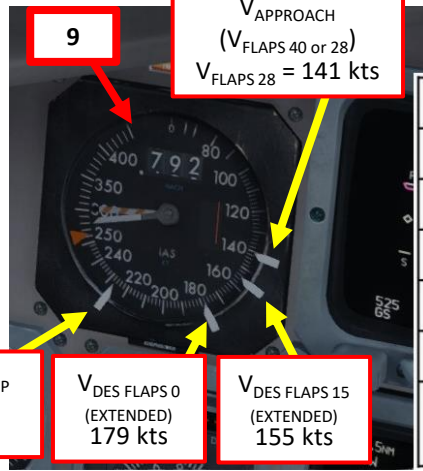
AIR FOIL A/I ON	MTOW	FLAP	ACT. TOW
	149491		125000

NOTES:

FLAP	ASS. TEMP.	
11		
	WET	DRY
V_1	124	133
V_R	140	140
V_2	148	148
FLAP RETR	164	
SLAT RETR	183	
FINAL SEG CL.	202	
CLEAN MAN.	228	

DC9/80 LANDING DATA

DRIFTDOWN > 18000 ft.	V_{MAN}	CONF.	V_{TH}
234			
FINAL SEGMENT CLIMB 202	228	UP RET	204
SLAT RETRACTION 183	179	0 EXT	161
FLAP RETRACTION 164	155	15 EXT	151
GO-AROUND 149	145	28 EXT	141
LANDING WEIGHT 125		40 EXT	133



$V_{APPROACH}$ ($V_{FLAPS\ 40\ or\ 28}$)
$V_{FLAPS\ 28}$ = 141 kts

$V_{DESCENT\ FLAPS\ UP}$ (RETRACTED) 228 kts

$V_{DES\ FLAPS\ 0}$ (EXTENDED) 179 kts

$V_{DES\ FLAPS\ 15}$ (EXTENDED) 155 kts

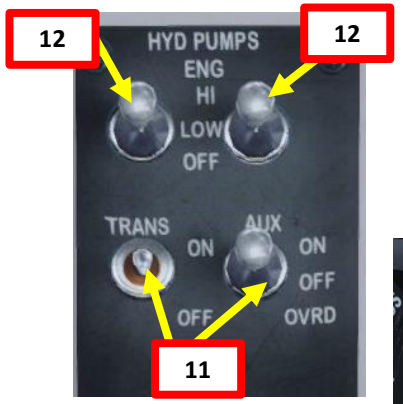
DC9/80 LANDING DATA

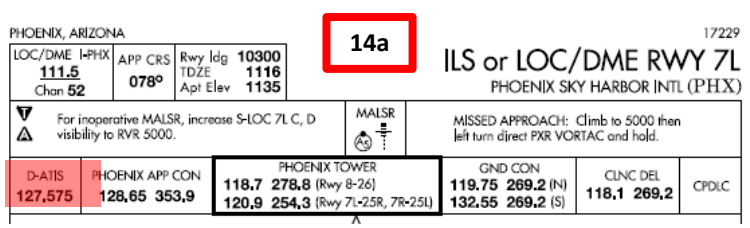
DRIFTDOWN > 18000 ft.	V_{MAN}	CONF.	V_{TH}
234			
FINAL SEGMENT CLIMB 202	228	UP RET	204
SLAT RETRACTION 183	179	0 EXT	161
FLAP RETRACTION 164	155	15 EXT	151
GO-AROUND 149	145	28 EXT	141
LANDING WEIGHT 125		40 EXT	133

