Technical Ground School Study Guide
AIRBUS A330
May 1, 2014 to April 30, 2015

Updated : 3/3/2015

Send corrections/comments to:
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APU.

Scenario #1: Madrid: You are taxiing to the runway and have received the final weight and balance from CLP. It is a hot day and your aircraft is close to the maximum gross weight, therefore you will be required to make an APU BLEED ON takeoff.

1. Fifteen minutes prior to departure the Captain attempts to start the APU. The first start attempt is unsuccessful. How many more start attempts can be made?

- ***a. Two more attempts can be made then a cooling period of 30 minutes is required before making additional attempts.***
- ***b. Three more attempts can be made then a cooling period of 60 minutes is required before making additional attempts.***
- ***c. Two more attempts can be made then a cooling period of 60 minutes is required before making additional attempts.***
- ***d. Two more attempts can be made then a cooling period of 90 minutes is required.***

Reference: PH 1.13.1

After 3 starter motor duty cycles, wait 60 minutes before attempting 3 more cycles.

2. (True or False) The APU START pb green AVAIL light signifies the APU is on speed at 100% and is available for use? (Note - Poor question, is the point really asking 95 vs. 100%?)
Reference: TM 4.2.1

AVAIL: This green light illuminates when N reaches 95%.

Scenario #1 continued: Because of a long line of aircraft during Taxi out the Captain has elected to shut down engine #2 and single engine taxi.

3. With the APU running will the APU generator be powering either electrical bus?
Reference: TM 7.1.2

Yes, AC BUS 2. Operation of the electrical system is automatic. Normal priority for supplying electrical power to each of the two main AC buses is:

1. Corresponding engine generator
a. 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.)
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.)
3. Opposite engine generator

4. (Yes or No) In the event of an APU fire on the ground the APU will automatically shut down and automatically discharge the fire bottle.
Reference: TM 8.1.3

On the ground, detection of an APU fire causes automatic APU shutdown and extinguisher discharge. In flight, there is no automatic APU shutdown and the extinguisher must be manually discharged.

5. Where can you find the procedure to make an APU BLEEDS ON takeoff?
Reference: PH 4.4

PH 4.4.1 or 4.4.2

6. In preparation for the takeoff you select the APU BLEED pb to ON. What does this accomplish?

- ***a. Closes the Crossbleed valve, Opens the APU Bleed valve and closes the Engine Bleed valves.***
- ***b. Opens the Crossbleed valve, Opens the APU Bleed valve and closes the Engine Bleed valves.***
- ***c. Opens the Crossbleed valve, Opens the APU Bleed valve and opens the Engine Bleed valves.***
- ***d. Closes the Crossbleed valve, closes the APU Bleed valve and closes the Engine Bleed valves.***

Reference: TM 3.3.1

When the APU BLEED pb is ON the BMCs command the crossbleed valve to open (with the X BLEED selector in AUTO), and the engine bleed valves to close. The APU bleed air supplies the pneumatic system provided APU speed is more than 95%. The APU bleed valve automatically closes when climbing through 25,000' and remains closed until descending through 23,000' regardless of APU BLEED pb position.

The APU can be used to supply bleed air for air conditioning operation during takeoff, allowing additional thrust to be obtained from the engines.

Scenario #2: You have departed Madrid and are climbing out on the departure, APU Bleed On…

7. When should you select the APU BLEED pb to OFF?
Reference: PH 4.4

After thrust reduction

8. What are the altitude limits for APU generator and bleed air? (Note - Poor question since no specified APU generator altitude limit)
Reference: PH 1.13.2 PH1.13.3

No specific APU generator altitude limit but Maximum Altitude for APU Operation. 41,000 feet (25,000 feet if using JET B or JP4 fuel).

Maximum altitude for APU bleed operation: 22,500 feet

Scenario #2 continued: Immediately after selecting the APU BLEED pb OFF and prior to initiating the APU shutdown procedure the APU experiences an auto shutdown.

9. What are some of the things that could cause this in flight?

- ***a. Overspeed, critical ECB internal failures, underspeed, low oil pressure, high oil temperature, Fire, DC power interrupt, EGT overtemp.***
- ***b. Overspeed, critical ECB internal failures, underspeed, low oil pressure, high oil temperature, APU generator failure, DC power interrupt, EGT overtemp.***
- ***c. In flight the APU will only auto shut down for an overspeed and certain critical ECB internal failures.***
- ***d. Overspeed, critical ECB internal failures, underspeed, low oil pressure, high oil temperature, DC power interrupt, EGT overtemp.***

Reference: TM 4.2.1

FAULT: This amber light illuminates and a caution appears on ECAM, when an automatic APU shutdown occurs, which happens in case of:

- Fire (on ground only)
- Reverse flow
- Air inlet flap not open
- Low oil pressure
- Overspeed
- High oil temperature
- No acceleration
- ECB failure
- Slow start
- Loss of overspeed protection
- EGT overtemperature
- Underspeed
- No flame
- DC power loss. (BAT OFF when aircraft on batteries only)

10. After an auto shutdown of the APU you should expect to see the ___FAULT__ light illuminated in the APU MASTER SW pb.
Reference: TM 4.2.1

Electrical.

Scenario #1: KPHL to EGKK flight. Your aircraft is located at the maintenance hangar where you will be picking it up and taxiing to your departure gate. There is no power on the aircraft when you arrive, however a ground power unit is plugged in and operating.

1. As part of the Safety and Power on Checklist you are required to check the battery voltage. During this check you observe that all three batteries indicate 25 volts. What actions, if any, are required?

