X-Plane
Airbus A330-300

Pilot’s Operating Manual

Author: Julian Lockwood (julian@x-plane.com)

Disclaimer

The information contained in this document is for **simulation use only**, within the X-Plane flight simulator. This document is not subject to revision and has not been checked for accuracy. This document is intended for entertainment only and may not to be used in situations involving real-life aircraft, or real-life aviation.

Distribution

This document may be copied and distributed by Laminar Research customers and developers, for entertainment. It may also be distributed with third-party content developed for X-Plane.

Contents

Background: The Airbus A330

The Airbus A330 is a wide-bodied, twin-jet aircraft that was launched in 1987, and derived from the company's first airliner, the A300. The initial variant was the A330-300, which first flew in November 1992, and entered service in 1994.

The A330 was developed in parallel with the four-engined A340, and shares the same airframe, 'fly-by-wire' control system and avionics. The A330 is available with a choice of three engines: the General Electric CF6, Pratt & Whitney PW4000, or the Rolls-Royce Trent 700.

The A330-300 seats up to 440 passengers and has a range of 6,300 nautical miles. Other variants of the original A300 series include the A330-200 (with shorter range and fewer passengers), the A330-200F (for cargo) and the A330 MRTT (tanker).

The A330neo (New Engine Option) was announced in 2014, featuring Rolls Royce Trent 7000 turbofans and wingtip 'sharklets', providing increased fuel efficiency.

The major components for the aircraft are manufactured at plants in the UK, France, and Germany. The final assembly line is located at the Airbus facility at Toulouse-Blagnac airport, in Colomiers France.

The first customer for the A330 was 'Air Inter', with commercial service between Paris Orly and Marseille beginning in January 1994. Orders followed later that year from Malaysia Airlines, Thai Airways and Cathay Pacific.

The A330 features side-stick controls (in place of conventional yokes), coupled to the 'fly-by-wire' computer-controlled system that is common to the A320, A330, A340 and A350 families. This uses three primary, and two secondary flight control systems. Inputs provided by the pilots via the side-stick controls are transmitted as electronic signals via wires, instead of conventional cables. The flight control computers determine how to move the control surfaces (ailerons, elevators, rudder and speed-brakes) to provide the necessary response, while also remaining inside a safe flight 'envelope' that ensures the aircraft does not exceed it's structural, or performance capabilities.

By the end of 2022, a total of 1,774 orders had been received across all A330 variants, with 1,560 delivered and 1,467 currently in service. The A330 is the most popular variant, with 784 orders and 776 deliveries. The largest operator of the A330 is currently Delta Air Lines, with 62 aircraft in service.

A330-300 Series Specifications

Engines:

Model	--	2 x Rolls Royce Trent 700 turbofans
Power	--	2 x 70,000 lb. thrust

Fuel:

Capacity	--	240,000 lbs. / 109,000 kg.
Fuel	--	Jet A-1
Fuel Burn (average)	--	15,800 lbs. per hour

Weights and Capacities:

Max. Takeoff Weight	--	533,000 lbs. / 242,000 kg.
Max. Landing Weight	--	412,000 lbs. / 187,000 kg.
Empty Operating Weight	--	271,000 lbs. / 123,000 kg.
Maximum Payload	--	114,000 lbs. / 52,000 kg.
Maximum Passengers	--	440

Performance:

Cruise Speed	--	Mach 0.86
Max Operating Speed	--	Mach 0.89
Final Approach Speed		140 - 160 KIAS (full flap/gear down)
Takeoff Distance	--	8,200 ft. / 2,500 m.
Landing Distance	--	4,750 ft. / 1,450 m
Range	--	6,000 nm
Service Ceiling	--	41,000 ft. / 12,500 m.

The X-Plane A330-300

Unlike other flight simulators, X-Plane employs a technique called “blade element theory. This utilizes the actual shape of the aircraft (as modeled in the simulator) and breaks down the forces on each part separately. The force of the “air” acting on each component of the model is individually calculated, and combined, to produce extremely realistic flight.

When you “fly” an airplane in X-Plane, your control inputs move the control surfaces of the aircraft, and these interact with the virtual flow of air around it. As such, you may consider that you are really flying the aircraft.

Due to the use of ‘Blade Element Theory’ in X-Plane, an aircraft must be modeled with great accuracy, in order that it behave like its real-life counterpart. This means the fuselage, wings and tail surfaces must be the right size and shape, the center of lift and center of gravity must be in the right places, and the engine(s) must develop the right amount of power. In fact, there are a great many properties that must be modeled correctly to achieve a high-fidelity flight model.

The A330-300 featured in X-Plane has been modeled by our design team with a degree of accuracy that ensures its flight characteristics are like the real aircraft. However, despite this, some differences will be apparent, because even the smallest factor plays into the ultimate behavior of the aircraft, both in real life, and in X-Plane. The systems modeling of this aircraft involves some compromise too, because of the degree of complexity present in the real aircraft. However, in most cases, the actual A330-300 procedures could be followed when operating the X-Plane version. Checklists are presented later in this document (with modifications to suit this specific simulation platform and model). It is recommended that X-Plane pilots follow those procedures to extract the maximum capability and enjoyment from this aircraft.

Views and Controls

The X-Plane A330-300 features a detailed 3-D cockpit with a great many of the primary controls and systems modeled, including: Flight controls (yoke, rudder pedals, thrust levers, prop levers, condition levers), electrical systems, pneumatic systems, navigation aids, radios, autopilot, interior and exterior lighting, and fuel systems.

Creating “Quick Look” views

Before discussing the controls, we suggest that the pilot establish a series of “Quick Look” views that will be helpful later when interacting with this particular aircraft. If you are not familiar with this technique, more information is available in the X-Plane Desktop Manual.

The following “Quick Look” views are recommended for the B737-800, in a situation where the pilot is not using a Virtual Reality (VR) headset, or a head tracking device. To some degree, these correspond (on the keyboard Number Pad) with their physical locations in the cockpit, and are therefore logical and easy to recall later.

Control Display Unit (CDU)

Pilot’s Primary Instrument Panel

Thrust Lever Quadrant and Center Console

Co-Pilot’s Primary Instrument Panel

Pilot’s EFIS (Electronic Flight Instrument System) Control Panel / Autopilot

Electronic Centralized Aircraft Monitor (ECAM)

Co-Pilot’s EFIS (Electronic Flight Instrument System) Control Panel

Pilot’s Left
Glance View

Overhead Panel

Co-Pilot’s Right
Glance View

Operating the controls

This section covers the basics techniques for the operation of the controls that you will encounter in the cockpit of an X-Plane aircraft. Control manipulators are consistent across all X-Plane aircraft. However, the specific **ILLUSTRATIONS** in THIS chapter may differ from YOUR aircraft.

Toggle and Rocker switches are operated with a single click of the mouse. Place the mouse pointer slightly above, or below, the center point of the switch, depending on the direction you intend to move it. A small white arrow is displayed to confirm the intended direction. Click the mouse button to complete the operation.

Levers are operated by assigning a peripheral device to the necessary axes in X-Plane (throttle, prop, mixture etc.). More information is available in the X-Plane Desktop Manual.

Levers may also be operated by clicking and dragging the mouse pointer.

Some rotary dials are operated by positioning the mouse pointer on top of the control, and then a click and drag to the right, or to the left. The same can be accomplished using the mouse wheel - if one is present on your device.

Other rotary controls require finer precision. When the mouse pointer is positioned slightly to the left of such a control, a counterclockwise arrow appears. This indicates that you are ready to rotate the control counterclockwise. Correspondingly, a clockwise arrow indicates that you are ready to rotate the control clockwise. After positioning the mouse pointer, changing the frequency in the desired direction is accomplished in two ways:

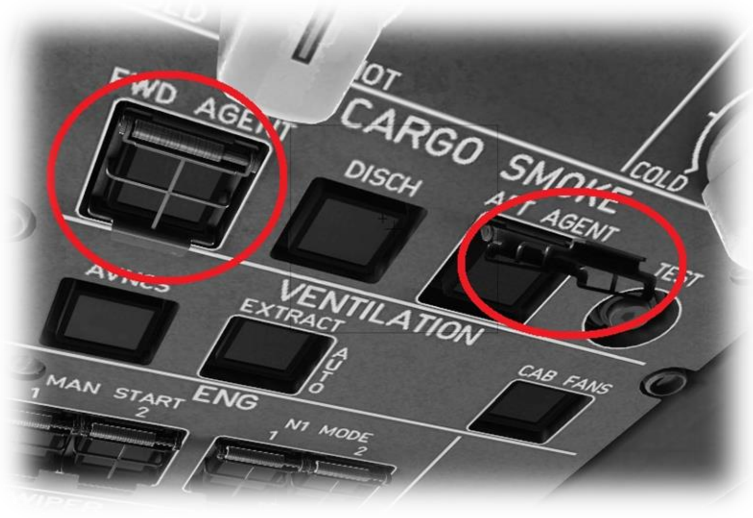
i) By rolling the mouse wheel forwards, or backwards.

ii) By clicking (dragging is not supported here)

Radio and Navigation frequency rotary dials are grouped together as "twin concentric knobs". Here, the larger rotary is used to tune the integer portion of the frequency, and the smaller rotary is used to tune the decimal portion. Each works independently, using the same technique, as described above.

Push buttons are operated by a mouse point and click.

These are usually toggle operations.



Guarded switches are used in situations where accidental activation of the switch must be prevented. To operate a guarded switch, the guard must first be opened. Do this by positioning the mouse pointer over the switch until the two vertical white arrows are displayed. Click once. If the switch is currently closed, it will open, and vice-versa. After the guard has been opened, the switch may be operated like a toggle and rocker switch (see above).

The Yoke / Stick / Joystick is operated by assigning a peripheral device to the "roll" and "pitch" axes in X-Plane. This is discussed in greater detail later in the guide.

The Rudder Pedals are operated by assigning a peripheral device to the "yaw" axis in X-Plane. If your rudders also support toe braking, create additional assignments to the "left toe brake" and "right toe brake" axes in X-Plane. This is discussed in greater detail later in the guide.

Note that you may also assign keys on your keyboard, or buttons on your external peripheral to move the rudder to the left or right, or to center the rudder.

Assigning peripheral devices

This section of the manual deals with an “ideal” scenario, in terms of the assignment of external computer peripherals to operate the X-Plane B737-800 with the highest degree of realism. If you are missing some of these external peripherals, you may elect to choose a different configuration that better suits your hardware.

This aircraft is equipped with side sticks, for roll and pitch control.

To simulate this, assign the lateral axis of your yoke (or joystick) to the “Roll” command in X-Plane, and the vertical axis to the “Pitch” command.

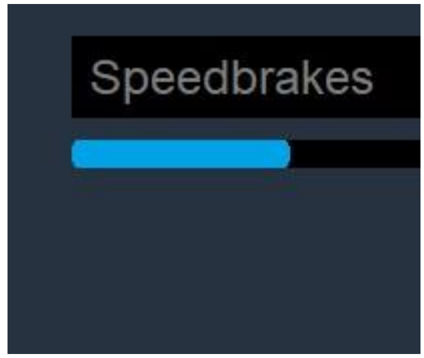
More information is available in the X-Plane Desktop Manual.

This aircraft is equipped with dual thrust levers – which control the thrust generated by the left and right engines respectively.

To simulate this, assign two levers on your quadrant to the “Throttle 1” and “Throttle 2” property in X-Plane.

This aircraft is equipped with a Flap lever, which controls the deployment of the flaps for takeoff and landing.

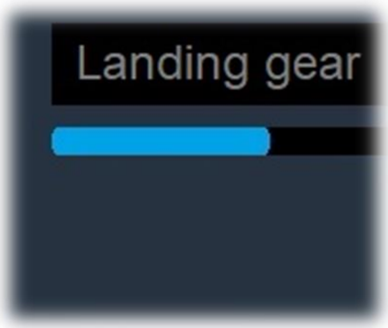
To simulate this, assign a peripheral lever to the “Flaps” property in X-Plane.
.



This aircraft is equipped with a Speedbrakes lever, which controls the deployment of the speed brakes above the wings. These reduce lift, and slow the aircraft, for situations that require a rapid decent without a corresponding increase in speed.

To simulate this, assign a peripheral lever to the "Speedbrakes" property in X-Plane.

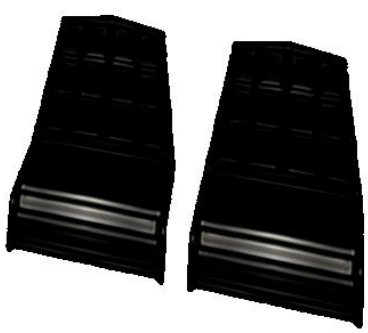
.

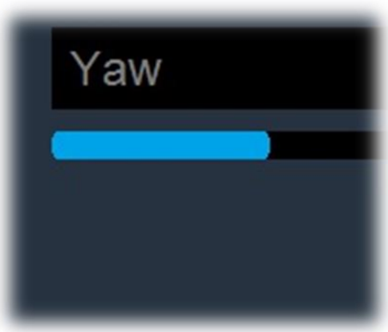


This aircraft is equipped with a Landing Gear lever.

To simulate this, assign a peripheral lever to the "Landing gear" property in X-Plane.

.



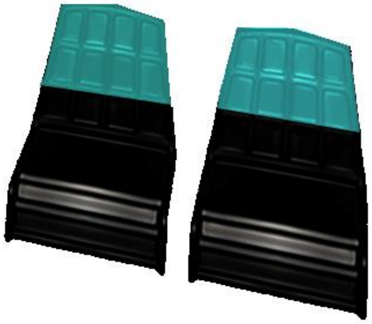


This aircraft has rudder control pedals, that actuate the rudder (integrated into the tail assembly).

The rudder "yaws" the aircraft to the left or right. This mostly applies to the takeoff, approach, and landing phases, to maintain the desired course without applying roll.

In a conventional aircraft, the rudder is also used to make coordinated turns, but this is automated by the Airbus fly-by-wire system.

To simulate this, assign the yaw axis of your pedals peripheral device (or a joystick axis) to the "yaw" property in X-Plane.



This aircraft has rudder toe-braking, actuated by the tip of the rudder pedals.

To simulate this, assign the brake “toe-tipping” motion of each individual pedal (or a joystick axis) to the “left toe brake” and “right toe brake” property in X-Plane.

Airbus Flight Control Systems

All contemporary Airbus aircraft (excepting the A300 and A310) operate ‘Fly-By Wire’ computer control systems that enforce the Airbus flight control laws – a set of protocols that govern how the aircraft responds to pilot input.

