A330 Limitations

Weight Limits

	-200	-300
Max Takeoff	***513,600***	***513,600***
Max Landing	***401,200***	***412,200***

Crosswind / Max Alt

Max 90° crosswind component (including gusts) for takeoff and landing	**29/G32 knots**
Max 90° crosswind component (including gusts) for CAT II/III approaches	**15 knots**
Limiting tailwind component for takeoff and landing	**10 knots**
Max operating altitude	**41,000 feet**

Speed Limits

Max operating airspeed (V_{MO})	**330KIAS**
Max operating mach (M_{MO})	**.86M**
Max gear	
Extension speed (V_{LO})	**250 KIAS/ .55M**
Retraction Speed (V_{LO})	**250 KIAS/ .55M**
Extended speed (V_{LE})	**250 KIAS/ .55M**
Turbulence penetration speeds	
– At or above 20,000 feet	**260 KIAS/ .78M (-200 .80M?)**
– Below 20,000 feet	**240 KIAS**

Max Flap/Slat Extended Speeds (V_{FE})	
Position	V_{FE}
1	**240 KIAS**
1+F	**215 KIAS**
2	**196 KIAS**
3	**186 KIAS**
Full	**180 KIAS**

Ice & Rain Protection

Engine Anti-Ice must be on when:

- Icing Conditions exist on the ground & for Takeoff when **OAT ≤ 10°C (50°F)**
- Icing Conditions exist in-flight when **TAT ≤ 10°C (50°F)**

Fuel

Total Usable Fuel tank Quantity	**172,000 lbs.** 244,000 (-200
Maximum allowable fuel imbalance between the left and right wing tanks	**ECAM limits**

Landing Gear

Max landing gear extension altitude	**21,000 feet**

Flight Controls

Max operating altitude with slats or slats and flaps extended	**20,000 feet**

Autopilot / Autoland

Min Altitude	
– After T/O if SRS is Indicated	**100 feet AGL**

Max wind for Automatic Approach, Landing and Roll Out

- Headwind 35 knots
- Tailwind **10 knots**
- Cross wind other than CAT II/III **20 knots**

SAMPLE PERFORMANCE QUESTIONS

1. What is the total Landing Distance Correction for the following multiple failures?

FLAPS FAULT: $1+F \leq FLAPS < 2$

F/CTL: ALTERNATE LAW

ANS: Landing Distance Correction = 1.4
(If ALL failures are indicated by an asterisk (*), use the highest landing distance factor)

2. What is the TOTAL ADDITIVE to V_{REF} for the following failure and wind condition?

HYD G+B: $SLATS < 2$

HEADWIND: 15 kt

ANS: ΔV_{REF} (25 kt)+ Wind Correction (0) = 25 kt
(If $\Delta V_{REF} \geq$ 20kt No Wind Correction)

3. What LANDING CONFIG is used for the following multiple failure?

ELEC: EMER CONFIG

SLATS: $0 \leq SLATS < 1$

ANS: CONFIG 2
(Use the lowest LANDING CONFIG)

4. What is the APPR SPD INCREMENT to V_{REF} and LNDG DIST CORRECTION for the following multiple failure.

FLAPS: $2 \leq FLAPS < 3$

SLATS: $1 \leq SLATS < 2$

ANS: APPR SPD INCREMENT V_{REF} + 15 kt

LNDG DIST CORRECTION 1.35
(Use chart on page P-4 for FLAP+SLAT fault)

5. LDG DIST factors are applied to which landing distance chart?

ANS: LANDING DISTANCE WITHOUT AUTOBRAKE –CONFIGURATION FULL
(Page P-1)

SAMPLE MEL QUESTIONS

1. Can you dispatch with an out of Date NAV DATA BASE?
Yes but restrictions apply(34-61-01, NAVIGATION)

2. Can ER operations be conducted with MCDU 1 inop?
No (22-82-01, AUTOFLIGHT)

3. Can the A-330 be dispatched with an inoperative ENG Fire Loop?
Yes, One loop may be inoperative on each engine and ER not beyone 120 minutes (26-12-01, FIRE PROTECTION)

4. Can the A-330 dispatch with SEC 2 inop?
No (27-94-01, FLIGHT CONTROLS)

5. Can the A-330 dispatch with Blue Auxiliary Hydraulic Power (Electric Pump) inop?
Yes (29-22-01, HYDRAULICS)

6. Can the A330 dispatch with LGCIU 1 inop?
No. Only LGCIU 2 may be inop(32-31-01, LANDING GEAR)

ADIRS Panel

When you turn the Mode Selectors to NAV, what are you looking for on the panel?
Ensure that each ADIR has the ability to revert to the batteries, BAT light illuminates for several seconds.

What does the ON BAT light indicate?
It is illuminated amber, if one (or more) IR is supplied by the aircraft battery. It illuminates briefly during the beginning of a full alignment.

What does steady illumination of the IR FAULT light indicate?
A fault affects the respective IR.

What does flashing illumination of the IR FAULT light indicate?
Attitude and Heading information may be recovered in ATT mode.

What does the ADR 1 FAULT light indicate?
A fault is detected in the air data reference part

APU Fire Panel

–During an APU Fire Test on AC power, would you have a valid test without [pick one or more of the following]?
[A continuous repetitive chime sounds
The MASTER WARN Lights Flash
APU FIRE warning appears on ECAM
APU FIRE pb illuminates red
The SQUIB light illuminates white
The DISCH light illuminates amber]

In general, what occurs when the APU FIRE pb is released out?
Isolates the air, fuel, and electrics
[Shuts down the APU
Silences the Aural Warning
Arms the squib on the APU fire extinguisher
Closes the fuel valve and shuts off the APU fuel pumps
Closes the APU bleed valve and X bleed valve
Deactivates the APU generator]

Flight Control Computers

How many PRIM computers are on-board?
Three.