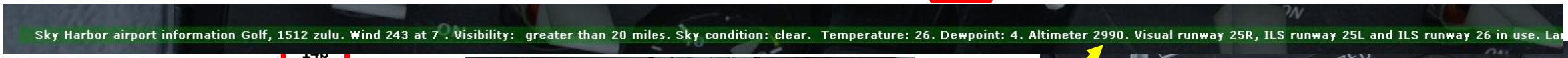
PLANNING DESCENT

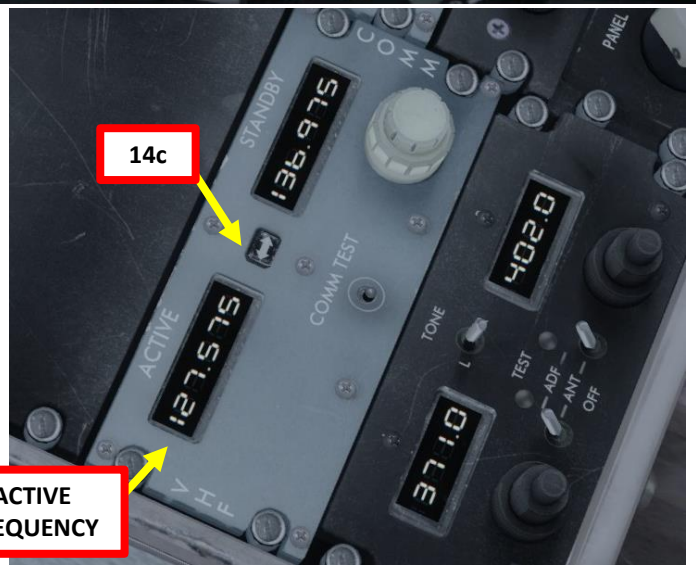
11. Set AUX & Transfer Hydraulic Pump switches to ON
12. Set both engine-driven Hydraulic Pump switches – HI
13. Set GPWS (Ground Proximity Warning System) TERRAIN switch – ON
14. If you have a weather add-on installed like Active Sky, you can get a weather report through the ACARS as shown in the FLIGHT PLANNING – ALTIMETER SETTING section.

    If you have no weather add-on installed, you can consult the KPHX ATIS system via the radio to get the altimeter setting.
    a) Consult the KPHX chart and find the Phoenix Sky Harbor ATIS Frequency (127.575).
    b) Set VHF-3 STANDBY radio frequency ATIS frequency (127.575)
    c) Click on the Transfer button to set the ATIS frequency to the ACTIVE frequency.
    d) You should receive the ATIS automated report on the radio for Sky Harbor Airport. The reported altimeter setting is 29.90 inches of Hg.
    e) You can click on the Transfer button to set the ATIS frequency back to the STANDBY frequency once you have the information you need.
15. Set Cabin Pressure LANDING BARO setting to 29.88 inches of Hg, as stated by ATIS.
16. Set TCAS (Traffic & Collision Avoidance System) antenna switch to scan BELOW aircraft for descent.