The A330 has a total of five flight-control computers – three primary computers (PRIM1, PRIM2, PRIM3) and two secondary computers (SEC1, SEC2). If necessary, the aircraft may be operated by any single flight control computer, in the simplest of Airbus flight control laws – ‘Direct Law’.

The flight control surfaces are electronically, or hydraulically actuated, and the computers act to prevent the aircraft from exceeding the safe flight envelope in terms of pitch, roll, angle of attack, and airspeed.

Three flight control laws are supported: Normal Law, Alternate Law and Direct Law. Alternat Law is further refined into Alternate Law 1 and Alternate Law 2.

Normal Law

Normal Law provides control of pitch, roll and yaw during normal flight.

Ground mode

Ground mode is enabled when the aircraft is on the ground. There is a direct relationship between the sidestick pitch input and elevator response.

Flight Mode

Flight Mode progressively replaces ground mode over a 5-second interval once the aircraft leaves the ground and remains in effect until the aircraft descends below 100 feet during the landing phase. Flight Mode incorporates pitch attitude, angle-of-attack, load factor, high-speed and bank angle protections.

When the sidestick is neutral, the flight control system maintains a load factor of 1g. When making turns, the load-factor is governed automatically, and is proportional to the side-stick deflection. Additionally, during turns, the flight control system automatically trims as required to maintain level flight (for bank angles up to 33°). In the event the aircraft is climbing or descending during a turn, the system attempts to maintain the original geometrical path in 3D space. This means that no sidestick back pressure need be applied by the pilot during a turn. However, if the bank angle exceeds 33°, or the load exceeds 1.3g, the auto-trim disengages.

The flight control system ensures load factor remains within a range of -1g to +2.5g, and pitch between -15° and +30°. The pilot is therefore unable to exceed these limitations, irrespective of side stick input.

At the lower end of the speed scale (amber band) the system will ensure the angle of attack does not exceed the maximum permittable (designated a-max).

High speed protection automatically engages when exceeding critical airspeed (Vmo). The system reduces the side-stick pitch authority and applies a permanent nose-up command, until the speed is below Vmo, at which time Normal Law resumes.

When making a turn, the system will not allow the aircraft to exceed a bank angle of 67°, even with maximum side-stick deflection, and will return to a bank angle of 33° when pressure is released.

Flare Mode

This mode automatically engages when the radar-altimeter records an altitude of 100 feet AGL, or less. Pitch inputs made with the side stick are directly translated into a corresponding movement of the elevator. When the altitude is 50 feet or less, the system commands a nose-down trim that requires the pilot to compensate with increased pitch-up, to achieve the desired flare at touchdown.

Alternate Law

Alternate Law comes into effect in the event of a failure of one or more critical flight control components.

Alternate Law 1 (ALT1)

This law comes into effect in the event of a failure of both elevators, yaw damper, flaps or slats. Lateral control is not affected and continues to follow Normal Law. However, the system no longer provides automated pitch protection.

Alternate Law 2 (ALT2)

This law comes into effect in the event of a failure of two IRS/ADR units, faults associated with the ailerons or spoilers, or loss of thrust from both engines. Normal Law for lateral control is no longer available and is replaced by Direct Law (see below). The system no longer provides automated pitch protection, or bank angle protection.

Direct Law

This law comes into effect in the event of total failure of the flight computers or IRS/ADR units, faults in both elevators, or loss of thrust from both engines. Inputs made by the pilot are translated directly into the corresponding movement of the control surfaces.

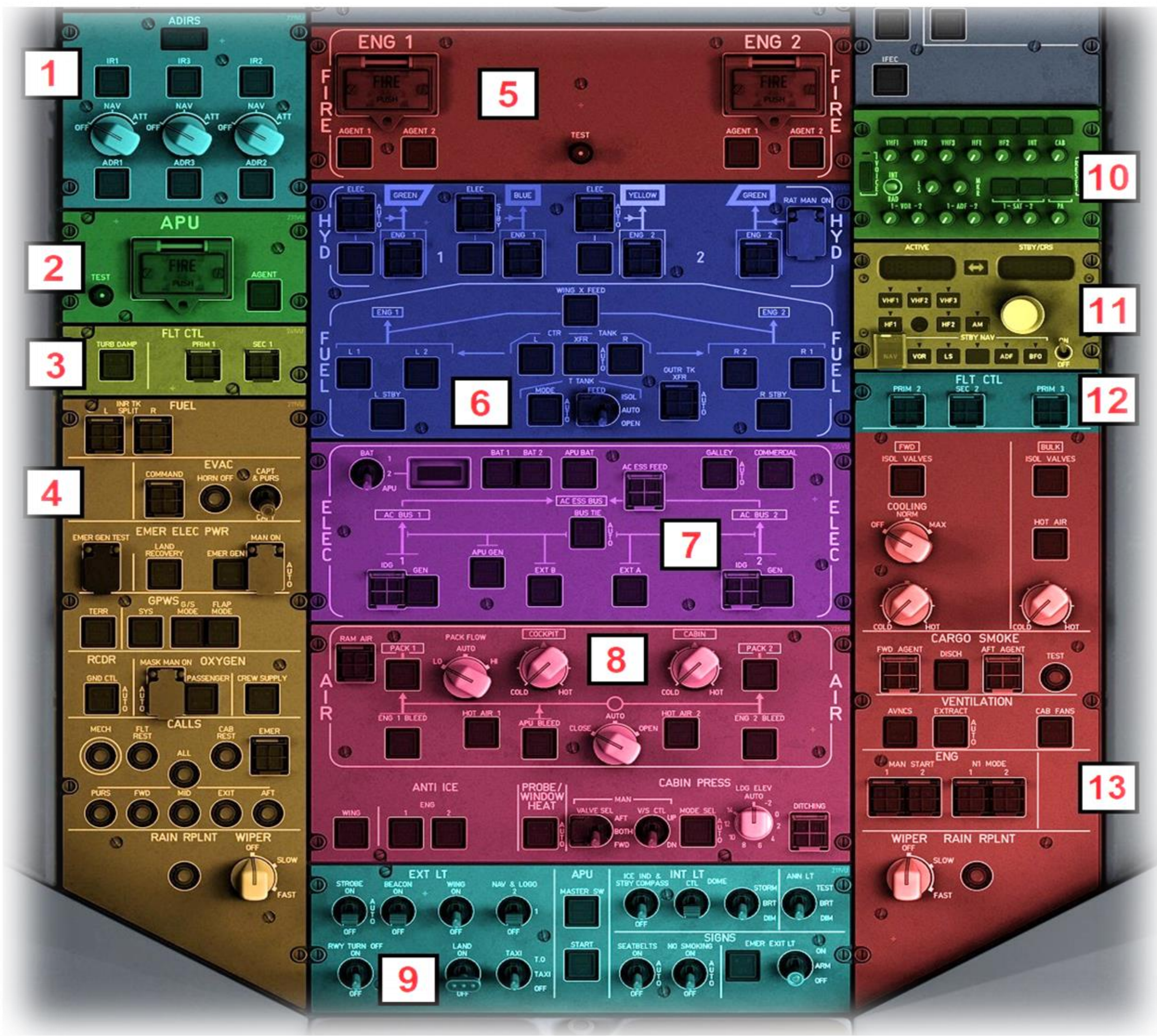
A Tour of the Cockpit

In this section of the manual, the cockpit will be broken down into distinct functional areas, and the controls that are featured in those areas will be identified and described. This will assist in locating the necessary instruments and controls later, when working through the aircraft check lists, and flying the aircraft.

Forward Overhead Panel

The forward overhead panel comprises a collection of smaller panels that manage the aircraft's electrical, pneumatic, lighting, pressurization, engine start, and other systems. Many of these were previously the domain of a flight engineer in the era of three-person flight crews.

Note: Not all of the functions contained within these panels are fully simulated in the X-Plane A330-300 model. The rear overhead panel is not covered, as this supports secondary functions that are not modelled.



1. ADIRS

This panel controls the aircraft's three inertial reference (IRS) units, and three air data inertial reference (ADR) units.

The IRS units are gyro-accelerometers that detect accelerations in the lateral and vertical axes. IRS systems provide an independent source of data for the on-board navigation systems to determine the aircraft's position in 3D space. This is necessary in the absence of external references, such as satellite or ground-based navigation aids.

The ADR units gather data from aircraft probes and sensors to provide airspeed, barometric altitude, temperature, and angle of attack.

ON BAT = IRS systems are operating with battery power, prior to flight.

IR1 / IR2 / IR3 Indicators

ALIGN: IRS unit is in the process of aligning, and not yet ready to navigate.

FAULT: IRS unit cannot provide data

OFF: IRS unit is powered off

Rotaries:

OFF: IRS unit set to OFF
NAV: Normal navigation mode
ATT: Attitude and Heading only mode

ADR1 / ADR2 / ADR3 Indicators

FAULT: ADR unit cannot provide data
OFF: ADR unit is powered off

2. APU Fire

In the event of an fire in the Auxiliary Power Unit (APU), this annunciator will illuminate, together with an aural warning.

Lifting the guard and clicking the 'FIRE" button will cut off the fuel supply to the APU.

This will also illuminate the 'AGENT' button. Clicking this button deploys a fire suppressant.

3. Flight Control Panel (Left)

[See also: 12. Flight Control Panel (Right)]

The A330 features a computer controlled ‘Fly By Wire’ system (see Airbus Flight Control Systems) that translates the pilot’s commands into the desired movements of the control surfaces (ailerons, elevators, rudder, and speed-brakes).

This panel, and it’s twin on the right-side of the overhead, controls which computer systems are active. There are three PRIMARY systems for redundancy, and two SECONDARY systems for additional redundancy at a reduced level of automation.

TURB DAMP: Enables the (automated) turbulence damping system.

PRIM1: Enables Primary 1 flight control computer system.

SEC 1: Enables Secondary 1 flight control system that supports only Direct Control laws.

4. Multi-Function Panel

INR TK SPLIT: Not modelled.

EVAC COMMAND: Activating this guarded switch notifies the cabin crew to begin evacuating the cabin in the event of an emergency on the ground.

EVAC HORN OFF: Silences the aural evacuation warning in the flight deck.

EVAC CAPT & PURS: The position of this switch determines if the evacuation warning can be triggered by the captain and cabin-crew, or just the captain.

EMER GEN TEST / LAND RECOVERY / EMER GEN / MAN ON: Not modelled.

TERR: Defaults to ON. When OFF, this inhibits the automated 'Terrain' (proximity) aural callout.

SYS: Defaults to ON. When OFF, this inhibits ALL automated aural callouts.

G/L: Defaults to ON. When OFF, this inhibits the automated 'Glideslope' (deviation) aural callout.

FLAP MODE: Defaults to ON. When OFF, this inhibits the automated 'Too Low Flaps' (not fully deployed) aural callout.

MASK MAN ON: Defaults to AUTO. This guarded switch deploys the passenger oxygen masks.

PASSENGER: Clicking this button deploys the passenger cabin supplemental oxygen.

CREW SUPPLY: Defaults to ON to provide supplemental oxygen to the flight crew in the event of a cabin pressure emergency. Changing the state of this button to OFF manually stops the supply.

CALL buttons: These buttons call individual members of the crew and ground services. Not modelled.

RAIN RPLNT: Clicking this button injects a measured quantity of rain-repellant fluid onto the windshield (during flight only). Not modelled.

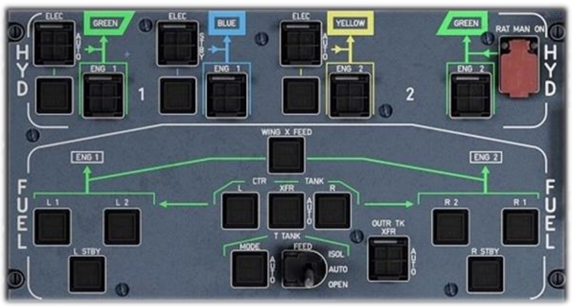
WIPER (Rotary): Activates the windshield wipers in two speed-modes.

5. Engine Fire Panel

In the event of a fire in the left or right engine, the associated annunciator will illuminate, together with an aural warning.

Lifting the guard and clicking the 'FIRE" button will cut off the fuel supply to that engine.

This will also illuminate the 'AGENT' buttons. Clicking these buttons deploys a fire suppressant, and secondary fire suppressant if needed.



There are four fuel tanks – LEFT (wing), CENTER, RIGHT (wing) and (tail) TRIM tank.

The wing tanks have three fuel pumps that feed the engines (L1, L2, L STBY) and the center tank has two fuel pumps (CTR L and CTR R). The T TANK XFR pump transfers fuel between the trim tank and center tank.

These buttons default to ON or AUTO (when not illuminated). In the event of a failure, the associated button will illuminate. Clicking one of these buttons cycles the mode to OFF, which shuts down that pump.

Clicking the XFR button cycles the mode to MAN (manual). When in manual mode, fuel will no longer automatically transfer between the center tanks.

Clicking the MODE button cycles the mode to MAN (manual). The adjacent guarded switch can then be used to control the transfer of fuel from the trim tanks in the tail to the center tanks.

Clicking the WING X FEED (cross feed) button opens a valve that allows fuel to cross over from the wing tank on one side to the opposite engine. This is used in the event of a failure of the normal fuel supply for that engine.

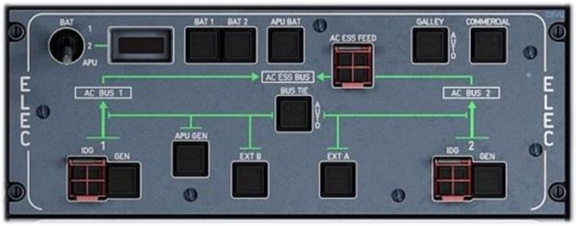
6. Hydraulic & Fuel Control Panel

There are three hydraulic systems that operate the control surfaces – BLUE, GREEN and YELLOW. In normal operation each of these systems handles different control surface, but redundancy can be provided to a failed system from either of the remaining two systems.

There are two mechanical engine-driven pumps for normal operations, and three electrical pumps for redundancy.

ENG BUTTONS: Indicate the status of the two engine-driven pumps. These default to ON (when not illuminated). In the event of a failure, the associated button will illuminate. Clicking one of these buttons cycles the mode to OFF, which shuts down that pump.

ELEC BUTTONS: Indicate the status of the three electrical pumps. These default to OFF (when not illuminated). Clicking one of these buttons cycles the mode to ON, which activates that pump.