What do the PRIMs control?
Normal, Alternate and Direct control laws, speedbrake and ground spoiler control and characteristic speed computation.

How many SEC's are installed?
Two.

What do the SEC's control?
Direct control laws *[including yaw damper function, rudder trim, rudder travel limit and pedal travel limit.]*

How many flight control computers does it take to fly the A/C and assure safe flight and landing?
One computer of either type.

Can we move the PITCH trim wheel if all systems are working normally?
Yes, manual inputs have priority over computer inputs (but as soon as we let go of the trim wheel it would return to what the computers figured to be the proper setting.)

Can the aircraft be flown with a loss of all flight control computers?
Yes, in Mechanical Back-up.

What do you have available in Mechanical Back-up?
Horizontal stabilizer (pitch trim wheel), rudder pedals, *[and back-up yaw damping].*

Can the aircraft be flown with a loss of all hydraulic systems?
No, it must have one.

What two control surfaces have mechanical back up?
Horizontal stabilizer and rudder

Hand flying the aircraft can we trim the rudder?
Yes, by using the Rudder Trim Rotary Switch

On Auto pilot?
No.

What is the RUD TRIM button used for?
To reset rudder trim to 0.

Does the rudder RESET button work while on the autopilot?
No.

Is there any feedback in the rudder pedals from the yaw damping or turn coordination functions?
No.

Is full rudder deflection available during all points of the flight regime?
No. Rudder deflection is limited as a function of speed.

How are the flight controls actuated?
All surfaces are actuated hydraulically.

What happens to the ailerons when the flaps are extended?
The ailerons droop when flaps are extended.

What happens if a fault is detected or electrical power is lost?
The spoiler automatically retracts.

In Normal Law flight mode, what is the maximum bank allowable?
67°.

What are the Pitch Limits in Normal Law?
Up to 30° Nose Up *[depending on flap setting]*; 15° Nose Down

Explain what [pick one from below] means to you while operating in Normal Law?
[Load Factor Limitation
Pitch Attitude Protection
Bank Angle Protection
High Angle-of-Attack Protection
High Speed Protection]

In general terms, how does the High-Speed Protection system operate?
If VMO/MMO + a predetermined factor is exceeded the system induces a pitch up input to limit aircraft speed.

Can the pilot override this pitch up?
No

What is alpha max?
The maximum angle of attack allowed in normal law, *[indicated by the top of the red strip on the airspeed scale]*

How does High Angle-of-Attack Protection operate?
When the angle of attack exceeds α prot, pitch trim ceases and angle of attack is proportional to sidestick deflection.(however α max will not be exceeded even if the pilot applies full aft deflection)

What is Maneuver Load Alleviation (MLA)?
MLA uses spoilers and ailerons to relieve structural loads on the outer wings at high g *[when load factor exceeds 2g. Available Normal or Alternate law, flap lever zero and speed above 250kts.]*

What is the Turbulence Damping function?
Elevator and rudder inputs are used to perform turbulence damping.

Can the aircraft be stalled?
Yes in Alternate Law and Direct Law.

How is roll control achieved?
Ailerons and spoilers on each wing.

When is there a direct relationship between sidestick deflection and flight control deflection?
When in Direct Law, and when below 100 ft.

Are there any protections in Direct Law?
No

What does the Abnormal Attitude Laws do?
Allows the aircraft to be recovered from an unusual attitude.*[Pitch Law becomes Alternate, Roll Law becomes Direct with Yaw Alternate]*

Does the aircraft return to Normal Law?
No. *[It remains in a combination of pitch and yaw alternate and roll direct for the remainder of the flight.]*

Fuel

Is it possible to balance fuel if the crossfeed inop?
Yes, IAW the QRH.

What does pressing the INR TK SPLIT pb do?
The inner tank(L or R) is split into two parts in case of tank damage.(Fuel from either division may be used)

Evacuation Signal Panel

What does the CAPT and CAPT/PURS switch control and what is the normal position of the switch?
In the CAPT position the alert can only be activated from the cockpit; in the CAPT & PURS position, the alert can be activated from either the cockpit or the cabin. It is normally left in the CAPT & PURS position

How would the flight deck crew command an evacuation?
"This is the captain. Evacuate, evacuate."

Emergency Electrical Power Panel

Explain the AUTO function of the EMER ELEC PWR - MAN ON pb.
In flight, in case of normal AC supply loss, the emergency generator is automatically started.

What happens when the MAN ON pb on the EMER ELEC PWR panel is depressed?
The emergency generator starts and connects to the aircraft network.

Does the RAT deploy?
No

What situation would dictate pressing the LAND RECOVERY push-button?
During landing with the Emergency Generator Configuration.

In general what happens?
You recover some equipment to aid in the approach and landing. *[LGCIU 1, SFCC 1, ILS 1, BSCU channel 1, LH windshield and ice, LH landing light and the remaining fuel pump is lost. The following is shed: HF 1,ADR 3 and consequently AP 1]*

When does the FAULT light on the EMER GEN pb illuminate?
If the emergency generator is not supplying power and normal AC is lost.

What powers the Emergency Generator?
Green hydraulics.

Ground Proximity Warning System

Activation of the SYS push-button does what?
Inhibits all EGPWS warnings *[except TERR system]*

When would the FLAP MODE push-button be activated?
To avoid nuisance warnings when landing with flaps less than 3.

Cockpit Voice Recorder

With the GND CTL switch in the spring-loaded AUTO position, when will the CVR operate?
On the ground during the first five minutes after the aircraft electrical network is energized.
On the ground with one engine running until 5 min after engine shut down.
In flight.

What does the CVR record?
ACP's and cockpit area mike.

Oxygen System

When does the white SYS ON light illuminate?
When control for the oxygen mask doors is activated.