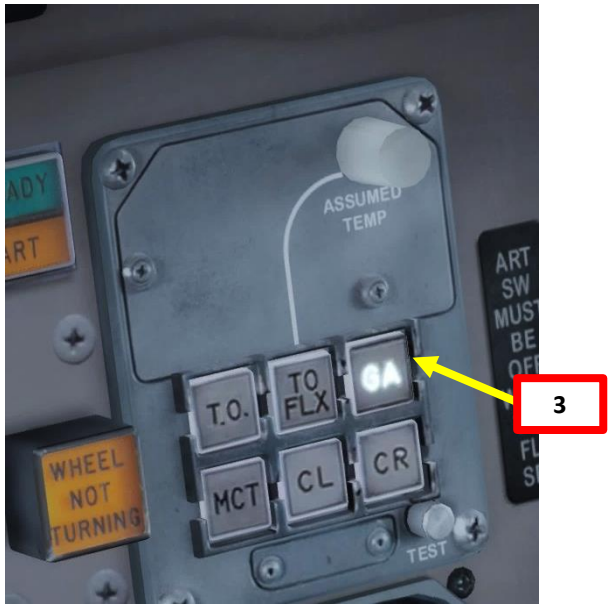




DESCENT & APPROACH

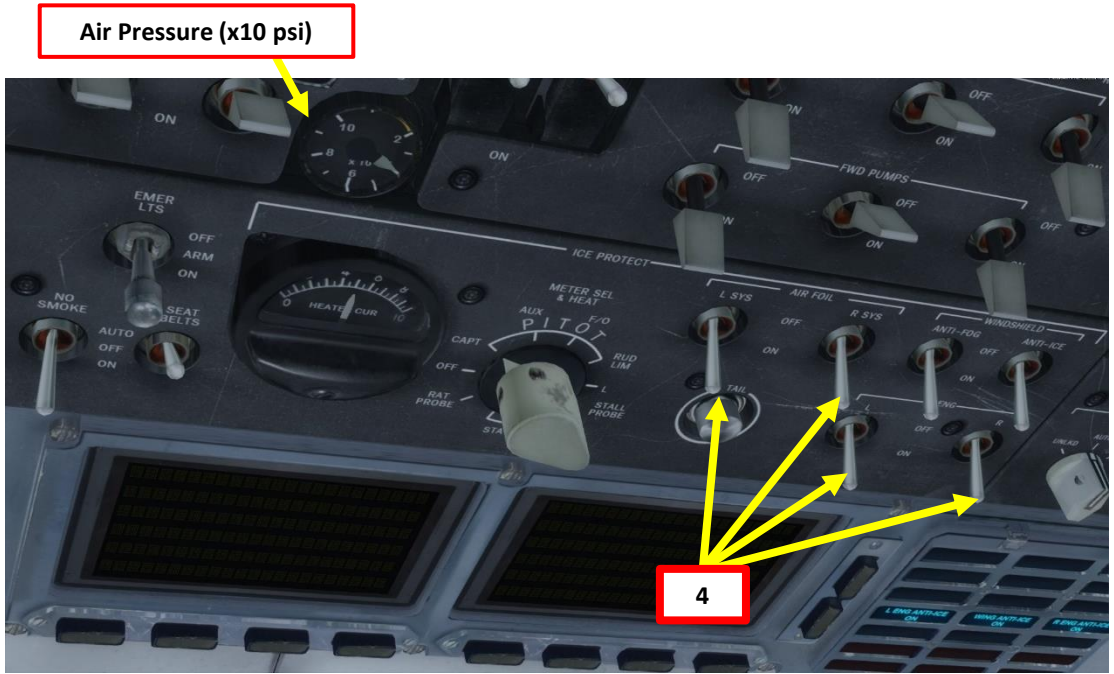
1. You will automatically start descending when reaching the T/D point, activating the VNAV DES mode. If for some reason you remain in VNAV LVL (level) mode, press the VNAV button on the glareshield to activate the VNAV DES (descent) mode.

   Alternatively, you can use another method to initiate descent. You can go In the DES page of the AFMC, click on the LSK next to DES NOW, and click the EXEC button. This will start a steep descent and the autothrottle will enter CLMP (Clamped) mode, meaning that you have to manually manage your descent speed by controlling the throttle levers. I do not recommend that method since it will not initiate a smooth transition to descent.
2. Set Thrust Rating to GA (Go-Around)
3. When reaching the transition level of 18000 ft, set barometric pressure to the altimeter setting specified by the ATIS (29.90 in Hg).