<table>
<tr>
<td>


IDG: Clicking either of these guarded buttons disconnects the Integrated Drive Generator (IDG) for the associated engine. These generators convert a portion of the mechanical energy in the engines into electrical energy. In the event the oil cooling system for the IDG fails it must be disconnected from the engine before further damage occurs. Once disconnected, it cannot be restored in flight, and that engine will no longer be able to generate electrical power.

GEN: Clicking either of these buttons stops the electrical generator of the associated engine from providing power to the main electrical bus.

APU GEN: Clicking this button stops the APU electrical generator from providing power to the main electrical bus.

EXT A / B: Clicking this button sources power from external ground-sourced power connected to the A or B port.
</td>
<td>
7. Electrical System Control Panel

BAT: Displays the voltage (alongside) of the selected electrical bus (BAT 1, BAT 2, or APU).

BAT 1 / BAT 2: These default to OFF. Clicking these buttons energized the electrical buses powered by battery 1 and battery 2 respectively.

APU BAT: Defaults to OFF. Click this button to cycle the mode to ON in the event the APU must be started without the aircraft being connected to an external power source.

AC ESS FEED: Click this guarded button to change the source of power for the AC (Alternating Current) Essential (systems) Bus from BAT 1 to BAT 2.

GALLEY: Click this button to cut power to the galley.

COMMERCIAL: Click this button to cut power from the commercial electrical bus, which powers systems that support commercial operations such as passenger accommodations, cargo-bays, etc.
</td>
</tr>
<tr>
<td>


PACK FLOW: This rotary controls the rate at which bleed air is introduced into the cabin.

COCKPIT / CABIN rotaries: Used to control the temperature of the cockpit and cabin respectively.

Cross Bleed Rotary: When set to AUTO, bleed air is transferred between PACK 1 and PACK 2 automatically, as required. The crew may override this by setting this rotary to OPEN or CLOSED.
</td>
<td>
8. Air Conditioning Panel

RAM AIR: Opens an external vent to provide emergency ventilation to the cockpit and cabin.

PACK 1 / 2: Default to OFF. Clicking these buttons activates the associated Pneumatic Air Cycle Kit (PACK). This provides pressurized and conditioned air to the cockpit and cabin and is driven by surplus “bleed” air from the engines, or APU.

ENG BLEED 1 / 2: Default to OFF. Clicking these buttons opens a valve to provide surplus ‘bleed’ air from the associated engine to PACK 1 and PACK 2.

APU BLEED: Defaults to OFF. Clicking this button opens a valve to provide surplus ‘bleed’ air from the APU to PACK 1 and PACK 2.
</td>
</tr>
</table>

STROBE: This switch controls the external strobe lights mounted on the wing tips and tail assembly. When set to AUTO, the lights will illuminate when the shock absorbers are not compressed (aircraft is airborne).

BEACON: Illuminates the pulsing red beacon atop the fuselage.

WING: Activates the fuselage mounted lights that illuminate the IPFDng edge of the wings for ice inspection.

NAVE & LOGO. In position 1, the white, red and green navigation lights are illuminated. In position 2, lights on the horizontal stabilizer are illuminated to highlight the logo on the vertical stabilizer.

LAND: Illuminates the wing-mounted landing lights.

TAXI: Illuminates the nose-gear mounted taxi lights in either taxi, or takeoff mode (brighter).

9. Lighting Panel

APU MASTER SW (switch): Opens a flap to channel external air to the Auxiliary Power Unit (APU).

START: Starts the APU. This will take a short while to reach 100% RPMs, at which point the button will illuminate with ‘Avail’, meaning that bleed air is now available for engine-start.

ICE IND & STBY COMPASS: Illuminates the ice-indicator mounted on the external side of the center windshield pillar. This is visible to the crew through the windows. This switch also illuminates the standby magnetic compass mounted on the inside of the center windshield pillar.

DOME: Illuminates the overhead dome lighting in the cockpit. The switch immediately to the right controls the intensity.

ANN LT: Controls the brightness of the cockpit annunciator lights. TEST mode illuminates every light.

SEATBELTS / NO SMOKING: Illuminate the associated signs in the cabin.

EMER EXIT LT. Defaults to ARM, whereby the emergency cabin lighting comes on in the event of an electrical failure. The crew may manually override this with the ON and OFF positions.

VOR 1/2: Click this rotary to enable the (morse) audio for the currently tuned VOR 1 or VOR 2 receiver. Turn the rotary to adjust the volume.

ADF 1/2: Click this rotary to enable the (morse) audio for the currently tuned ADF/NDB 1 or ADF/NDB 2 receiver. Turn the rotary to adjust the volume.

10. Audio Control Panel

This panel replicates the functionality of the twin Audio Control Panels located for the captain and first officer respectively, on the center pedestal.

This aircraft is equipped with two VHF (Very High Frequency) radios, two HF (High Frequency) radios, an intercom between flight crew, and an intercom between the cockpit and cabin crew.

The buttons on the top-row control which of these radios is being used to transmit. When the button is illuminated, the corresponding radio is transmitting.

The rotaries on the second-row control which radios can be heard. By default, if a radio is selected for transmission, it can also be heard. However, additional radios may be heard by clicking the associated rotary (it will illuminate). The rotary may also be used to control the volume of that audio channel.

The <-> button swaps the standby and active radio frequencies.

ON/OFF: This switch toggles power between on and off for the entire panel.

STBY NAV switches: Not modeled.

Note: *The MCDU supports tuning the navigation-aid frequencies (ILS / VOR / ADF). This is covered in the Center Pedestal chapter. Additionally, a separate manual will be published for the Airbus MCDU in the near future.*

11. Radio Management Panel

This panel replicates the functionality of the twin Radio Management Panels located for the captain and first officer respectively, on the center pedestal.

This aircraft is equipped with two VHF (Very High Frequency) radios, two HF (High Frequency) radios, an intercom between flight crew, and an intercom between the cockpit and cabin crew.

VHF 1 / VHF 2: These buttons select the VHF radio being controlled by this panel.

HF1 / HF 2: These buttons select the HF radio being controlled by this panel.

Multi-Rotary: The outer rotary adjusts the integer portion of the standby radio frequency, and the inner rotary adjusts the decimal portion of the standby radio frequency.

12. Flight Control Panel (Right)

[See also: 3. Flight Control Panel (Left)]

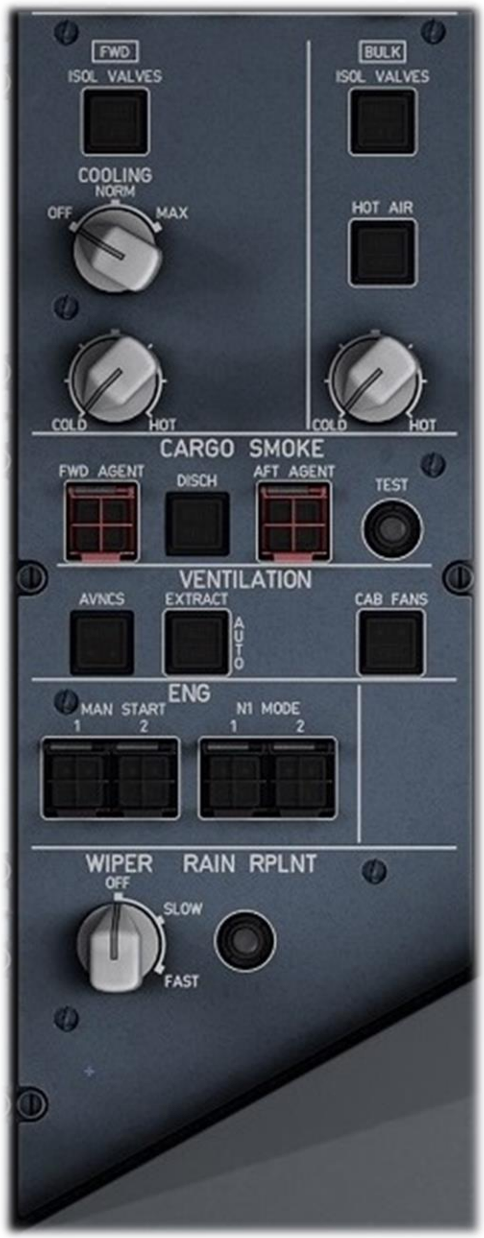
The A330 features a computer controlled 'Fly By Wire' system (see Airbus Flight Control Systems) that translates the pilot's commands into the desired movements of the control surfaces (ailerons, elevators, rudder, and speed-brakes).

This panel, and it's twin on the right-side of the overhead, controls which computer systems are active. There are three PRIMARY systems for redundancy, and two SECONDARY systems for additional redundancy at a reduced level of automation.

PRIM2: Enables Primary 2 flight control computer system.

PRIM3: Enables Primary 3 flight control computer system.

SEC 2: Enables Secondary 2 flight control system that supports only Direct Control laws.



13. Multi-Function Panel

ISOL VALVES: These default to ON. Clicking these buttons isolates the associated cargo hold from the heating and ventilation system. This would usually be done in the event that hold was empty.

COOLING Rotary: Sets the temperature of the cargo holds.

HOT AIR: Defaults to ON. Clicking this button closes the hot air duct to the cargo holds.

CARGO SMOKE buttons: Not modeled.

AVNCS: Not modeled.

EXTRACT: Defaults to AUTO. Clicking this button disables the avionics / electronics (air cooling) extractor fan.

CAB FANS: Defaults to ON. Clicking this button disables the fans that circulate air through he passenger cabin.

ENG Buttons: Not modeled.

WIPER Rotary: Sets the speed of the windshield wipers.

Primary Instrument Panels

Primary Flight Display (PFD)

This is the left LCD panel in the avionics cluster. The PFD displays the attitude of the aircraft relative to the horizon, and the altitude (above sea level) - via the scale on the right.

The attitude display informs the pilot whether the aircraft is flying straight, or turning, and whether the aircraft is climbing, or descending. This information is crucial in “instrument conditions” - when the outside horizon is not visible.

The PFD also displays altitude and airspeed information, and localizer and glideslope deviation, when coupled to an ILS approach.

The PFD is covered in detail in a separate chapter:

[Primary Flight Display (PFD) Components]

Navigation Display (ND)

This is the right LCD panel in the avionics cluster. The ND displays the aircraft's position & (magnetic) heading.

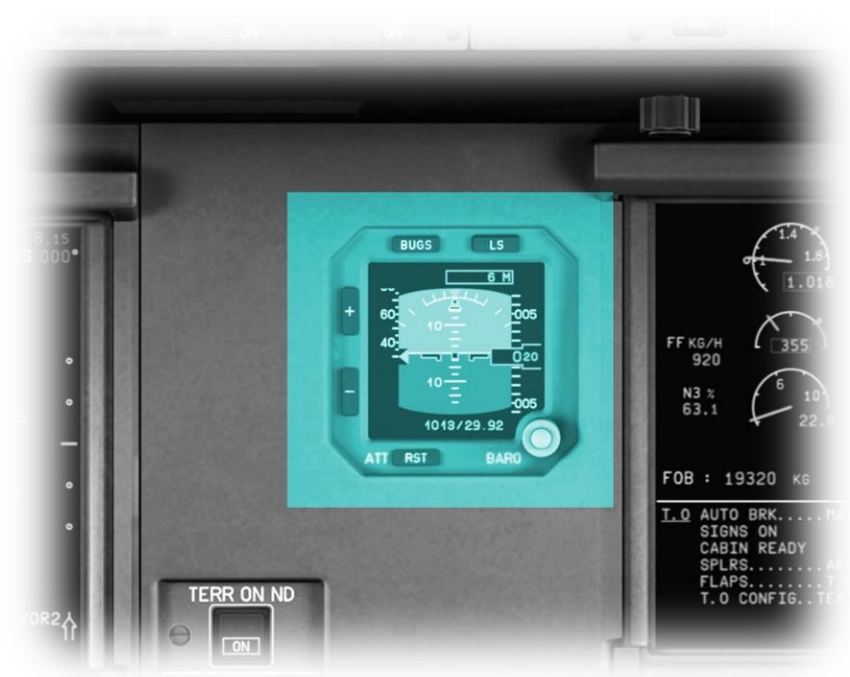
The display is presented in a plan view, as if looking down at the aircraft from directly above.

If a flight plan has been input (using the FMS), this panel also displays the aircraft's position relative to the desired track.

The ND is covered in detail in a separate chapter:

[Navigation Display (ND) Components]

Integrated Standby Instrument System (ISIS)



This instrument provides redundancy in the event of a failure of the primary PFDs.

The ISIS is powered by a separate electrical source and uses dedicated gyros and accelerometers.

This instrument displays:

Attitude;
Airspeed;
Altitude;
Barometric Pressure (set also);
Airspeed Bugs (set also);

Electronic Centralized Aircraft Monitoring (ECAM) / Engine & Warning Display

This panel displays:

Engine Pressure Ration (EPR);

Engine Exhaust Gas Temperature (EGT);

Engine Low Pressure Turbine Rotational Speed (N1);

Engine High Pressure Turbine Rotational Speed (N2);

Fuel Quantity;

Flap and Slat Positions;

This display panel is covered in more detail in a separate chapter:

[ECAM Engine & Warning Display Components]

Electronic Centralized Aircraft Monitoring (ECAM) / System Display

Synoptic diagrams of aircraft systems;

Aircraft system status messages;

This display panel is covered in more detail in a separate chapter:

[ECAM System Display Components]

Landing Gear & Auto Brake

The lever at the lower left of this panel deploys and retracts the landing gear.

Three landing gear indicators are located in the upper left of this panel, corresponding to the nosewheel, and left/right main landing gear.

When the gear is down and locked, this is indicated by three green illuminations.

When the gear is in motion, these will indicate an amber unlocked status.

When the gear is fully retracted, the indicators will show no status.

AUTO/BRK:

These buttons control the rate at which the autobrakes are applied, during touchdown, and an aborted takeoff.

LO is used for landings on a long/dry runway.

MED is used for landings on a short/wet runway.

MAX is used for aborted takeoffs and may only be set on the ground. The brakes are triggered if the spoilers are deployed during the takeoff run.

TERR ON ND: Click this button to enable terrain radar, superimposed over the Navigation Display (ND) map.