With the MASK MAN ON push-button in the guarded AUTO position, when will the cabin oxygen masks drop?
When cabin altitude exceeds approximately 14,000 feet.

What method is used to supply passenger cabin supplemental oxygen?
Chemical generators.

When does oxygen begin flowing to the mask?
Pulling the mask towards you activates the system.

How long will the passenger oxygen system provide oxygen?
Approximately 15 minutes.

Calls Panel

When the MECH call button is pushed what occurs?
The COCKPIT CALL blue light illuminates on the external power panel and external horn sounds.

What does the guarded EMER push-button do?
Activates both visual indications and aural tones (3 double chimes) throughout the cabin

What would indicate an emergency call from the cabin to the cockpit?
The white ON light and amber CALL lights on the CALL panel flash,
The amber ATT lights on the ACP's flash and
Three long buzzers sound in the cockpit.

Auxiliary Power Unit

From where does the APU receive it's fuel?
The trim tank transfer line.

What is the Maximum Altitude for APU Electrical supply?
41,000 feet.

Is the APU Bleed Air allowed to be used to the Maximum Operating Altitude?
No *[limit 22,500 feet.]*

If you forgot to close the APU bleed valve during climb, what would happen?
It would automatically close *[climbing through FL250].*

In this case, what would you expect to happen, if anything, during descent?
It would automatically reopen *[descending through FL230].*

What does the green AVAIL light on the APU Start pb mean?
The APU is available to provide electrics or bleed air.

If the APU is running must Bleed Air be manually selected OFF prior to APU shutdown?
No. When the APU master Switch is selected OFF the bleed air valve is closed and the APU is allowed to cool before shutdown.

Will the APU bleed valve close automatically during climb? Will it reopen during descent
Yes, *[it closes automatically climbing through 25,000 feet.]*
Yes, *[it reopens descending through 23,000 feet.]*

Will the APU Auto Shutdown for Low Oil pressure?
Yes.

What does illumination of the amber FAULT light on the APU Master push-button indicate?
An automatic shutdown has occurred.

Lights & Signs

What overhead cockpit lighting is available with battery power only?
Right Dome Light.

Which cockpit light(s) illuminate during a rejected takeoff regardless of switch position?
Right Dome Light.

What does the "2" position on the NAV & LOGO lights switch operate?
The second set of navigation lights, which are co-located with the first set at the wingtips, in the APU tailcone and on the upper surface of each horizontal stabilizer (to illuminate the company logo).

Which lights go off automatically when the landing gear is retracted?
Nose TAXI and T.O., and the RWY TURN OFF lights.

When will the floor proximity emergency escape path marking system and overhead emergency lighting automatically illuminate?
When the normal AC electrical power system fails, *[or DC ESS BUS fails, or AC BUS 1 fails]*

When will the EXIT signs illuminate automatically?
Failure of the normal AC electrical power system, *[or DC SHED BUS failure, or Excessive cabin altitude (11,300' +/- 350' When the NO SMOKING/STERILE COCKPIT signs come on.]*

Ice Protection Systems

What components utilize bleed air for ice protection?
Four outboard leading edge slats on each wing
Engine air intakes

In what position do the Wing and Engine Anti-Ice valves fail if electrical power is lost?
Wing Anti- Ice valves close
Engine Anti Ice valves open

Which exterior aircraft components utilize electrical heating?
Cockpit windows *[windshields and side windows are electrically heated]*
AOA probes, TAT probes, pitot probes and static ports
Waste-water drain masts

What does illumination of the amber FAULT light on the wing anti-ice push-button indicate?
The position of the anti-icing control valve is not in the required position, or
Low pressure is detected.

What is the source of engine anti-ice bleed air?
Each engine produces its own independent source of bleed air for engine anti-icing.

When engine anti-ice is selected ON, what else occurs with regard to the engine?
Maximum EPR limit for that engine is reduced automatically and the idle EPR is increased on the respective engine.

Continuous ignition is activated for that engine.

When is window heat/probe heat operational?
Automatically when one engine is running and when the aircraft is in flight.
Manually, prior to engine start, when the crew selects PROBE/WINDOW HEAT ON. On ground low heat is applied. In-flight temp automatically switches to high.

Air Conditioning, Pressurization & Ventilation

What does a MODE SEL FAULT light indicate?
Both automatic pressure controllers are faulty.

What does the LDG ELEV knob do?
It is used only when the automatic system is working. In auto the auto-controllers take the landing elevation from the FMGEC. If landing elevation is not available from the FMGEC the auto controllers can get the necessary information by manual selection of the landing field elevation.

If required how does the crew manually control the pressurization system?
The crew can control cabin altitude by first selecting MAN on the MODE SEL pb then selecting AFT FWD or BOTH outflow valves and operating the MAN V/S CTL toggle switch on the panel that regulates the position of the outflow valve.

What does the DITCHING push-button do?
In the event of ditching, operation of this push-button will close all exterior openings below the flotation line.

Will the DITCHING push-button always close the outflow valves?
No. If the outflow valve is under manual control it will not close.

What effect will the Engine Start Sequence have on the pack flow control valves?
The pack flow control valve will close automatically.

What is the function of the RAM AIR push-button?
Cockpit/cabin ventilation if both packs fail or to remove smoke in the cabin.

When would the flight crew use the PACK FLOW knob?
To adjust the pack flow for the number of passengers/length of flight

What output is automatically selected, regardless of knob position, during single pack or APU bleed operation?
High flow.

Inflight if the engine bleed pressure is too low, what will occur?
Engine speed is automatically increased to provide adequate air pressure.

What is the relationship between the ENG and APU bleed air valves and the Cross-Bleed valve in AUTO?
When the APU BLEED pb is ON the Bleed Monitoring Computers (BMC) command the crossbleed valve to open and the engine bleed valves to close if APU bleed air is available.

If the crew selects LO flow and the temperature demand cannot be satisfied, what will occur?
The zone controller generates an ECAM advisory message to inform the crew to manually select NORM flow.