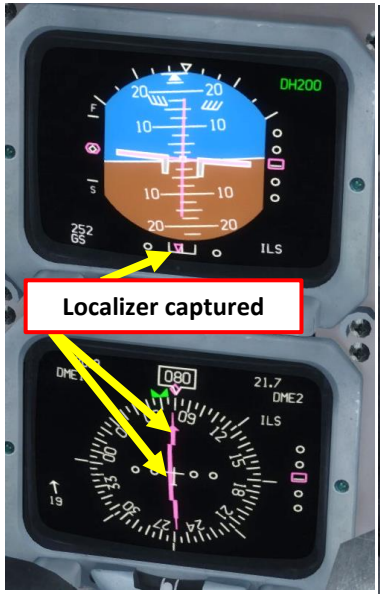
DESCENT & APPROACH

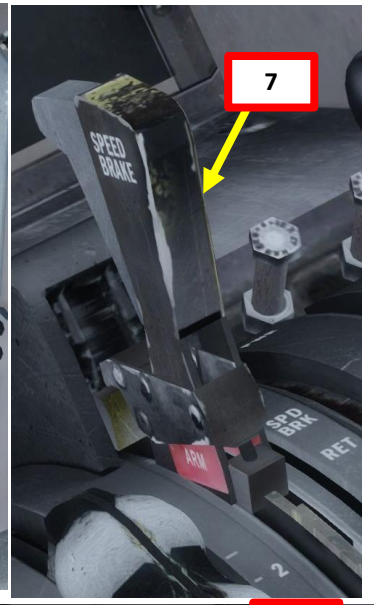
4. Once you start descending, make sure to check if there are cloud layers that you are likely to go through and check if the RAT (Ram Air Temperature) is greater than -6 deg C. If the temperature is below -6 deg C, you need to engage the AIR FOIL Wing Anti-Ice switches and the ENG Anti-Ice switches to prevent icing from occurring. Take note that you need at least 20 psi of bleed air pressure to use AIR FOIL anti-ice, which will require you to throttle up above IDLE. Engaging AIR FOIL anti-ice with a low pressure will trigger the " ICE PROTECT TEMP LOW" (appears when air delivered to pneumatic crossfeed duct is below normal operating temperature due to low engine power or a malfunction in temperature control system).
5. When reaching FL100 (10000 ft), set Wing Landing lights to EXT ON and Nose Lights to BRT.

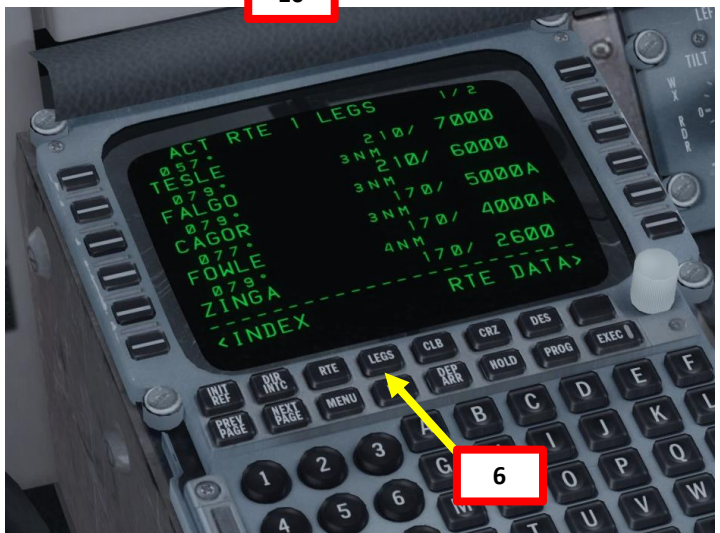


SET UP APPROACH

6. Consult the LEGS page of the AFMC to consult the altitude and airspeed restrictions of the approach waypoints. We will maintain a descent speed of 210 kts until FALGO, then slow down to 170 kts or below at CADOR, then level off at 4000 ft at FOWLE and descend to 2600 ft to ZINGA.
7. Arm Speed Brake Lever (UP)
8. Press the VOR/LOC button to arm Localizer mode.
9. When localizer is captured (about when you are lined up with FALGO), the FMA will display LOC CAP (Localizer Capture).
10. When localizer lateral deviation is small enough, the autopilot will track the localizer and the FMA will display LOC TRK (Localizer Tracking).