Chronometer

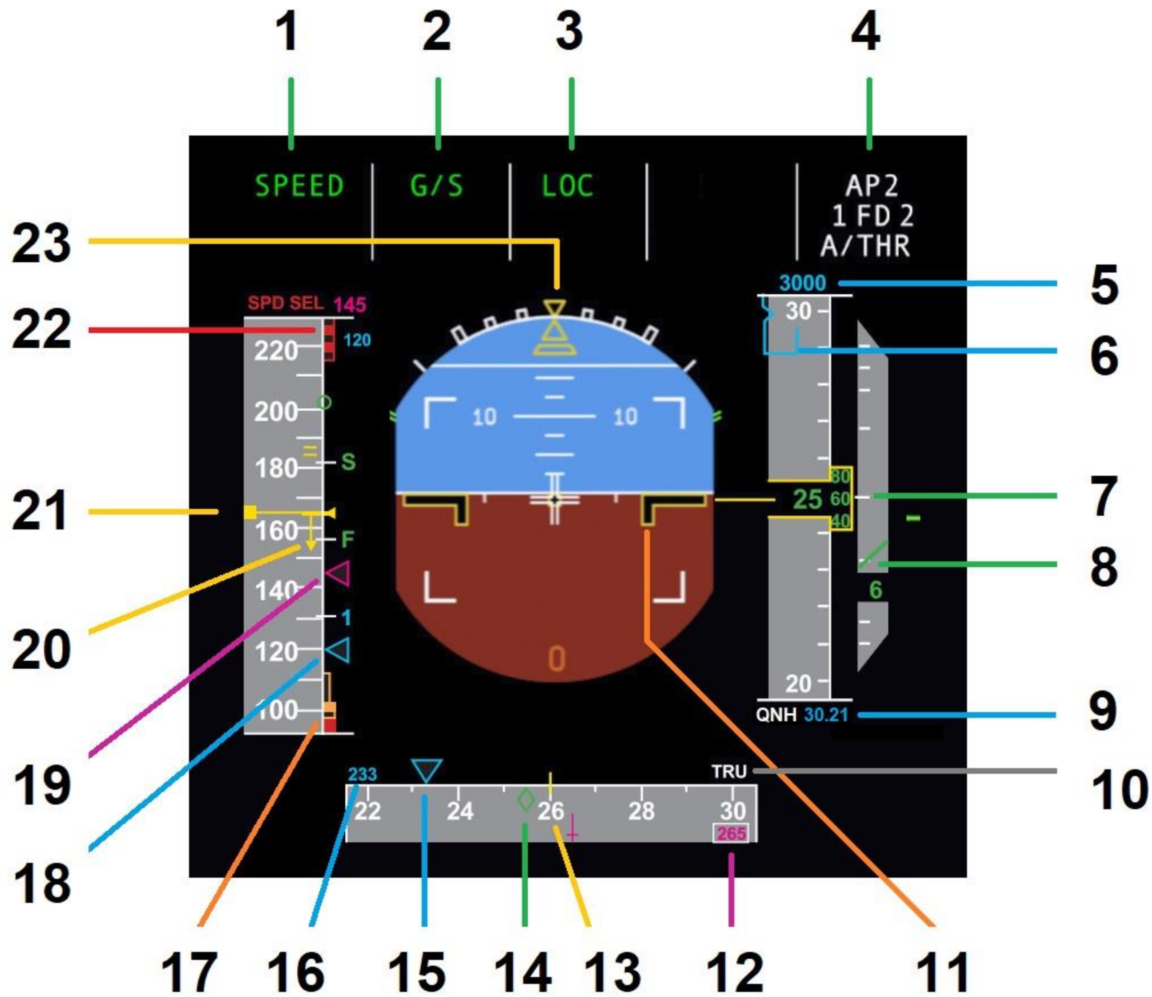
This instrument displays the current local time and flight elapsed time. It also features a chronometer for timing events during flight.

CHR: Click this button to start and stop the chronometer.

RST: Click this button to reset the chronometer.

RUN: Click this button to begin the (flight) elapsed timer. This is only available once airborne.

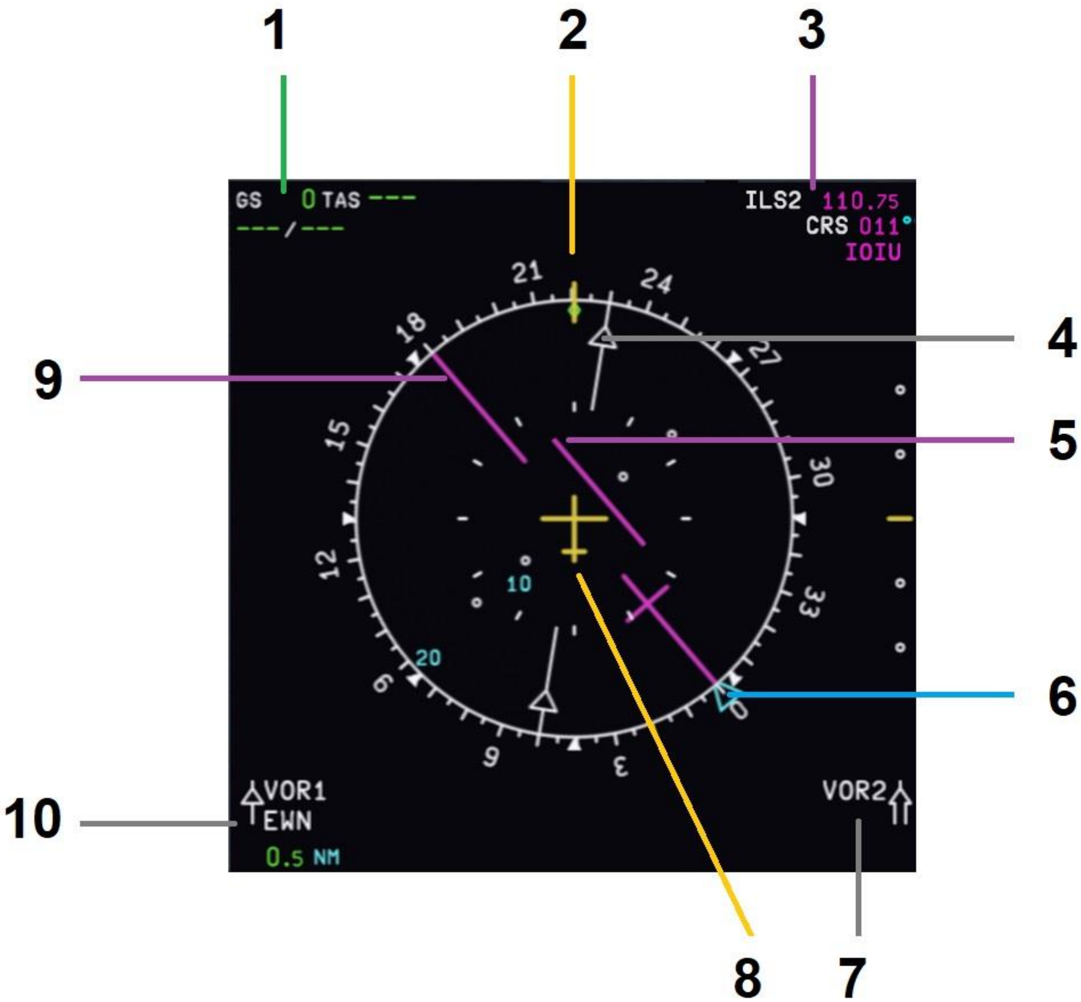
Primary Flight Display (PFD) Components



1	Auto Thrust Annunciator	Illuminated when autopilot is managing airspeed
2	Vertical Mode Annunciators	Illuminated when auto-pilot vertical modes are in effect
3	Lateral Mode Annunciators	Illuminated when auto-pilot lateral modes are in effect
4	Engagement Status	Displays autopilot, flight director and auto-throttle engagement status
5	Selected Altitude	Altitude pre-selected by flight crew
6	Level Off altitude	Level-off altitude (actual level-off altitude) blue = selected / magenta = constrained)
7	Current Altitude	
8	Altitude Trend	
9	Barometric Altimeter Reference	Set by crew
10	TRU Annunciator	Illuminated if airspeed scale is reading true airspeed (versus Indicated airspeed)
11	Static Reference Lines	A static reference showing the position of the aircraft with respect to the artificial horizon – in terms of ascent, descent, a left turn, or a right turn

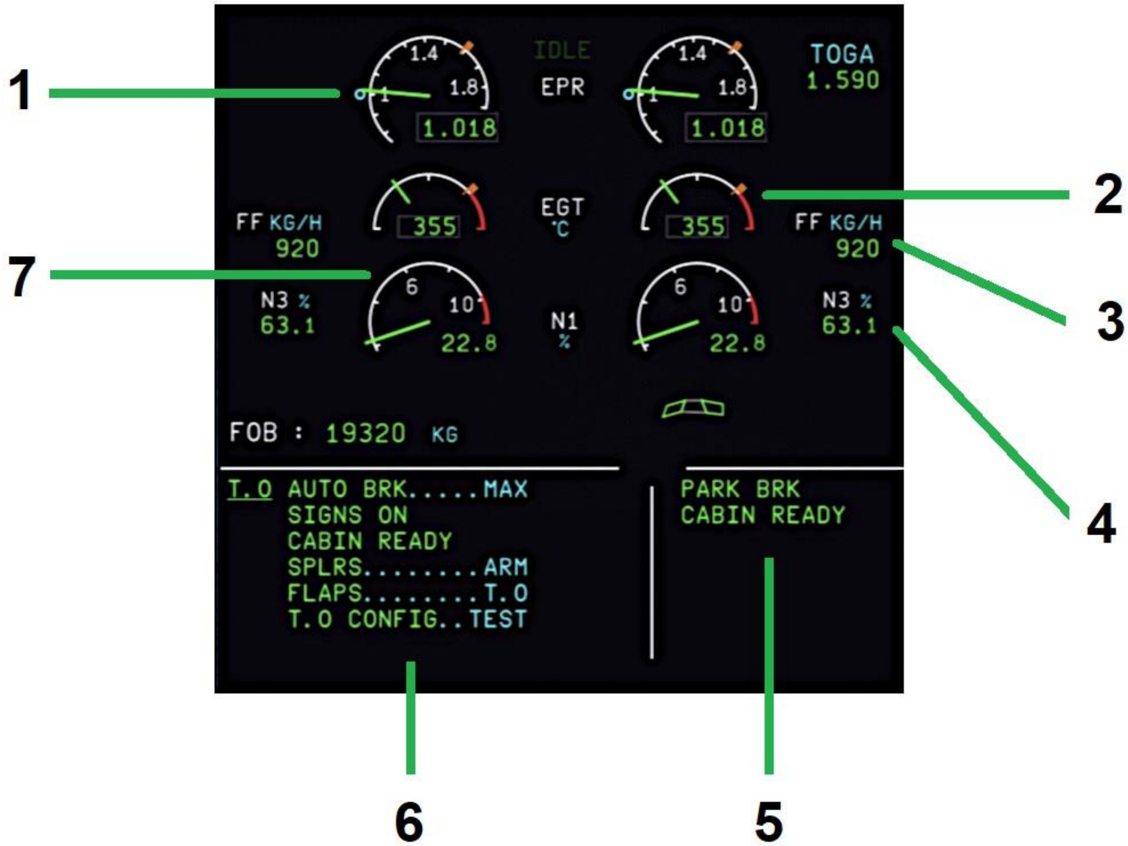
12	ILS Inbound Course	Displayed here if beyond the display range of the heading scale
13	Heading	Current heading (magnetic)
14	Actual Track	The actual track (over the ground)
15	Selected Heading (Bug)	Set by crew
16	Selected Heading (numeric)	Selected heading in numeric form - displayed if bug is beyond the display range of the heading scale
17	Minimum Airspeed Limits Scale	
18	Selected Airspeed	Set by crew
19	Approach Target Speed	Desired approach speed
20	Airspeed Trend	
21	Airspeed	Current airspeed (indicated, unless TRU annunciator illuminated)
22	Maximum Airspeed Limits Scale	
23	Roll Rate	Roll rate (10, 20, 30, 45, 67 degrees)

Navigation Display (ND) Components



1	Speed	Ground Speed / True Airspeed
2	Current Heading	
3	Waypoint/Navaid Info	Current waypoint or navigation aid information
4	VOR Course	Selected VOR course (and inbound / outbound indicator) when in VOR mode
5	CDI	Course Deflection Indicator (from crew selected course)
6	Heading Bug	Crew-selected autopilot heading
7	VOR 2 Navaid Info	Navigation aid information for (crew selected) VOR 2 (if tuned)
8	This Aircraft	Current plan view location and situation for this aircraft.
9	Selected Course	Crew-selected course (magenta for ILS, blue for VOR)
10	VOR 1 Navaid Info	Navigation aid information for (crew selected) VOR 1 (if tuned)

ECAM System Display Components (Upper)



1	EPR	Engine Pressure Ratio: A measure of the thrust being produced by the left and right engines.
2	EGT	Exhaust Gas Temperature: The temperature of the turbine exhaust gases as they leave the left and right engines (degrees Celsius).
3	Fuel Flow	Fuel flow (left and right engines) in Kilograms per Hour
4	Annunciator Messages	
5	Annunciator Messages	
6	N3	Rotational speed (percentage of max) of the left and right engine high pressure turbines

ECAM System Display Components (Lower)

The lower ECAM displays synoptic diagrams of aircraft systems, controlled by the pushbuttons on the ECAM Control Panel.

ECAM Control Panel

ECAM Upper Display Rotary:

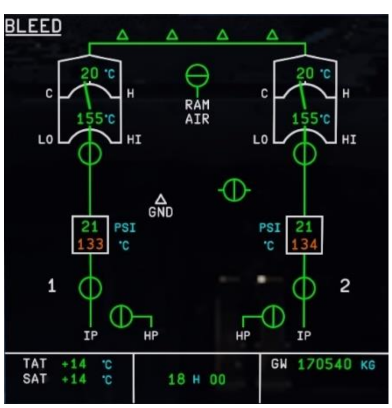
Controls the brightness of the upper ECAM display.

ECAM Lower Display Rotary:

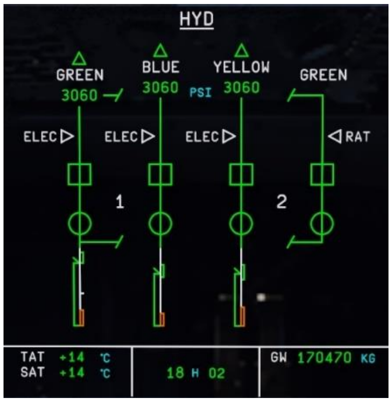
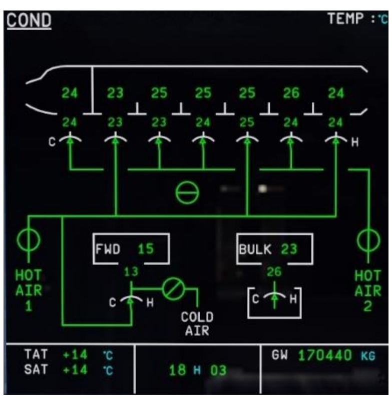
Controls the brightness of the lower ECAM display.