What is the function of the HOT AIR push buttons?
They control the hot air pressure regulating valves that control the flow of hot air to the trim air valves.

Describe how the air conditioning system control the temperature in each zone?
Pack output temperature regulation is determined by the zone requiring the coldest air.
Hot air is added to the individual zones via the trim air valves to maintain desired zone temperatures.

What do the CAB FANS push-button operate?
Two cabin fans used to blow air from the cabin to the avionics compartment and also to the mixer unit of the conditioning systems.

How is avionics ventilation accomplished?
Electric fans and cabin recirculation fans direct air into the avionics plumbing for ventilation. *[The extract fan draws air from the avionics equipment and panels and blows it through either the inboard or the overboard valve.]*

Electrical System

Using the overhead panel, describe the normal priority for supplying electrical power to each of the two main AC buses?

Corresponding Engine Generator
APU Generator or External power A (if both are connected, the APU generator has priority for AC BUS 1 and EXT A has priority for AC BUS 2)
External power B (if both EXT A and EXT B are connected EXT B has priority for AC BUS 1 and EXT A has priority for AC BUS 2)
Opposite Engine Generator

If during the preflight, you see an AVAIL light on the EXT A switch and an AVAIL light on the APU START SW switch, which is powering the AC buses?

The APU is powering both AC buses. If the External Power was powering the aircraft there would be an ON light on the EXT PWR switch instead of an AVAIL light.

What is the AUTO function of the BUS TIE pb?

Allows powering Both AC bus 1 and AC Bus 2 from a single power source.

What is the function of the AC ESS FEED pb in the Normal position?

If AC BUS 1 is lost AC BUS 2 automatically feeds the AC ESS BUS.

What does a fault on the GEN switch indicate?

The generator is not available
[A fault is detected by the GCU, or the Generator Line Contactor opens.]

When is it normal to see it illuminated?

Prior to engine start.

What cautions is associated with the IDG switch?

Don't hold the switch for more than 3 seconds

What busses are powered by the emergency generator?

AC essential bus and DC essential bus .(if the Ram Air Turbine is powering the green hydraulic system some shedding occurs).

Explain the battery charge check on the Originating Checklist?

Select the ECAM EL/DC Page on the ECAM Control Panel.
Select BAT 1, 2 and APU BAT Pushbutton switches to OFF, then ON.
Check on the ECAM EL/DC Page that the three battery charge currents are below 60 amps and decreasing within 10 seconds.
Deselect the ECAM EL/DC Page

Will the batteries completely drain by inadvertently leaving the BAT switches in AUTO after AC power is removed?

No. Battery automatic cut-off logic prevents complete discharge of the battery when the aircraft is on the ground and unpowered.

Where are the circuit breakers located and how is their condition monitored?

The circuit breakers are located in the electronic equipment bay. *[A Circuit Breaker Monitoring Unit (CBMU) monitors the circuit breakers and sends this information to the ECAM system. In the event of a tripped breaker, there will be an ECAM alert for crew awareness.]* Press the C/B pushbutton on the ECAM Control Panel to identify the affected breaker on the ECAM SD.)

When are the batteries connected to the DC BAT BUS?

When batteries being charged
[When on the ground with battery power only]

What is the purpose of the static inverter?

To provide AC power when down to Emer Elec Config, Battery only. *[In the event of total AC failure, the static inverter which is connected to the DC ESS bus converts DC power into AC power to power the AC ESS bus.]*

Fuel System

What will cause an aft transfer of fuel from the main tanks to the trim tank, and when will it occur?
An aft transfer will occur automatically when the aircraft is climbing *[through FL255]* to altitude or thereafter if the CG is forward of target.

-How many main fuel pumps are installed?
Six. There are two main fuel pumps in each wing tank collector box, and an additional standby pump within each wing inner tank.

Do all six fuel pumps run in normal operation?
No. (A standby pump runs when at least one associated main pump is failed or OFF.)

What does a wing tank pump fault light indicate?
The pump is not operating. *[Also ECAM alert.]*

What is the normal fuel feed sequencing?
Fuel is always fed to the engines from the inner tanks: (-200 Empty center then wing)
Trim tank fuel transferred into the inner tanks
Outer tanks transferred into the inner tanks

When does the fuel crossfeed valve automatically open?
Electrical emergency configuration.

When is forward transfer automatically initiated?
Actual CG reaches target
Either inner tank quantity is low
Aircraft is close to destination in altitude or time *[altitude below FL245 or FMGS time to destination is less than 35 minutes.]*

When and how is fuel normally transferred from the outer to inner wing tanks?
Automatically *[(by the FCMC) based on inner tank quantity].*

What power must be available to refuel the aircraft?
A minimum of battery power is required.

What does the OUTR TK XFR pb do?
Allows gravity transfer of outer tank fuel *[by opening the outer transfer valves and the outer and inner inlet valves].*

If the Forward Transfer pump is inoperative, can a forward transfer take place?
Yes, transfer can be accomplished by gravity.

What, if anything, automatically happens to the fuel system in emergency electrical configuration?
The fuel crossfeed valve opens.

With only one fuel pump operating in emergency electrical configuration, how can you maintain fuel balance?
Turn OFF the operating pump *[L2]* as necessary; the other (backup) pump *[R2]* will operate.

Hydraulic System

Name the hydraulic systems and their primary power sources?
Green Two engine driven pumps (one on each engine)
One electric pump (manually or automatically controlled)

Ram Air Turbine (RAT)

Blue ENG 1 pump
One electric pump (manually controlled)

Yellow ENG 2 pump
One electric pump (manually or automatically controlled)

When will the YELLOW ELEC pump operate automatically?
With the YELLOW ELEC pump pb in AUTO, the electric pump operates automatically:
As necessary for flap operation with failure of #2 engine *[except when the green electric pump is operating for landing gear retraction]*

On the ground during cargo door operation

When will the RAT deploy automatically?
Both engines fail
Green and Yellow system low quantities
Green and Blue system low quantities

Can the RAT be deployed manually?
Yes, with the guarded RAT MAN ON push-button on the overhead panel.