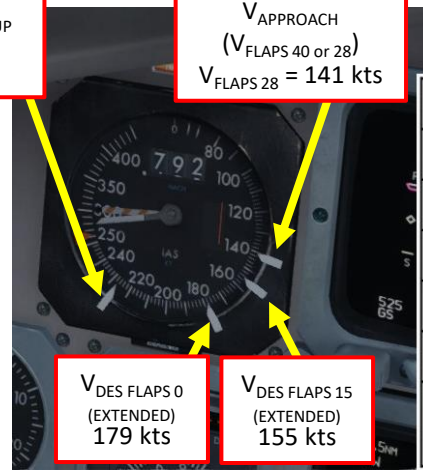






SET UP APPROACH

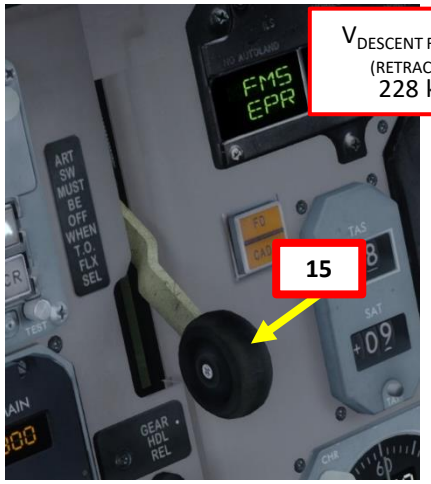
11. When localizer is tracked, press the ILS button to arm ILS (glide slope) mode.
12. When glide slope is captured the FMA will display G/S CAP (Glide Slope Capture).
13. When glide slope vertical deviation is small enough, the autopilot will track the glide slope and the FMA will display G/S TRK (Glide Slope Tracking).
14. When you reach FALGO and start approaching FOWLE (initial approach fix), your airspeed limit will be 170 kts, which means that we can start deploying our flaps since the maximum speed for flaps extension at 0 deg is 179 kts.



DC9/80 LANDING DATA			
DRIFTDOWN > 18000 ft. 234	V_{MAN}	CONF.	V_{TH}
FINAL SEGMENT CLIMB 202	228	UP RET	204
SLAT RETRACTION 183	179	0 EXT	161
FLAP RETRACTION 164	155	15 EXT	151
GO-AROUND 149	145	28 EXT	141
LANDING WEIGHT 125		40 EXT	133

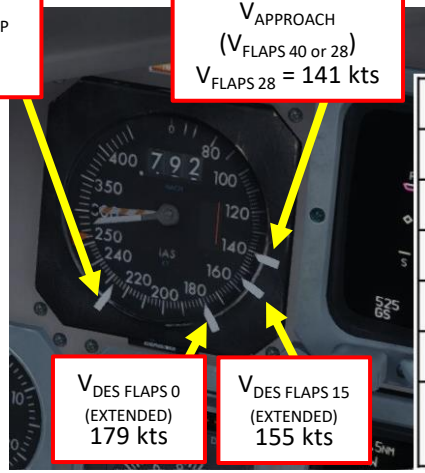
SET UP APPROACH

15. Deploy landing gear at an airspeed lower than 250 kts
16. Set SPD knob to 170 kts (FOWLE speed limit). Orange speed command bug will be set as well.
17. Once aircraft has slowed down to 170 kts, set flaps lever to 0 deg.
18. Set SPD knob to 155 kts. Orange speed command bug will be set as well.
19. Once aircraft has slowed down to 155 kts (flaps 15 configuration speed) , set flaps lever to 15 deg.
20. Set SPD knob to 146 kts. Orange speed command bug will be set as well.
21. Once aircraft has slowed down to 146 kts ($V_{APPROACH}$ = $V_{FLAPS\ 28}$ + 5 kts), set flaps lever to 28 deg. *Alternatively, you can set flaps 40 for landing if you prefer.*
22. Once flaps are deployed to LANDING configuration (either 28 or 40), Arm and Set Autobrake to MED.