Buttons: See table below

ECAM Control Panel modes

ENG		ENGINE Mode: • All primary engine parameters; • F.USED: Fuel used; • OIL: Oil quantity left and right engine (Quarts); • PSI: Engine Oil Pressure and Temperature; • VIB N1, N2, N3: Turbine vibration (in Hertz [0.5 to 1,000]); • NAC: Nacelle Inlet temperature left and right engine (Celsius);
BLEED		BLEED Mode: • Pack (Pneumatic Air Cycle Kit) outlet temperatures; • Pneumatic pressures; • Pneumatic valve positions; • Outside air temperature; • Gross weight;

PRESS		PRESSURE Mode: • Landing elevation; • Cabin differential pressure; • Cabin vertical speed; • Cabin altitude; • Cabin inlet and outflow valve positions; • Safety valve position; • Outside air temperature; • Gross weight;
EL/AC		ELECTRICAL AC Mode: • Generator status's; • Generator Loads; • Generator Voltages; • Generator AC (output) frequency; • Outside air temperature; • Gross weight;
EL/DC		ELECTRICAL DC Mode: • Battery status's; • Battery voltages; • Transformer status's; • Transformer voltages; • Outside air temperature; • Gross weight;

HYD		HYDRAULIC Mode: • Hydraulic system pressures; • Status of electrical systems providing power to green/blue/yellow hydraulic systems; • Status (deployed or stowed) of RAM Air Turbine providing power to green hydraulic system; • Outside air temperature; • Gross weight;
APU		APU Mode: • APU bleed valve position; • APU rotational speed; • APU exhaust gas temperature; • Outside air temperature; • Gross weight;
COND		COND Mode: • Cockpit and cabin zone temperatures; • Hot and cold air valve positions; • Outside air temperature; • Gross weight;

DOOR		DOOR Mode: • Door positions • Evacuation slide status's • Outside air temperature; • Gross weight;
WHEEL		WHEEL Mode: • Landing gear status's; • Landing gear door positions; • Outside air temperature; • Gross weight;
F/CTL		FLIGHT CONTROL Mode: • Aileron positions; • Primary and secondary flight control computer status's; • Pitch trim position; • Elevator positions; • Rudder position; • Rudder trim position; • Outside air temperature; • Gross weight;

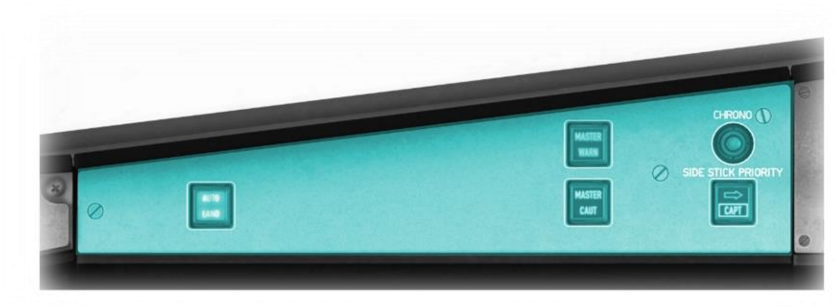
<table>
<tr>
<td>FUEL</td>
<td>
</td>
<td>FUEL Mode:

Fuel used indications;
Fuel flow valve positions;
Fuel tank quantities;
Total fuel flow;
Total fuel on board;
Outside air temperature;
Gross weight;
</td>
</tr>
<tr>
<td>ALL</td>
<td>
</td>
<td>ALL Mode:

Left and right engine high pressure turbine (N2) rotational speeds;
Left and right engines total fuel used;
Left and right engine oil quantities;
Left and right engine oil pressures and temperatures;
N1, N2, N3 turbine vibrations (in Hertz [0.5 to 1,000]);
Left and right engine nacelle inlet temperatures;
Outside air temperature;
Gross weight;
</td>
</tr>
</table>

Glareshield Panel

Annunciator Panel



MASTER WARNING: Illuminates and flashes for a level 3 severity warning. The crew must cancel the annunciator.

MASTER CAUTION: Illuminates for a level 2 severity caution. The crew must cancel the annunciator.

AUTO LAND: This warning light illuminates if the aircraft is conducting an automated landing that cannot be completed. The crew must take over control of the aircraft and cancel the annunciator.

SIDE STICK PRIORITY: Illuminates if there is a conflict due to both pilots making a simultaneous input with their side sticks.

EFIS Control Panel

Mode Rotary: Switches the MFD between the available display modes.

Range Rotary: Alters the scale of the MFD map.

CSTR: When illuminated, the PFD will show nearby altitude and speed constraints.

WPT: When illuminated, the PFD will show nearby waypoints.

VOR.D: When illuminated, the PFD will show nearby VOR stations.

NDB: When illuminated, the PFD will show nearby NDB stations.

ARPT: When illuminated, the PFD will show nearby airports.

This panel controls aspects of the EFIS displays for the pilot and co-pilot independently.

The Baro rotary controls the altimeter setting. The outer rotary switches between inches of mercury and hectopascals. The inner rotary is used to set the desired pressure.

FD: Toggles the flight director bars between on and off. These provide a visual guide on the PFD for the pilot to adhere to the current flight plan or approach.

LS: Toggles the landing system glideslope display (during an ILS approach).

ADF1/VOR1: Displays the ADF pointer or VOR Course Deflection Indicator for the ADF1 or VOR1 frequency tuned using the MCDU.

ADF2/VOR2: Displays the ADF pointer or VOR Course Deflection Indicator for the ADF2 or VOR2 frequency tuned using the MCDU.

Flight Control Unit (Autopilot)

This panel controls the autopilot parameters, and modes.

The speed, heading, vertical-speed and altitude may be specifically selected by the pilots (by pulling the appropriate rotary to “selected mode”), or managed automatically by the Flight Management Guidance System (FMGS) by pushing the appropriate rotary to “managed mode”.

When managed automatically, the system will select appropriate parameters according to the current situation, aircraft configuration, and flight plan, and will display a dot alongside the corresponding display.

SPD/Mach: Toggles the speed selection between knots and Mach number.

Speed Rotary: Sets the desired speed when in “selected mode”.

HDG Rotary: Sets the desired heading when in “selected mode”.

AP1/AP2: Toggles the autopilot on or off. There are two identical systems for redundancy, designated AP1 and AP2.

A/THR: Toggles auto-thrust mode. When on, the autopilot has control of the throttles, allowing it to perform the necessary changes in thrust to adhere to the selections made. When off, the pilots have manual control of the thrust.

Altitude Pre-Select Rotary: Sets the desired altitude. The inner rotary increments/decrements in units of 100 feet, and the outer in units of 1,000 feet. Pre-select the desired altitude and pull the rotary UP to capture it.

ALT: Click this button to immediately level off at the current altitude, overriding any pre-selects that have been made.

LOC: Click this button to place the autopilot in “Localizer” mode. If a localizer frequency has been selected, the autopilot will attempt to intercept just the localizer, providing the autopilot inputs required are not too large.

APPR: Click this button to place the autopilot in “Approach” mode. If an ILS frequency has been selected, the autopilot will attempt to intercept the localizer, and capture the glideslope, providing the autopilot inputs required are not too large.

Vertical Speed Rotary: Alters the vertical speed when climbing or descending towards a pre-selected altitude. Pre-select the desired altitude (using the altitude rotary), then select the desired rate using the VS rotary. Pull the VS rotary UP to begin the ascent/descent.

HDG+VS/TRK+FPA: Toggles the autopilot mode between Heading + Vertical Speed and Track + Flight Path Angle. When in the latter mode, the autopilot maintains the desired track by compensating for wind drift, and a desired angle of ascent / descent instead of a rate (feet per second).

Center Pedestal

Multi-Function Control & Display Unit (MCDU)

The MCDU performs multiple functions, many of which were previously handled by the Flight Engineer in the era of three-crew cockpits.

This panel is the primary interface between the crew and the Flight Management Guidance Computer (FMGC). There are two MCDU panels in the center pedestal, and these may be operated independently by the captain and first officer.

The main function of the MCDU is navigation. This is accomplished by the input and execution of a flight plan, or direct navigation to chosen waypoints.

Setting navigation aid frequencies for ILS, VOR and ADF stations:

NAV/RAD: Click this button to input the frequency of an ILS, VOR or ADF station.

Use the CLR button to clear the scratch pad (the last line presented on the display for text input).

Use the number pad to key the desired frequency, which will appear in the scratch pad.

Click the button alongside VOR / LS / ADF to program assign the frequency. For example, if you intend to use an ILS with a frequency of 110.75, input this frequency into the scratch pad, and click the LS button on the upper-left bezel.

Note: A separate document will be provided to cover the functions of the MCDU in detail.

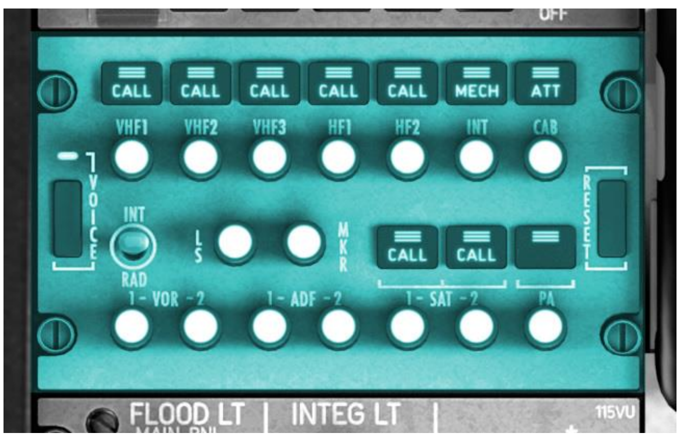
ECAM Control Panel

See: [ECAM Control Panel]

Radio Management Panel

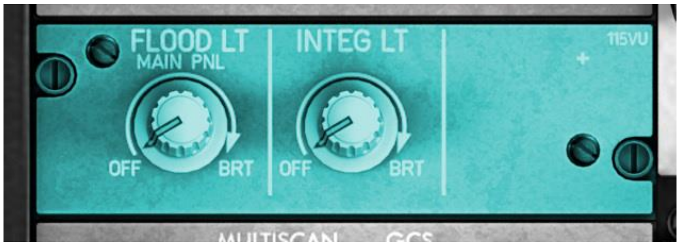
See: [Radio Management Panel]

Audio Control Panel



See: [Audio Control Panel]

Cockpit Flood Lighting Panel (Left)



FLOOD LT Rotary: Controls the intensity of the instrument facia lighting.

INTEG LT Rotary: Controls the intensity of the cockpit back-lighting.

Transponder Panel

Traffic Collision & Avoidance (TCAS) Rotaries:

THRT = Nearby aircraft are reported only if they present a collision threat;

ALL = All nearby aircraft are reported;

ABV = All nearby aircraft are reported if within 9000 feet above, and 2700 feet below this aircraft;

BLW = All nearby aircraft are reported if within 9000 feet below, and 2700 feet above this aircraft;

STBY = TCAS on standby (not operating);

TA = TCAS only provides Traffic Advisories (TAs);

TA/RA = TCAS provides Resolution Advisories (collision threats) and Traffic Advisories (TAs);

This aircraft is equipped with two transponders, for redundancy. Only one operates at any given time.

MODE Rotary: Switches the transponder between the available modes…

STBY = Powered up but not operating;
AUTO = Operates in Mode C when airborne, and Mode S when on the ground;
ON = Operates in Mode C

ATC: Selects the active transponder (1 or 2);

ALT RPTG: When set to OFF, no altitude data will be reported to ATC by the transponder;

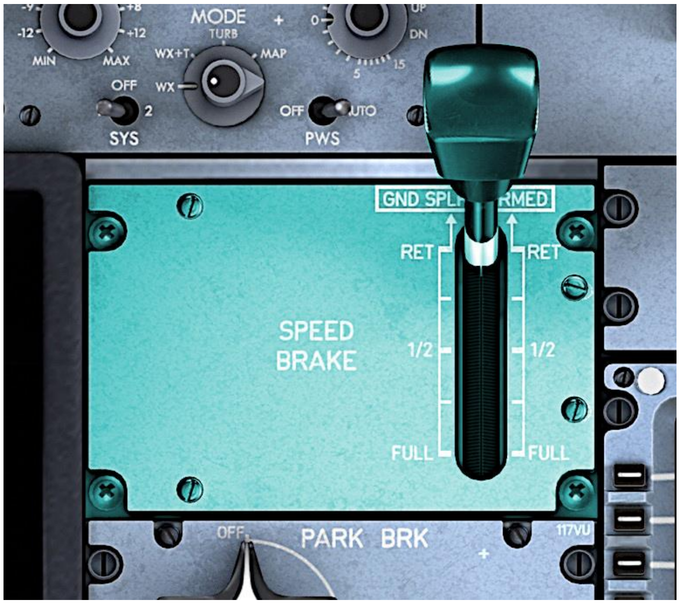
IDENT: Click this button to highlight the aircraft's position on the ATC controllers radar screen;

Keypad: Used to input the ATC assigned transponder code;

Cockpit Flood Lighting Panel (Left)

FLOOD LT Rotary: Controls the intensity of the pedestal lighting.

Speed Brakes Lever



This aircraft is equipped with a speed brake lever, which deploys the speed brakes located on top of the wings.

Speed brakes are very effective at reducing lift generated by the wings and adding drag, and are usually deployed partially during descent, or fully at touchdown.

The lever may be placed at any point between the following positions:

RET (Retracted):

> The speed brakes are fully retracted. When in the RET position, you may lift the lever to 'arm' the speed brakes. When armed, they will deploy automatically during landing, when the crew applies reverse thrust.

FULL (Fully Deployed):

The speed brakes are fully deployed, creating the maximum lift-reduction, and drag.

Flaps Lever

The Flap Lever operates the wing flaps and leading-edge slats. These change the contour of the wing. When extended, the flaps and slats generate more lift, and more drag, which is beneficial during the takeoff and the landing phases of the flight.

This lever provides four presets for the flaps and slats:

0 = Not deployed;

1 = Slats 16 degrees + Flaps 8 degrees;

2 = Slats 20 degrees + Flaps 14 degrees;

3 = Slats 23 degrees + Flaps 22 degrees;

FULL = Slats 23 degrees + Flaps 32 degrees;

Parking Brake

PARK BRK Rotary:

This control may be operated using the mouse wheel or push buttons.