What is the purpose of the priority valve in the Green Hydraulic System?
If Green system pressure becomes low, a priority valve cuts off pressure to heavy load items in order to retain pressure for flight controls and normal braking.

Fire Protection

How many extinguishers are installed for each engine? APU?
Two for each engine, one for the APU.

Can the fire bottles for eng #1 be used to fight a fire in eng #2?
No.

Will the APU shut down automatically in flight for a fire indication?
No.

If the APU fire system detects a fire in flight will the extinguisher discharge automatically?
No.

If we incur an APU fire on the ground, must we manually shut down the APU and depress the appropriate switches?
On ground only, the APU will automatically shut down and the APU fire extinguisher will discharge. In addition an external horn sounds in the nose wheel well and a red APU FIRE light illuminates on the external service interphone panel.

What cockpit indications will alert the crew to an engine fire?
Continuous repetitive chime.
Respective ENG FIRE pb illuminates red on the overhead panel
MASTER WARN lights
ENG FIRE warning appears on ECAM
Illumination of the respective FIRE light illuminates red on the pedestal

Audio Switching Panel

What is the purpose of the Audio Switching Panel?
To allow either the Captain or First Officer to use ACP 3 should their respective ACP fail.

Cargo Smoke Panel

Which cargo compartments contain smoke detection?
All three cargo compartments are equipped with smoke detectors.

How many extinguisher bottles are available to fight a Cargo Compartment Fire?
Two

Do both bottles discharge at the same rate?
No (Bottle one discharges immediately and bottle 2 is metered to discharge over a period in excess of 4 hours)

Engine Start Panel

What are the primary differences between a manual start and a normal automatic start?
The FADEC provides full monitoring during manual start and will provide appropriate ECAM cautions and procedures for the crew to follow in the event of a start fault; however, automatic start interruption and auto-crank are not available as in the automatic start sequence.

Glareshield

If both pilots press the takeover buttons on the side stick, which will have priority?
The pilot who presses last gets priority.

-What does illumination of the SIDE STICK PRIORITY red arrow light in front of the pilot indicate?
That pilot has lost side stick authority.

What does the flashing illumination of the green CAPT and F/O SIDE STICK PRIORITY lights indicate?
Both side sticks have been moved simultaneously and neither pilot has taken priority.

Flight Control Unit

What is the function of the Flight Control Unit (FCU?)
The FCU permits short-term interface between the pilot and the FMGES. It allows temporary modification of any flight parameter (heading, speed, altitude, and vertical speed). The FCU is also used to select operational modes of the autopilots, flight directors, and autothrust system.

What do dashes in the FCU display windows and illumination of adjacent white dot lights indicate?
FMGS managed guidance is being used.

How is selected guidance engaged?
The appropriate selector knob is pulled.

How are autopilot, flight director or autothrust mode inputs to the FCU confirmed?
Confirm mode inputs by reference to the FMA.

Will the FCU altitude window ever display dashes?
No. The pilot selected altitude will always be displayed.

Engine/Warning Display

What are the computers called that feed data to the six display units; how many are there?
Display Management Computers (DMCs); three.

What do each of the Display Management Computers (DMCs) normally supply?
#1 normally supplies the Capt's PFD and ND;
#2 normally supplies the F/O's PFD and ND;
#3 normally supplies the upper and lower ECAM displays (E/WD & SD)

What is the function of the DMC AUTO position of the DMC selector?
DMC 3 supplies data to both ECAM DUs. In case of DMC 3 failure, DMC 1 automatically takes over

If the upper ECAM (E/WD) screen fails what would occur?
The E/WD would automatically replace the SD on the lower ECAM screen.

What would occur if the lower ECAM display unit then failed?
The E/WD could be manually switched to the Captain or F/O's ND by use of the ECAM/ND XFR knob on the ECAM switching panel. *[SD data could then be temporarily displayed on the selected ND by pressing and holding the applicable system key on the ECAM control panel.]*

What are the 3 levels of ECAM Malfunction Notifications?
WARNINGS: Requires Immediate Crew Action *[indicated by flashing red MASTER WARN illumination, a red warning message on the E/WD, and continuous repetitive chime]*
CAUTIONS: Requires Timely Crew Action but not immediate action. *[indicated by an amber caution message on the E/WD, an amber MASTER CAUT illumination, and a single chime]*
ALERTS: Requires Only Crew Monitoring *[indicated by an amber message on the E/WD and no aural signal]*

If simultaneous failures occur, how will they be presented to the crew?
A priority system is in place which presents the most critical warnings first (level 3, then level 2, etc.)

Which part of the E/WD would the crew find indication of primary failures?
On the lower left part of the screen.

What indication does the E/WD provide for secondary failures?

Secondary failures are displayed on the lower, right part of the E/WD and are proceeded by an asterisk (*).

What does the appearance of a green arrow at the bottom of the E/WD screen indicate?

Information has overflowed off the screen and the pilot must scroll down using the CLR button on the ECAM panel.

What does the display of T.O. INHIBIT or LDG INHIBIT indicate?

The system has inhibited most warnings and cautions during takeoff and landing to avoid alerting the pilots unnecessarily during high workload times.

Are warnings inhibited during takeoff?

Yes, most but not all warnings are inhibited.

Are any warnings not inhibited during takeoff?

Yes.

What types of warnings are <u>not</u> inhibited during takeoff, and what is/are example(s) of such warnings?