$V_{DESCENT\ FLAPS\ UP}$ (RETRACTED) 228 kts

$V_{APPROACH}$ ($V_{FLAPS\ 40\ or\ 28}$) $V_{FLAPS\ 28}$ = 141 kts



$V_{DES\ FLAPS\ 0}$ (EXTENDED) 179 kts

$V_{DES\ FLAPS\ 15}$ (EXTENDED) 155 kts

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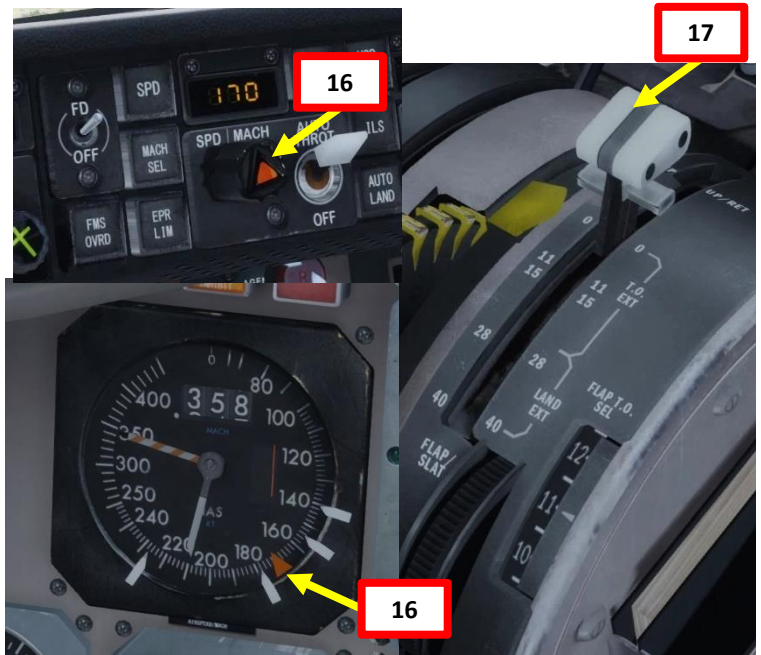
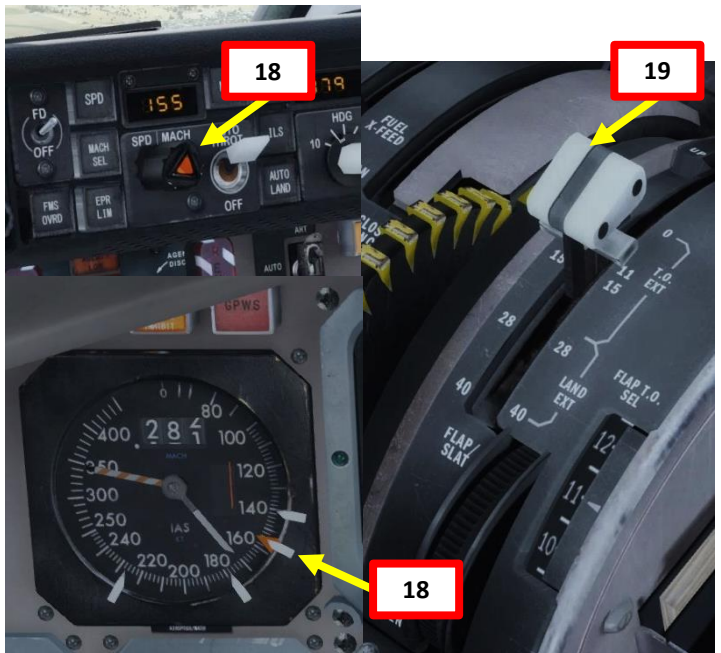
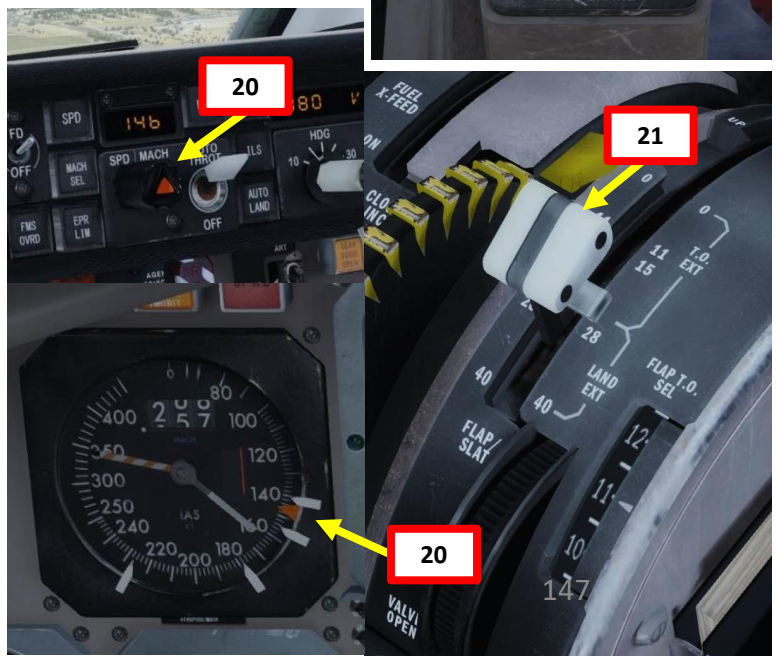