OFF = Parking brake OFF;

ON = Parking brake is SET;

Cockpit Door Lock / Unlock

Cockpit Door Switch:

UNLOCK = Door may be opened with a mouse-click to the door handle;

NORM / LOCK = Door may not be opened;

Rudder Trim

Rudder Trim Rotary:

This control may be operated using the mouse wheel or push buttons.

Counterclockwise = Increase left rudder trim;

Clockwise = Increase right rudder trim;

The current trim position is displayed by the adjacent indicator;

Auto-Land

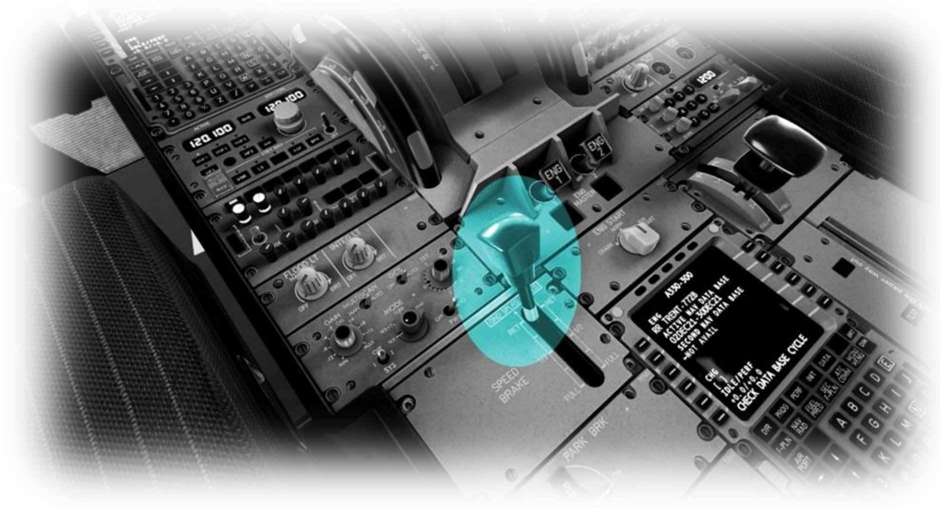
This aircraft is capable of full auto-land, provided the ILS at the chosen runway is CAT-3 approved (check this using the X-Plane map). If needed, refer to the Flight Control Unit (Autopilot) chapter for more detail regarding autopilot function.

Establishing Aircraft Prior to Approach

Establish the aircraft on a sensible intercept for both the localizer and glideslope. Activate the autopilot by clicking the AP1 button. Determine the appropriate course for localizer intercept. Set this using the heading rotary and pull the rotary UP to capture that heading. Determine the altitude for glideslope intercept. Set this using the altitude rotary and pull the rotary UP to capture that altitude.

Setting up for an ILS approach

Place the MCDU in NAV/RAD mode and dial in the appropriate frequency for the ILS localizer for the chosen runway.	
Enable Auto-Thrust mode. Push the speed rotary DOWN to place the auto-throttle in 'Managed' mode. The auto-throttle will manage the airspeed throughout the approach phase of the flight.	

ARM the Speed Brakes by pulling the lever UP when in the fully retracted position.	
ARM the auto brakes by selecting the desired intensity. (LO / MED / MAX).	
When the aircraft is positioned to intercept the localizer and glideslope, click the APPR button to place the autopilot in approach mode. Activate the second autopilot by clicking the AP2 button. The autopilot should capture the localizer and glideslope. At touchdown, the autopilot will handle the flare, and slow the aircraft using speed brakes and auto brakes. Disable both autopilots and take manual control of the aircraft prior to vacating the runway.	

Flight Planning

Flight planning is the process of determining a route from origin to destination that considers fuel requirements, terrain avoidance, Air Traffic Control, aircraft performance, airspace restrictions and notices to airmen (NOTAMS).

General information about flight plans is available on Wikipedia at http://en.wikipedia.org/wiki/Flight_planning

Flight plans can be generated by onboard computers if the aircraft is suitably equipped. If not, simulation pilots may elect to use an online flight planner. A web search for the phrase “Flight Planner” will yield a great many options, many of which are free services.

A good online flight planner will utilize the origin and destination airports, together with the aircraft type and equipment, the weather conditions, the chosen cruise altitude, known restrictions along the route, current NOTAMS, and other factors to generate a suitable flight plan. The waypoints incorporated into the flight plan can be subsequently input into the aircraft’s Flight Management Computer (FMS), or Global Positioning System (GPS). Some online flight planners provide the option to save the plan as an X-Plane compatible file, with an ‘fms’ extension. A saved flight plan can be loaded into the MCDU featured in the A330-300.

It is recommended the pilot generate a flight plan for the chosen route before using the MCDU, FMS or GPS units.

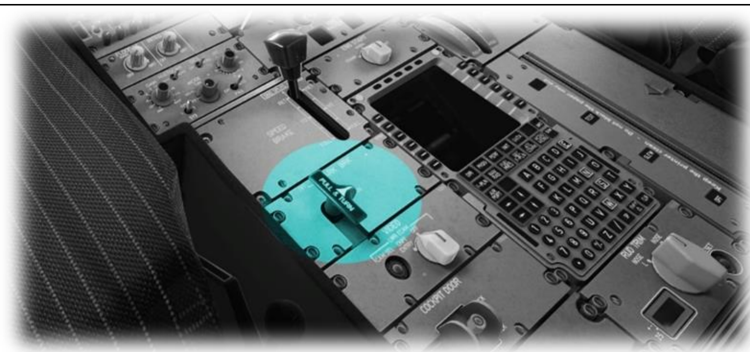
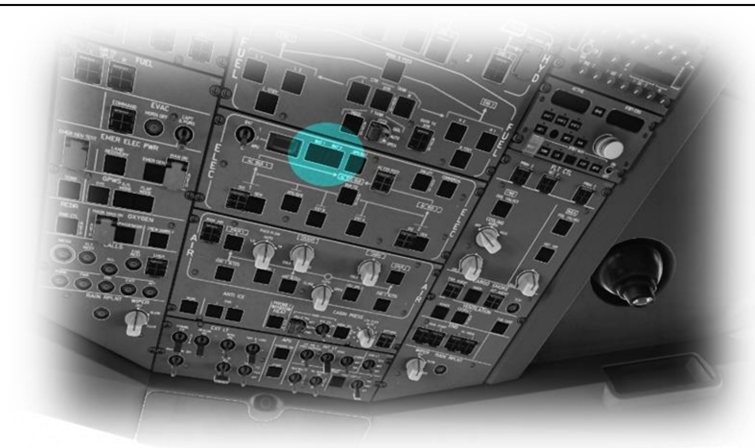
Instructions for operating the Laminar Research MCDU, FMS and GPS units (including inputting and working with flight plans) can be found in separate (dedicated) manuals. This manual covers only the basic functions of the MCDU required to operate the aircraft.

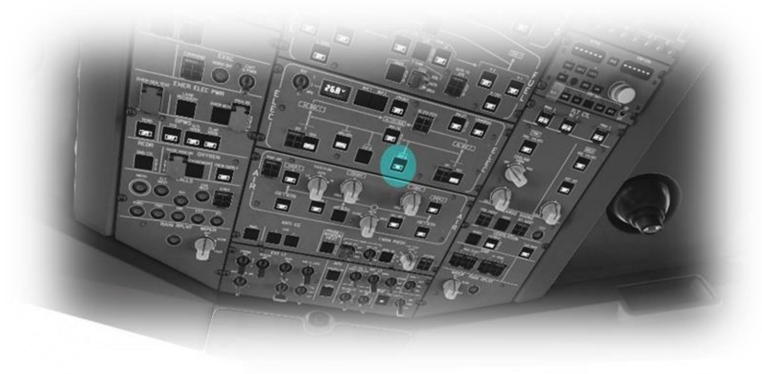
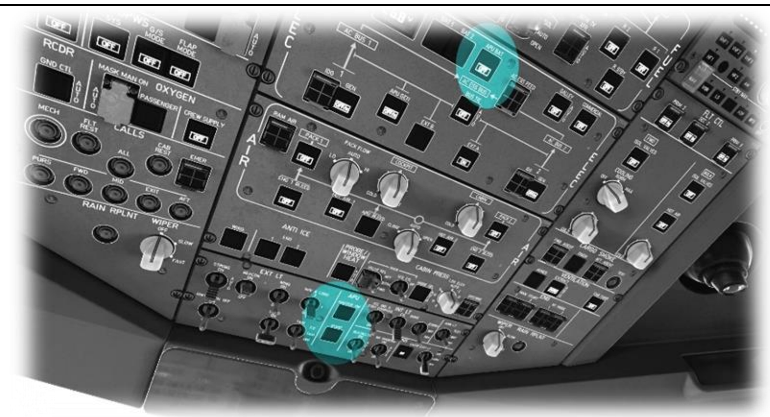
Check Lists

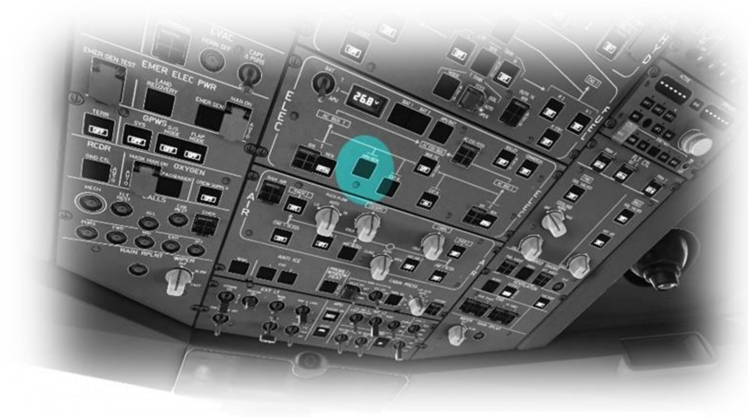
The following check lists are designed with the convenience of the simulation pilot in mind and customized to the X-Plane A330-300 aircraft. These differ from those of the real aircraft.

Cold and Dark to Engine Start

The following check list is a sub-set of the real procedures, and includes only the essential steps lPFDng to engine start:

PARKING BRAKE – ON	
TRANSPONDER – STANDBY	
BAT1 – ON BAT2 – ON	

(EXTERNAL POWER) EXTA - ON	
BEACON – ON NAV LIGHTS – ON	
APU BATTERY ON APU MASTER – ON APU - START	
Wait for APU startup. (APU AVAIL displayed)	

APU GENERATOR – ON	
(EXTERNAL POWER) EXTA - OFF	
ADIRS IR1 / IR2 / IR3 – ON ADR1 / ADR2 / ADR3 – ON ADIRS Rotaries - NAV	

(PNUMATIC AIR CYCLE KIT) PAX SYSTEM – ON	
APU BLEED – ON	

Using the **MCDU** Click CLR button [Removes CHECK DATA BASE CYCLE from scratch pad]	
Click INIT button to invoke INIT page	

<table>
<tr>
<td>

Key origin / destination ICAO codes into scratchpad

(delimited with a '/' character}

Example shown is KJFK/KBOS

</td>
<td>

</td>
</tr>
<tr>
<td>

Click line-select key 1R to populate FROM/TO field boxes

Example shown is KJFK/KBOS

</td>
<td>

</td>
</tr>
</table>

<table>
<tr>
<td>Key flight level ONLY into scratchpad

(temperature is auto-filled)

Example shown is Flight Level 240 / 24,000 ft</td>
<td>
</td>
</tr>
<tr>
<td>Click line-select key 6L to populate the CRZ FL/TEMP field boxes</td>
<td>
</td>
</tr>
</table>

<table>
<tr>
<td>Optionally enter a flight number into the scratchpad

Click line-select key 3L to populate

Example shown is AA300</td>
<td>
</td>
</tr>
<tr>
<td>Click the PERF button to select flight-phase performance page</td>
<td>
</td>
</tr>
</table>

Input your calculated V! speed into the scratch pad

Click line-select key 1L to populate this

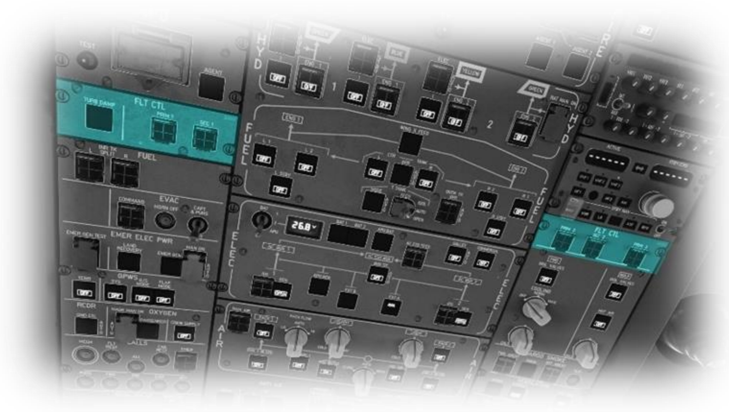
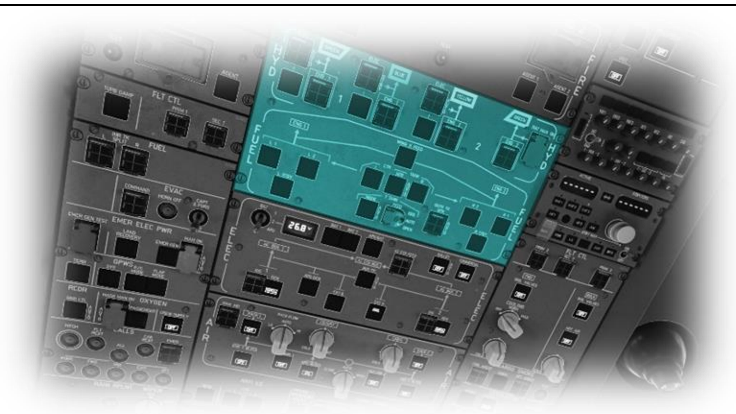
Repeat for VR and V2.