Warnings severe enough to stop the takeoff, such as [give at least one example of the following to demonstrate general knowledge of severity]:

ENGINE FIRE
APU FIRE
ENG FAIL(ENGINE SHUT DOWN)
DUAL ENG FAILURE
REV UNLOCKED
ENG OIL LOW PRESS
L+R ELEV FAULT
FWC 1+2 FAULT

How would you react to such a warning during takeoff?

Reject, assuming it happened prior to the V_1 callout.

When would the Landing Memo appear?

It appears on approach below 2000 feet if the landing gear is down, or below 800 feet if the landing gear is not down

<u>System Display</u>

In general, when are system pages automatically displayed on the SD?

When a malfunction is detected
Relative to the current phase of flight [doors prior to start, wheel/controls after start, etc.]

When is a STATUS page displayed?

After the SD has displayed a failure and the crew has cleared all applicable failure related pages, the STATUS page is displayed showing inoperative systems and the approach and landing procedures to be followed. It is also displayed when baro reference is selected and when slats are extended *[unless there is no information or only maintenance messages].*

What does STS indicate when displayed on the SD?

The boxed STS message indicates that the STATUS page holds messages other than CANCELED CAUTIONs, and is a reminder that airplane system(s) are degraded. Additionally, the STS message flashes after engine shutdown to alert maintenance of any other applicable messages.

Landing Gear & Brakes

How many Landing Gear Control and Interface Units (LGCIU) are installed and what is their function?
There are two LGCIU's installed and they provide sequencing, operation, monitoring, and indications for the landing gear. They also provide aircraft "in flight" or "on the ground" signals to other aircraft systems.

What hydraulic system powers all gear and doors?
The GREEN system.

Is it possible to extend the gear at any speed (high speed, for example)?
No. At high speed, *[above 280 knots]*, a safety valve automatically cuts off hydraulic supply to the landing gear system.

Does the hydraulic safety valve that prevents gear extension at high speed protect you from exceeding the operational limit speed of 250 knots?
No. *[The safety valve only prevents extension above 280 knots.]*

Is normal hydraulic power available to the gear after Emergency Landing Gear Gravity Extension?
No.

After Emergency Landing Gear Gravity Extension, other than the gear, itself, is any other system affected?
Yes, nose wheel steering.

What does the red UNLK light indicate on the landing gear panel?
The gear is not locked in the selected position.

What does illumination of the red arrow near the gear selector lever indicate?
The gear is not locked down when the aircraft is in the approach configuration. Additionally, a red warning will appear on the ECAM.

Which hydraulic systems provide brake pressure?
The normal system uses GREEN pressure and the alternate system uses BLUE pressure backed up by a hydraulic accumulator.

What controls and manages all braking functions?
A Brake and Steering Control Unit (BSCU).

Upon landing what will cause the auto-brakes to activate if armed?
Extension of the ground spoilers.

What will cause the auto-brakes to activate on an RTO?
Ground spoiler extension (aircraft speed above 72 knots).

What is the takeoff setting for the auto-brakes?
MAX.

Are auto-brakes available with the alternate brake system.
No.

Is anti-skid available with the alternate brake system?
Yes, if certain conditions are met.

How many brake applications should be available with only accumulator pressure?
At least seven full applications.

What does the BRAKES & ACCU PRESS triple indicator indicate?
BLUE system brake accumulator pressure and BLUE pressure delivered to the left and right brakes.

Is there a maximum allowable brake temperature for takeoff?
Yes.(300° C)

Switching Panel

What function does the ECAM/ND knob serve?
It allows transfer of the System Display to either the Captain or First Officer ND.

If both ECAM DU's (E/WD and SD) fail, how can the crew display E/WD information?
They can use the ECAM/ND knob to transfer the E/WD display to either ND.
[Pressing and holding the applicable ECAM system key will then display the related system page on the ND.]

What indication is provided to the crew of a DMC failure?
A diagonal line will be displayed in the DMC's respective display units (EFIS & ECAM).

ECAM Control Panel

If the UPPER DISPLAY knob were rotated to OFF, what would occur?
The E/WD display would automatically transfer to the lower display.

What does the RCL push-button do?
It allows the crew to call up warning and caution messages that the activation of the CLR push-button or flight phase inhibition may have suppressed. Additionally, if pressed and held for more than 3 seconds, the E/WD shows any caution messages that have been suppressed by the EMER CANC pb.

If the crew presses the STS button and the system has no status messages, what will be displayed?
The status page will display "NORMAL" for five seconds.

What function does the ALL button serve?
When held down, it will display all system pages successively in two-second intervals. Release the switch to maintain display of the selected page.

During the BEFORE TAKEOFF CHECKLIST the T.O CONFIG button is pressed, what occurs?
The system simulates the application of takeoff power and checks certain systems for proper configuration. A warning is displayed if any system is not configured properly; "TO CONFIG NORMAL" is displayed in the TO MEMO section if the configuration is correct.

Trimmable Horizontal Stabilizer

How is the THS normally operated in flight?
Trim functions are controlled automatically by the flight control computers, requiring no pilot input.

If no hydraulic power whatsoever is available, can the THS be positioned?
No. The THS requires hydraulic power (from the BLUE or YELLOW system.)

If a complete flight control computer failure occurs can the THS be positioned?
Yes., mechanical trimming is possible by manually positioning the Pitch trim wheel, *[which sends control inputs directly to the two hydraulic motors to drive the THS.]*

Thrust Levers

How is the autothrust system normally armed on takeoff?
By setting the thrust levers at the FLX or TOGA gate

What is the normal operational position of the thrust levers when autothrust is active?
The CLIMB detent.

What determines that maximum thrust that the autothrust system can command?
The position or gate of the thrust lever.

What are the preferred methods of disconnecting the autothrust?
Match the EPR TLA(blue circle) to the EPR needle, then push the instinctive disconnect button or
Set both thrust levers to idle.