SET UP APPROACH

FINAL APPROACH

1. To use the Autoland system, make sure that you have initially done the pre-flight test prior to takeoff.
2. **NOTE**: If the pre-flight test hasn't been performed beforehand on the ground, the NO AUTOLAND annunciation will flash and inhibit the Autoland system. You'll have to land using the ILS. Too bad!
3. If the pre-flight test has been done already, the LND (Autoland) mode will be armed on the Flight Mode Annunciator when you press the AUTO LAND button.
4. Once localizer (lateral component) and glide slope (vertical component) of approach path are both captured and tracked by autopilot, the autopilot will switch to AUT G/A mode (Autoland) on the Flight Mode Annunciator once flying below 1500 ft (radar altimeter altitude).

NOTE: If for some reason you decide to do a manual landing instead, a good procedure is to disconnect the Autopilot switch 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 past DH (decision height).

FINAL APPROACH

LANDING

1. At your Decision Height (200 ft), you will hear the « Minimums » audio cue. Below this altitude, you are now commited to land.
2. At 100 ft, if autopilot remains engaged, NO FLR (No Flare) flashes in the pitch FMA.
3. At 50 ft, if autothrottle remains engaged, RETD (Retard Throttle) flashes in the Autothrust FMA.
4. Throttle back to IDLE.