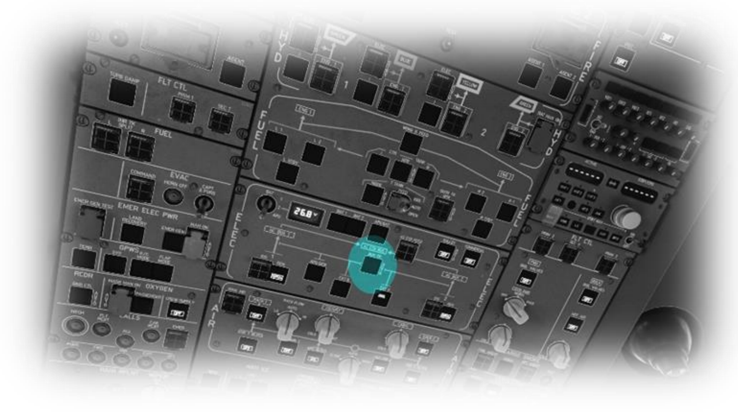
Hint: If you do not have a method for calculating the V-speeds, you may use the indicated 'Flap Retraction' speed for V2, with VR calculated as V2 minus 5, and V1 calculated as V2 minus 10

Input the desired flap position for takeoff (1 or 2) into the scratch pad

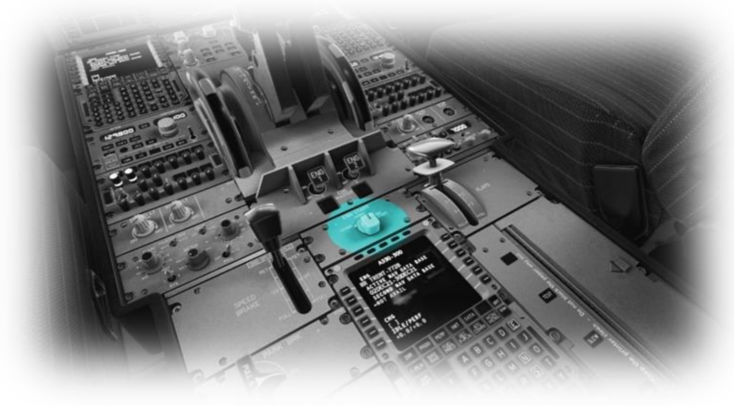
Click line-select key 3R to populate this

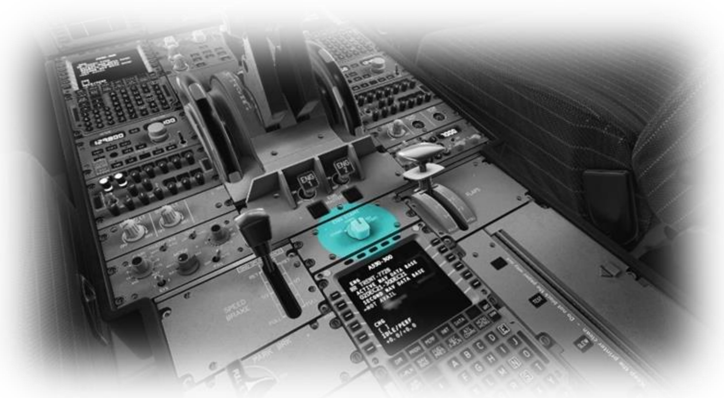
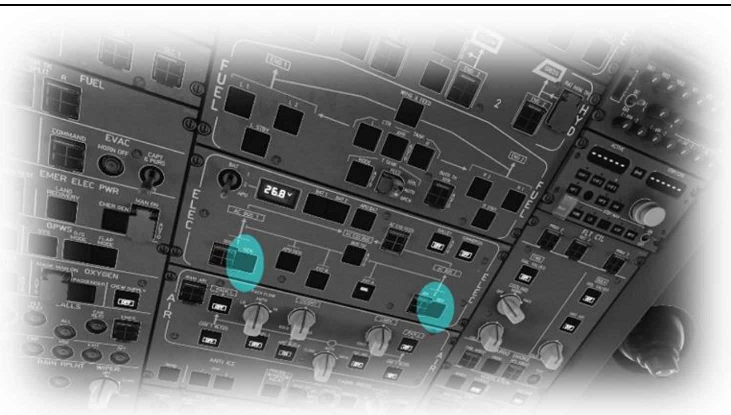
Hint: This is just a reminder to the pilot of the takeoff flap setting that applies to this situation. Use '2' if your v-speeds were derived from the Flap Retraction speed in the previous step.

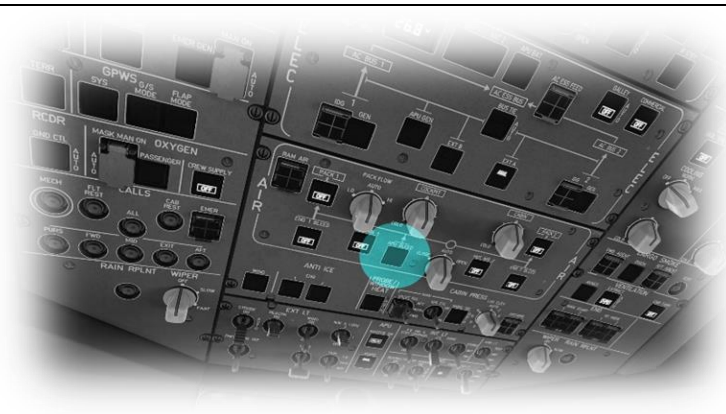
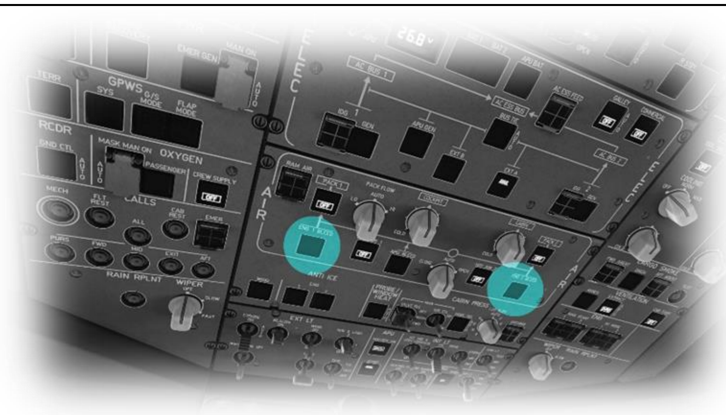
FLIGHT CONTROL SYSTEMS – ALL ON	
GROUND PROXIMITY (GPWS) AURAL ALERTS - ALL ON	
HYDRAULIC / FUEL PUMPS - ALL ON	

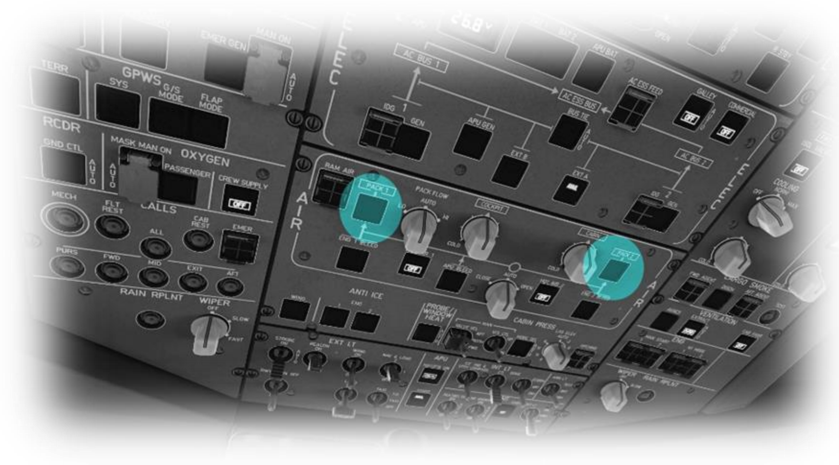
ELECTRICAL / BUS TIE - ON	

Engine Start

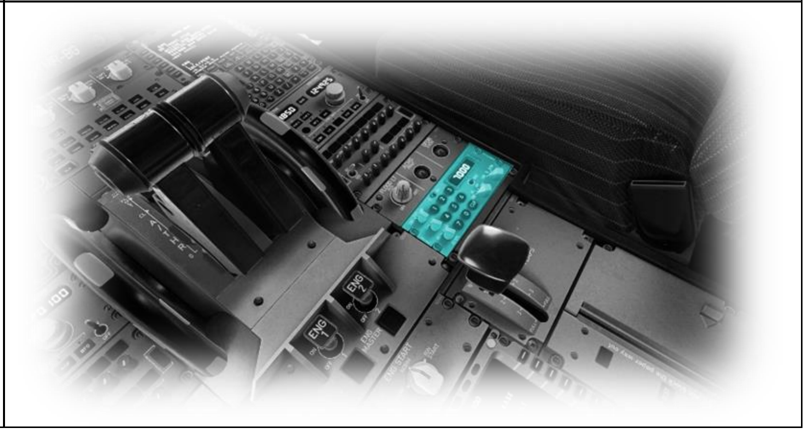
ENGINE START (ROTARY) IGN START	
ENG START ENG2 – ON	
MONITOR ENGINE 2 DIAGNOSTICS WAIT FOR ENGINE 2 TO STABILIZE	

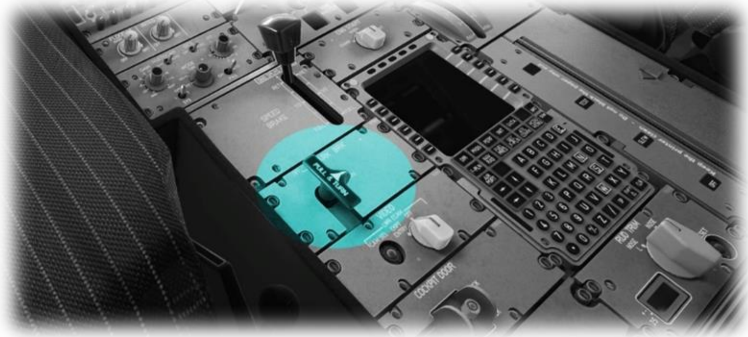
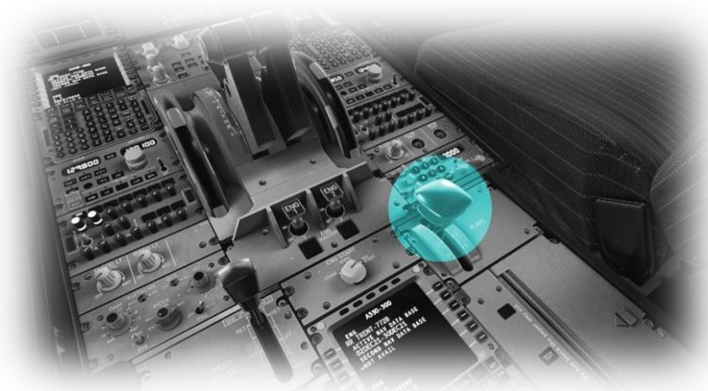
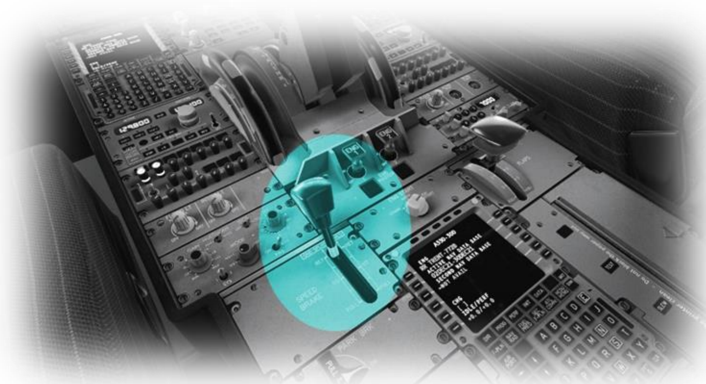
ENG START ENG1 – ON	
MONITOR ENGINE 1 DIAGNOSTICS WAIT FOR ENGINE 1 TO STABILIZE	
ENGINE START (ROTARY) NORM	
ENGINE GENERATOR 1 - ON ENGINE GENERATOR 2 - ON	

APU GENERATOR – OFF	
APU BLEED - OFF	
ENGINE 1 BLEED - ON ENGINE 2 BLEED - ON	

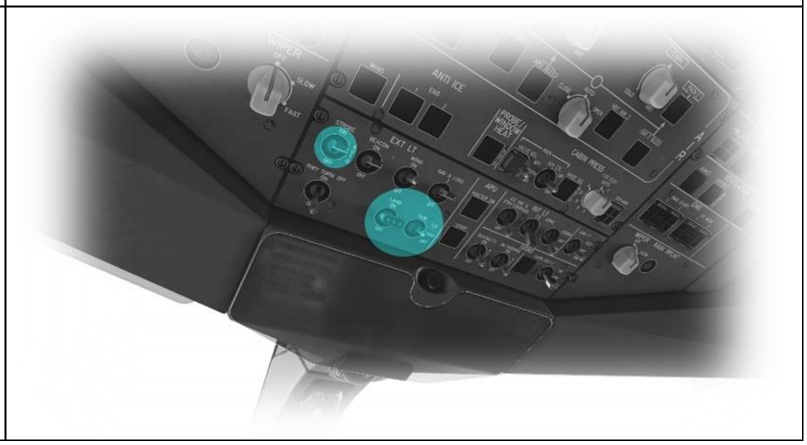
ENGINE 1 PACK - ON ENGINE 2 PACK - ON	
APU MASTER – OFF	

Before Taxi

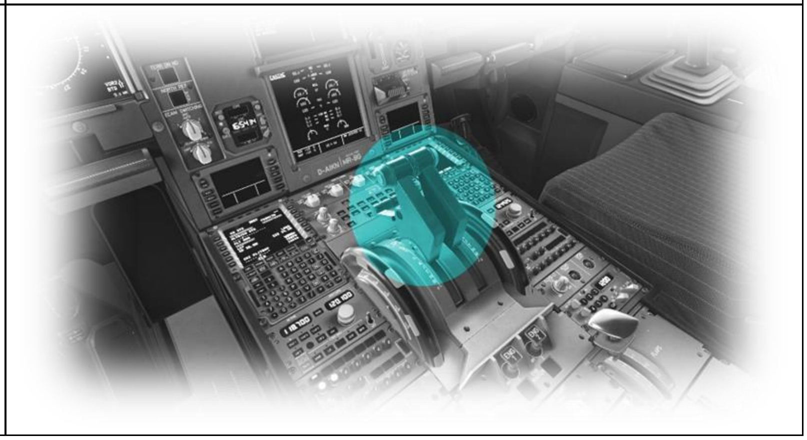
SEATBELT SIGN - ON	
TAXI LIGHTS – TAXI	
TRANSPONDER – AUTO	

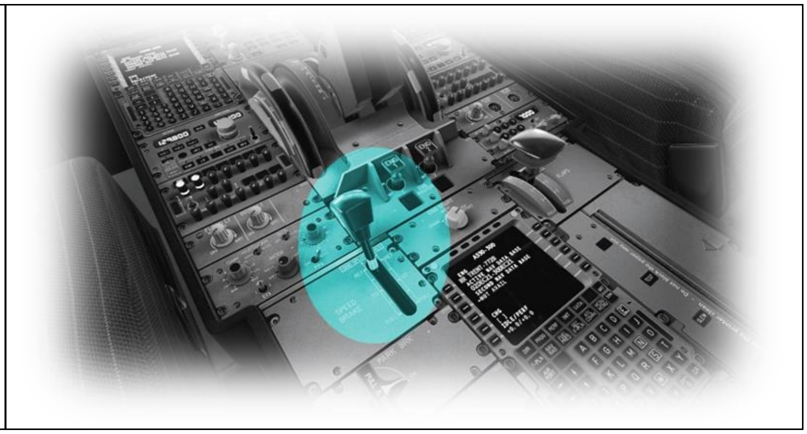
PARKING BRAKE – OFF	
FLAPS – AS REQUIRED	
SPEEDBRAKES – ARMED	
AUTO BRAKES – MAX	