When would thrust lock occur?
If the thrust levers are in the climb detent and the A/THR push-button on the FCU is pushed or the autothrust disconnects due to a failure.

When is Alpha Floor protection available?
From lift-off to 100 feet radio altitude on approach.

What, in general, is Ground Speed Mini?
Ground Speed Mini is based on a calculated ground speed at the runway. It protects against actual ground speed dropping below this calculated ground speed, (and would become active because of a stronger headwind component on final than at the runway).

What does it mean to you when you see the magenta target airspeed triangle above what you know to be VAPP, while fully configured on final approach?
Ground Speed mini is keeping us at a higher airspeed, due to a stronger headwind component at our present location than what was calculated at the runway.

Is this protection available in selected speed mode?
No.

Engine Start Panel

What redundancy does the FADEC have?
FADEC has dual channel redundancy, one channel is active, the other in standby.

What is the power source for the FADEC?
The system has its own alternator rendering it independent of the aircraft electrical system when the N_2 is above a set value. *[if this alternator fails the FADEC automatically switches to aircraft electrical power]*

What are some examples of the FADEC programming a higher engine idle speed?
bleed demands or high IDG temperatures *[increases Minimum Idle]*
approach configuration *[landing gear DOWN, or flaps at 3 or FULL results in Approach Idle]*
reverse *[reverse thrust results in Reverse Idle]*

How many igniters fire during a normal automatic start on the ground?
One igniter with the other serving as a backup. The FADEC automatically alternates the use of igniters at each start

How many igniters fire on manual or in-flight starts?
Both.

What are <u>some</u> instances when continuous ignition automatically operates?
ENG anti-ice on
Engine Flameout
ENG surge in flight
Take off mode (TOGA or FLEX)
Approach idle (flaps 2,3 or FULL or gear down)

If the FADEC detects a fault during automatic start is any crew intervention required?
No. The FADEC will discontinue the start, clear the engine and attempt a restart (if warranted) automatically.

Transponder

How many transponders are installed?
Two.

Does illumination of the ATC FAIL light indicate loss of all transponder capability?
No. Only the selected transponder has failed.

Flaps & Slats

With only GREEN system hydraulics available, will both the slats and flaps operate?
Yes. (they will operate at ½ speed)

If loss of one hydraulic system should occur, what effect would it have on the flap or slat system operation?
The affected system would operate at half speed.

What system prevents Flap or Slat asymmetry?
Wing Tip Brakes (WTB)

If the WTB activates due to a flap asymmetry can the slats still operate?
Yes, only flap operation is inhibited.

How many Slat/Flap Control Computers (SFCC) are installed?
Two.

What would occur if one SFCC failed?
The slats and flaps would continue to operate, but at half speed.

What flap/slat configurations correspond to position 1 on the FLAPS lever and how do they differ?
Config 1+F is used for takeoff and provides both slats (position 1) + flaps
Config 1 is used in-flight and is slat only

When will Automatic Retraction System (ARS) operate?
During acceleration in CONF 1+F the flaps will automatically retract to 0 at 200 kts.

What is Alpha Lock?
This function inhibits retracting slats from 1 to 0 at a high angle of attack or low airspeed

What is the Flap Load Relief System?
If an overspeed condition exists, the system automatically retracts or (prevents extension of) the flaps. Flaps will automatically retract to the next flap setting when limit speed is exceeded *[by 2.5 knots.]*

When the FLAP legend appears in cyan (blue) on the upper ECAM display what is indicated?
Flaps/Slats are in transit.

Parking Brake

What effect does setting the parking brake have on other braking modes?
Other braking modes and the anti-skid system are deactivated when the PARKING BRAKE is set.

When brake accumulator pressure is low, how is it re-charged?
With the BLUE system electric pump.

By what means is the parking brake activated when you turn the Parking Brake switch?
Electrically.

Do you need to hold the pedals depressed while setting the parking brake?
No.

How do you verify the parking brake set?
ECAM and triple indicator.

Speed Brake/Spoilers

Is there any landing configuration when speed brake extension is inhibited?
Yes: Flaps FULL

When do the ground spoilers automatically extend?
Partial Extension: Reverse thrust is selected on at least one engine with the other at or near idle and one main landing gear strut is compressed.
Full Extension: At touchdown of both main gear or in case of RTO (speed above 72 knots)when Both thrust levers at idle(if ground spoilers armed) or when reverse thrust is selected on at least one engine and the other thrust lever at idle (if the ground spoilers are not armed)

Upon touchdown if reverse is selected and only one gear has compressed; will the spoilers extend?
Yes, Partially. Extension is limited until both main gear are compressed.

When will spoilers automatically retract?
Upon disarming
When reverse is deselected if spoilers are unarmed
During a touch and go when thrust levers are advanced

RADAR

What capabilities does the RADAR system installed in US Airways' Airbus fleet have?

Weather Avoidance
Turbulence Detection
Terrain Mapping
Predictive Windshear Detection

What would prevent displaying weather on the ND?

PLAN. Mode or TERRAIN selected

When is the WX/TURB mode available?

At ranges of 40 nm or less.

Does windshear detection work when the RADAR system is off?

Yes, if the windshear switch is in AUTO the system automatically turns on if the radar transceiver is selected off or in another mode.

What is the scanned area of the predictive windshear detection feature?

Up to five miles ahead of the aircraft and aircraft is below 1500 ft. *[within +/- 40° forward]*

When are predictive windshear alerts inhibited?

When on the ground above 100 knots until reaching 50 feet AGL.
When landing – no alerts below 50 feet AGL

How many radar systems are installed?

Two.

Radio Management Panel

Which RMP is powered in the Emergency Electrical Configuration?

RMP 1.

Which communication radios are powered during the Emergency Electrical Configuration?

VHF COM 1, HF 1

What would cause the SEL indicator to illuminate on both RMP's?