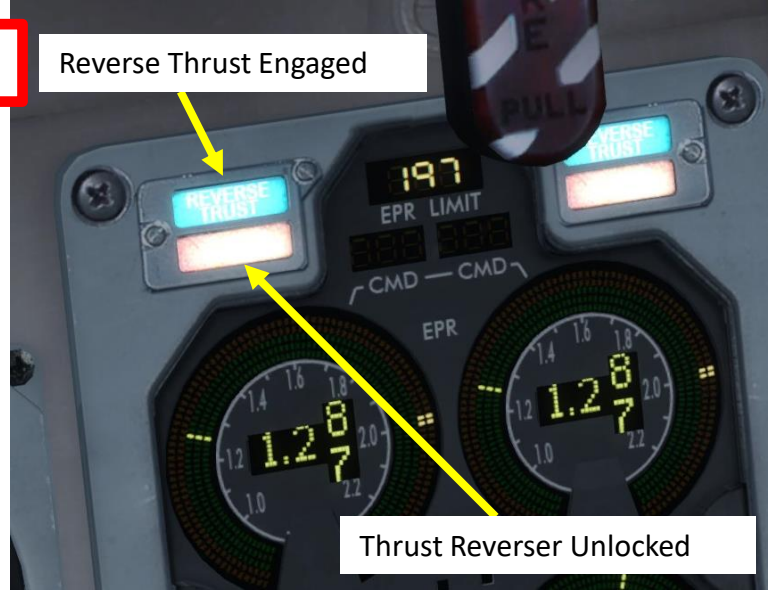
LANDING

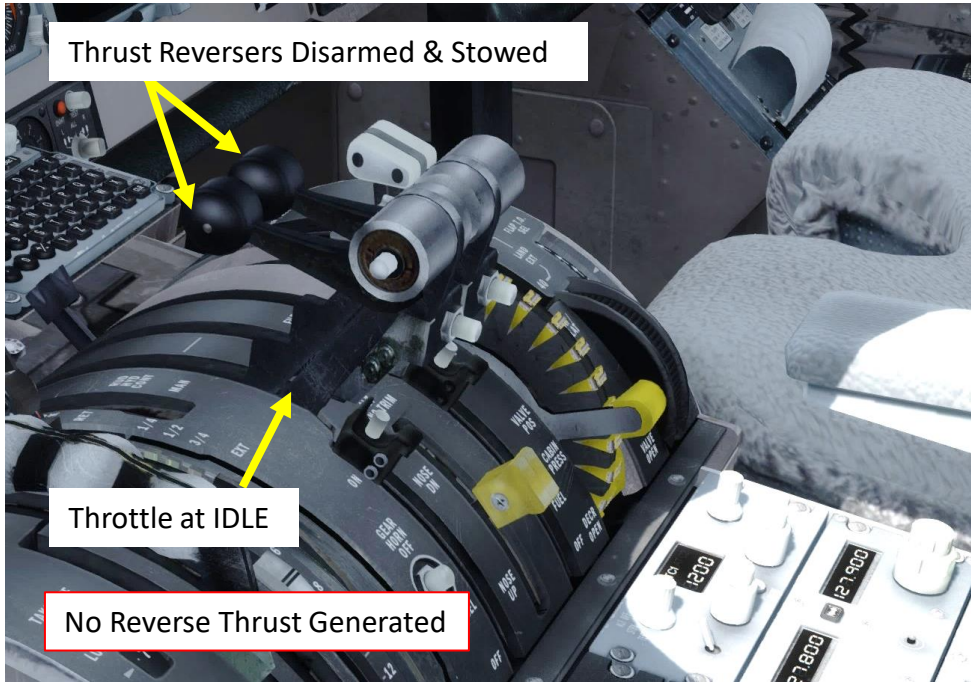
5. On touchdown, push the nose into the ground to improve adherence with the runway and maximize braking (the Autobrake system will already brake for you)

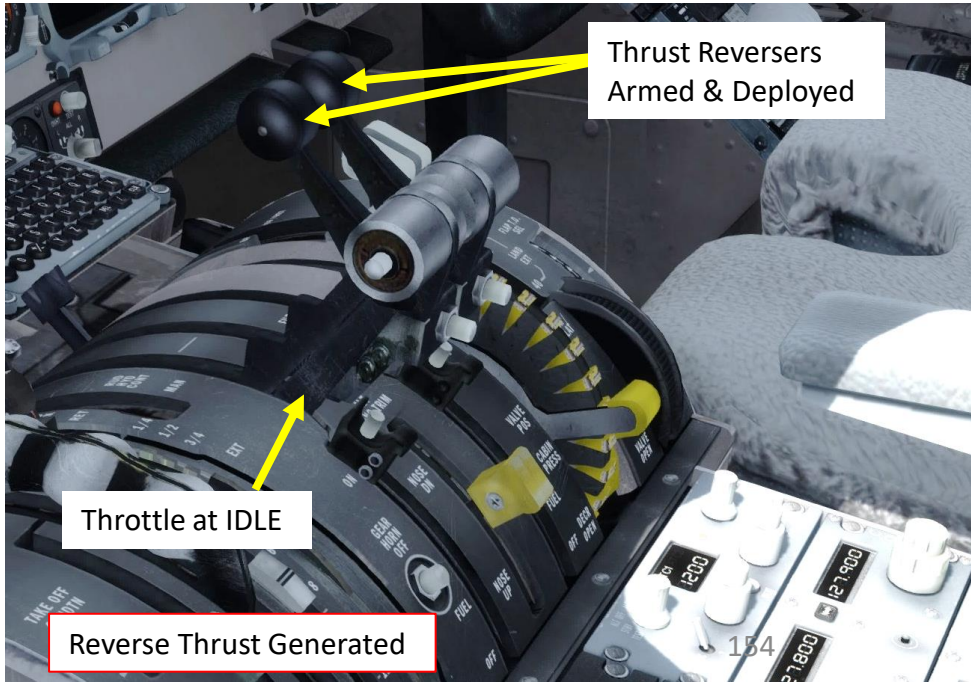
LANDING

LANDING

6. Press and hold “F2” (“Throttle decrease quickly” binding) to deploy thrust reversers until you slow down enough to vacate the runway safely.
7. Once landed safely, retract slats and flaps, stow thrust reversers and set throttle to IDLE to taxi towards parking spot.





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