Before Takeoff

ALTIMETER - SET	
LANDING LIGHTS – ON TAXI LIGHTS – TAKEOFF STROBES - ON	

After Takeoff

LANDING GEAR – UP	
FLAPS – RETRACTED	
THRUST – SET AS REQUIRED	

SPEEDBRAKES – DISARMED	

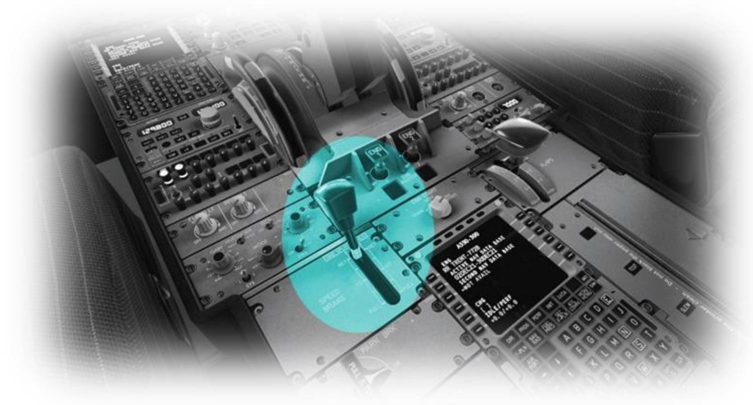
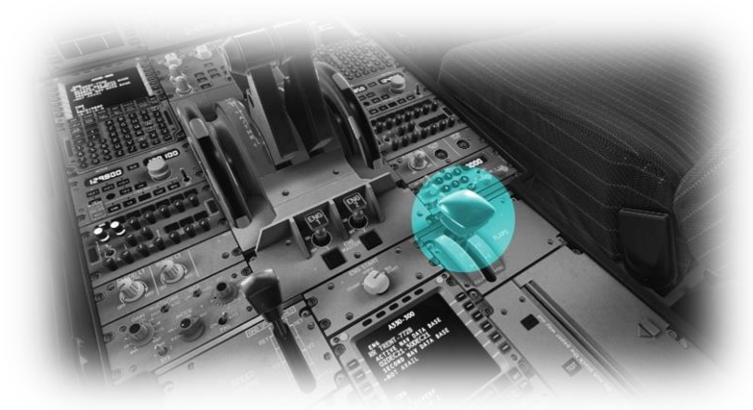
Cruise

SEATBELT SIGN - OFF	
LANDING LIGHTS – OFF TAXI LIGHTS – OFF	
ALTIMETER - SET	

Before Landing

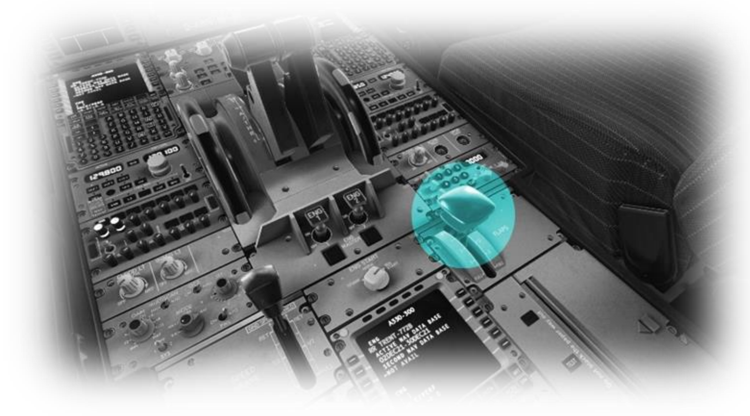
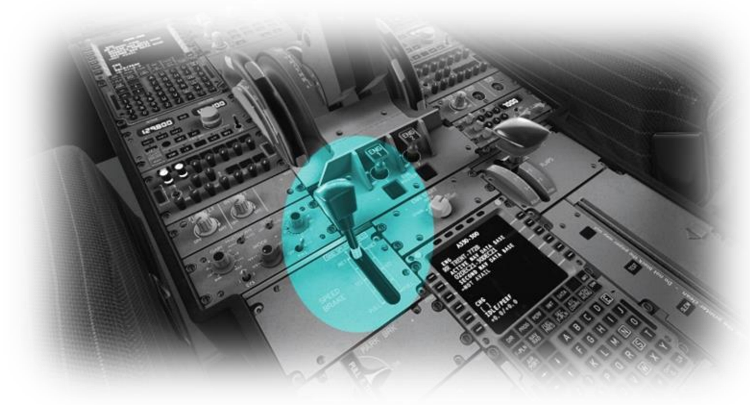
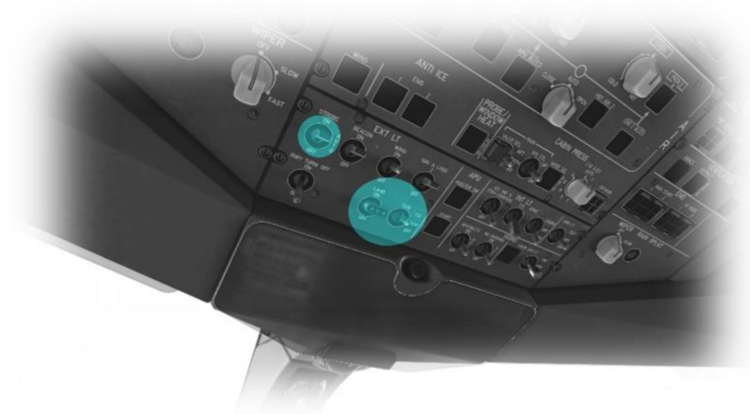
SEATBELT SIGN - ON	
ALTIMETER - SET	
LANDING LIGHTS – ON TAXI LIGHTS – TAKEOFF	

Landing

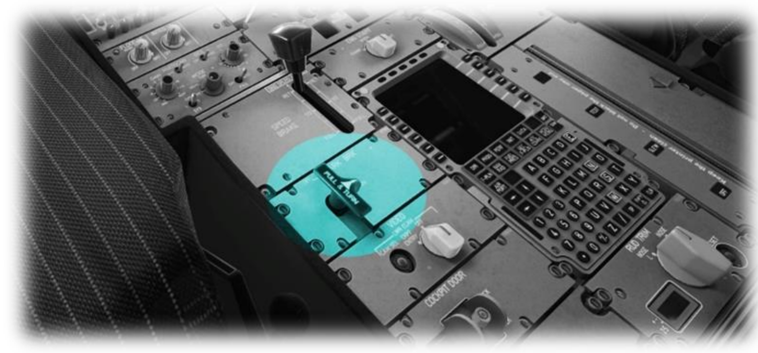
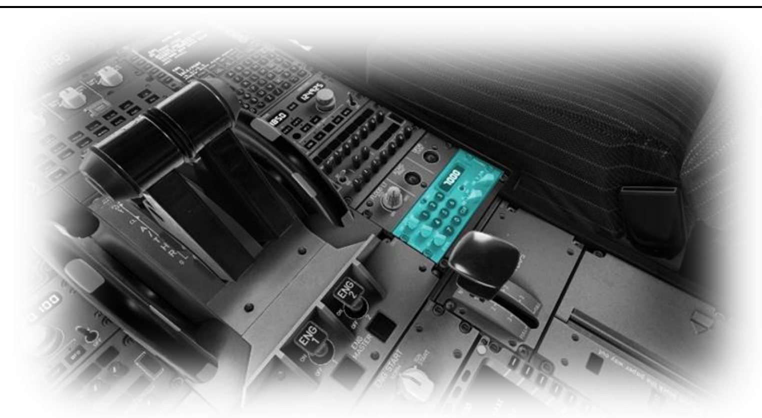
SPEEDBRAKES – ARMED	
AUTO BRAKES – AS REQUIRED	
FLAPS – AS REQUIRED	

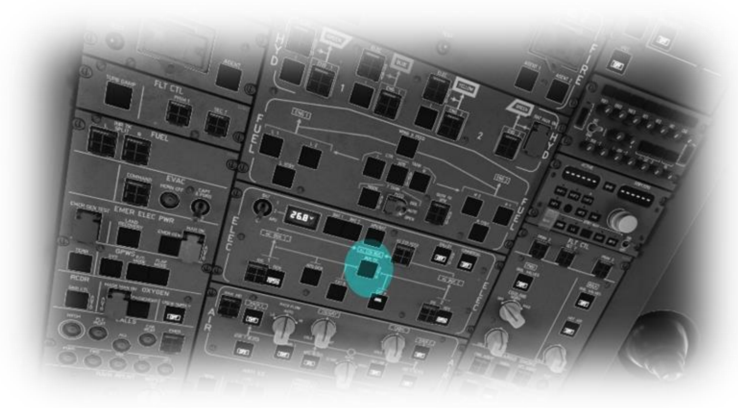
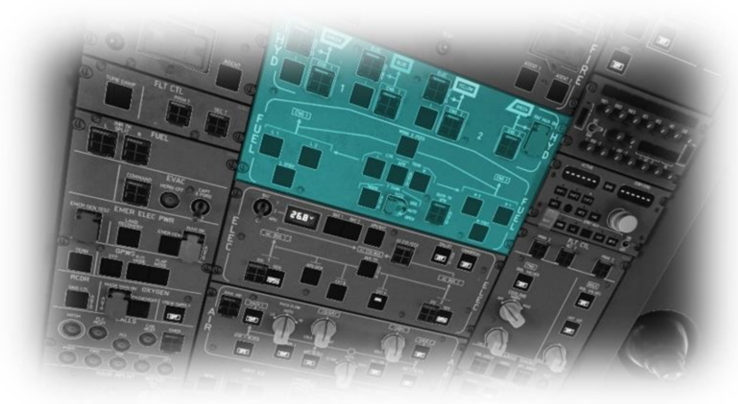
LANDING GEAR – DOWN	

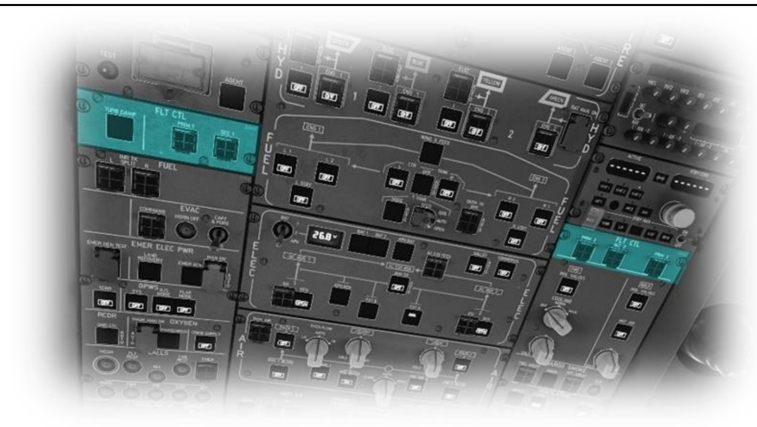
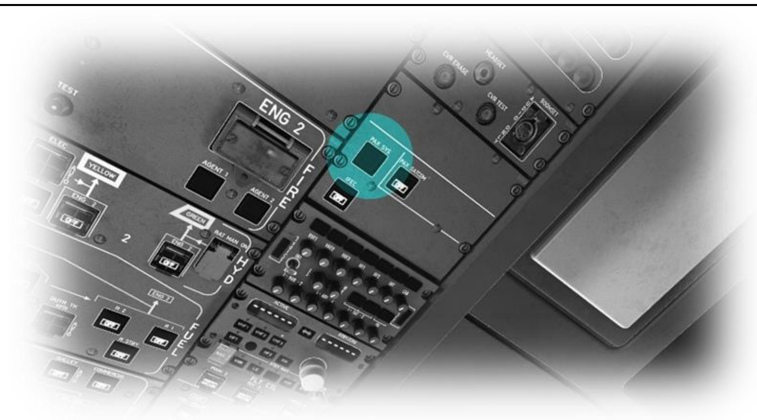
After Landing

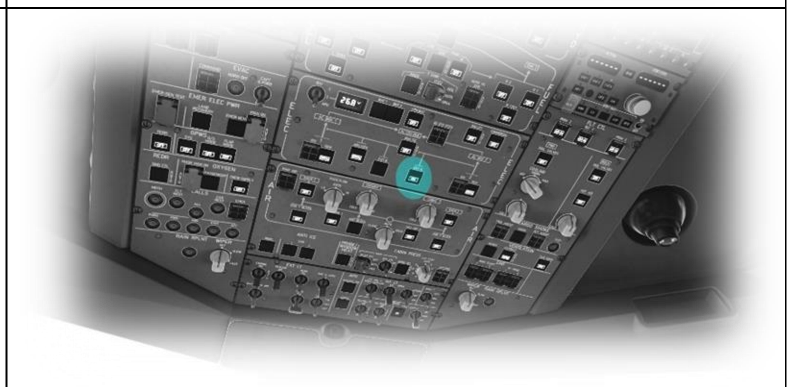
FLAPS – RETRACTED	
SPEEDBRAKES – DISARMED	
LANDING LIGHTS – OFF TAXI LIGHTS – TAXI	

Parking

PARKING BRAKE – ON	
SEATBELT SIGN - OFF	
TRANSPONDER – STANDBY	

ENG START ENG1 – OFF	
ENG START ENG2 – OFF	
ELECTRICAL / BUS TIE - OFF	
HYDRAULIC / FUEL PUMPS - ALL OFF	

GPWS AURAL ALERTS - ALL OFF	
FLIGHT CONTROL SYSTEMS – ALL OFF	
(PNUMATIC AIR CYCLE KIT) PAX SYSTEM – OFF	

[ADIRS] IR1 / IR2 / IR3 – OFF ADR1 / ADR2 / ADR3 – OFF ADIRS Rotaries - OFF	
(EXTERNAL POWER) EXTA - ON	
BEACON – OFF NAV LIGHTS – OFF	

BAT1 – OFF BAT2 – OFF