When a communications radio normally associated with one RMP is tuned by another.
This is the normal indication when both captain and first officer RMP's are selected to VHF 1 per US Airway's policy.

If the clear covered NAV key is selected on either pilot's RMP, can the FMGEC auto tune or manually tune navaids?

No

Audio Control Panel

What method would the crew employ to make a PA?

A PA may be made by pressing the PA button on an ACP and using any microphone associated with that ACP [Boom mike, hand mike or mask mike.] A flight deck handset may also be used which is dedicated to the PA system only.

What does illumination of the CALL light on the VHF or HF transmission keys indicate?

The SELCAL system detects a call.

Flight Management/Guidance System

What are some of the main components of the FMGES?

Two FMGECs
Three MCDUs
One FCU

Which has priority: selected guidance or managed guidance?

Selected guidance.

What type of database is periodically updated in the FMGECs?

Navigation database.

Can the crew modify data in the Navigation database?

The crew has limited ability to create pilot stored navigational data.

Is it possible to determine that the data contained in the FMGEC is valid?

Yes, check the validity period on the Aircraft Status page.

What is the normal operational mode of the FMGES and how does it operate?

The FMGES normally operates in dual mode, with one FMGEC as the master and the other as the slave.

How does autopilot selection influence master FMGEC logic?

If one autopilot is engaged, the respective FMGEC is the master; if both autopilots are engaged FMGEC 1 will be the master.

An amber "OFF SIDE FM CONTROL" message is displayed on a ND. What action should the crew take?

An FMGEC has failed and both NDs must be set to the same mode and range.

Large and small fonts are used on the MCDU display, what does each indicate?

Large font indicates pilot entries and modifiable data. Small font is used to display defaulted/computed and non-modifiable data.

When would a takeoff shift be entered on the PERF TO page?

When taking off from a runway intersection.

If managed NAV is engaged and the aircraft flies into a flight plan discontinuity, what will occur?

NAV mode will be lost and the HDG/TRK mode engages.

Navigation Display

What displays or modes are available on the ND?

Rose ILS
Rose VOR
Rose NAV
ARC
Plan
ENG [standby page]

What color is used to represent the flight plan to the alternate?

A dashed blue line.

What color is used to represent the active flight plan?

A continuous green line.

What color is used to represent the temporary flight plan?
A dotted yellow line.

What color is used to represent the secondary flight plan?
A continuous white line.

What color is used for the missed approach procedure?
A continuous blue line.

TOP OF DESCENT and CONTINUE DESCENT arrows can be displayed in blue or white. What is the difference?
TOP OF DESCENT-always white *[never armed]*
CONTINUE DESCENT -Blue indicates armed, white indicates not armed.

Altitude constraints are presented as a small circle in white, amber or magenta. What does each color represent?
White indicates that the altitude constraint is not taken into account by the guidance and the NAV mode is engaged. Magenta indicates the altitude constraint is predicted to be satisfied, and amber indicates the altitude constraint is predicted to be missed.

Primary Flight Display

When is the side stick position indication icon (white cross) displayed?
The side stick position indication is displayed as soon as one engine is started, and disappears when the aircraft becomes airborne.

What would the appearance of large red arrowheads on the PFD indicate?
Pitch attitude has exceeded +30 degrees.

What are the pitch and roll angle limits indicated on the PFD by green "=" signs?
Roll:+/-67 degrees
Pitch: +30 degrees nose up, -15 degrees nose down

When would the sideslip index change from yellow to blue?
In case of an engine failure at take-off or go around the slide slip indicator changes from yellow to blue. It is then called a Beta target *[Sideslip target is blue if Config 1,2,or 3 is selected and any ENG EPR is >1.3 and difference between ENG EPR >0.25]*

What does the yellow speed trend line indicate?
The speed the aircraft will reach in 10 seconds if its acceleration/deceleration remains constant.

Target airspeeds may be presented in magenta or blue, what is the difference?
Magenta indicates that the speed is Managed [computed by the FMGEC], and blue indicates that the speed was Selected manually on the FCU.

What is V_{LS} and how is it displayed?
It represents the lowest selectable speed providing an appropriate margin to the stall speed. It is defined by the top of the amber strip along the airspeed scale. In the approach mode this is equivalent to Vref.

What speeds does V_{MAX} represent and how is it displayed?
It is the lowest of V_{MO}/M_{MO}; V_{LE}; orV_{FE}. It is defined by the lower end a red and black strip along the speed scale.

What is "Green-Dot Speed"?
Green Dot (Engine out operating speed in a clean configuration) appears when the aircraft is flying in the clean configuration and corresponds to the best lift-to-drag ratio.

What would be indicated if the altitude window changed from yellow to amber?
The aircraft has deviated from the FCU selected altitude or flight level.

What is indicated when the altitude numbers change from green to amber?
The aircraft has descended below the MDA/DH entered into the FMGEC

What would a flashing amber "ILS" indicate on the bottom right of the PFD?
Flashes amber when APPR mode is armed, and the ILS display is not selected.

Generally, what information does each of the five FMA columns present?

Autothrust operation
AP/FD Vertical Modes
AP/FD Lateral Modes
Approach Capability DH or MDA
AP, FD, and A/THR Engagement Status

How is the crew made aware of mode changes on the FMA?

A white box is temporarily displayed around the new indication.*[Triple Click]*

How are armed modes displayed on the FMA?

Blue or Magenta fonts. [Magenta indicates that modes are armed or engaged because of a constraint.]

Nose Wheel Steering

What hydraulic system supplies nose wheel steering?

The GREEN system.

What does the Rudder PEDAL DISC push-button on the steering handwheel do?

Pressing the button removes control of nose wheel steering from the rudder pedals until the button is released.

What would occur if the A/SKID & N/W STRG switch were selected to OFF?

The anti-skid is deactivated and the nose wheel steering is lost.
The Blue hydraulic system would supply the brakes