- ***a. None, the voltage is within normal limits.***
- ***b. A charging cycle of 20 minutes is required. Continue checklist and establish electrical power.***
- ***c. A charging cycle of 30 minutes is required. Continue checklist and establish electrical power.***
- ***d. Leave the batteries off and contact maintenance.***

Reference: PH 2a.2

2. Electrical power has been established and the external power unit is powering the aircraft. If battery voltage was not normal, what indication could be expected on the System Display DC ELEC page?

- ***a. Voltage value is displayed in amber.***
- ***b. Voltage value is displayed in amber and flashing.***
- ***c. Voltage value displayed in red.***
- ***d. Voltage value displayed in green and flashing.***

Reference: TM 7.2.3

Voltage amber below 25V or above 31V

Scenario #1 continued: Now at FL370. Approximately 80 miles prior to reaching the EEP you observe a flashing ADV light on the EWD, the AC ELEC page is displayed on the SD and the number two IDG temperature indicates 152º and is flashing. (Note - Poor scenario, seems in conflict with this TM reference - *ADV Message.* The boxed message ADV is displayed in white on the lower part of the E/WD if the SD (lower screen) is inoperative, to alert the crew of a system advisory condition. No other reference to ADV light in C&I, PH, TM, or QRH)

3. What actions should you take? (Note - Poor question, should read "What initial actions..." since there would be other things to do like contact Dispatch, QRH page 100, etc.)
Reference: QRH Index-5, TM 7.2.2

Reduce IDG load if possible (GALLEY or COMMERCIAL or GEN OFF). If required restore when temperature has dropped. Restrict use of generator to short time, if temp rises again excessively.

4. In an effort to reduce the electrical load and prevent the IDG from overheating the COMMERCIAL pb is placed to OFF, is there any effect to the GALLEY power?
Reference: TM 7.2.1

Yes. COMMERCIAL pb OFF: Following equipment is shed:

- galleys
- passenger entertainment system (music and video)
- cargo loading system
- electrical service
- escape slide lock mechanism ice protection
- water/waste (drain mast) ice protection
- lavatory and cabin lights
- water heater
- in-seat power supply

5. Despite reducing the electrical loads, the IDG temperature continued to rise and exceeded 185º. Per the ECAM procedure you have disconnected the #2 IDG. Procedurally _ Accomplish ECAM Follow-Up procedures, if applicable _ is required after the ECAM actions and STATUS page have been cleared.
Reference: PH 9.1.4 (Note - Poor question since reference doesn't specially address STATUS page)

6. The APU has been started and the APU generator is operating normally. According to normal priority logic, the APU generator will be powering _____AC BUS 2_____.
Reference: TM 7.1.2

Operation of the electrical system is automatic. Normal priority for supplying electrical power to each of the two main AC buses is:

4. Corresponding engine generator
b. 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.)
5. 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.)
6. Opposite engine generator

7. Based on the electrical configuration in question #6, can you continue your flight beyond the EEP?

- ***a. Yes, with concurrence with Dispatch and Maintenance Control.***
- ***b. No, since the failure occurred prior to entry into ETOPS airspace all engine generators must be operative.***
- ***c. Yes. The Captain can make the decision to proceed and should advise dispatch of the decision prior to entering ETOPS airspace.***
- ***d. Yes, with concurrence with Dispatch and Maintenance Control. The aircraft must be flown at or below FL370 to avoid exceeding the maximum altitude for operating the APU with the APU generator supplying an electrical load.*** (Note - Poor question since IDG not mentioned but ELEC GEN 2 would be inop)

Reference: QRH pg 100

ELEC GEN 1(2) FAULT • May continue with concurrence after conferring with the controlling dispatcher and MOC unless it is not considered the best course of action.

Scenario #2: Enroute to KCLT, past TOD, you are approaching the Charlotte Douglas airport.

8. The AC ESS FEED Fault light pb has illuminated. What does this FAULT light indicate?

- ***a. The AC ESSENTIAL BUS is being powered by AC BUS #2.***
- ***b. AC ESS BUS is not electrically supplied.***
- ***c. The AC ESSENTIAL BUS is being powered by AC BUS #1.***
- ***d. The AC ESSENTIAL BUS is being powered by the Static Inverter.***

Reference: TM 7.2.1

Illuminates amber, accompanied by an ECAM caution, when AC ESS BUS is not electrically supplied. Note - In case of total loss of main generators, the AC ESS BUS is automatically supplied by the emergency generator or by the static inverter if the emergency generator is not available.

9. When the aircraft's batteries are the only source of electrical power in flight, which of the following will be operative?

- ***a. Captain's PFD and ND, FCU #1, MCDU #1, RMP #1, ACP # and Upper ECAM Display.***
- ***b. Captain's PFD and ND, FCU #1, RMP #1, Upper and Lower ECAM displays.***
- ***c. Captains PFD, FCU #1, MCDU #1, RMP #1, ACP #1 and ACP #2 AND Upper ECAM display.***
- ***d. Captains PFD, FCU #1, RMP #1, ACP #1 and ACP #2 AND Upper ECAM display.***

Reference: QRH pg 44 (Note – Poor, typo in a.)

10. (True or False) You have accomplished a normal landing and have taxied to the gate, external power has been plugged in. Illumination of the EXT PWR pb AVAIL light means External power is plugged in and external power parameters are normal.
Reference: TM 7.2.1

AVAIL: Illuminates green if external power parameters are normal.

Hydraulics.

Scenario #1: You are in level flight at FL 350 over the North Atlantic. You get an ECAM message for a Hydraulic Green System Low Level in the Green Hydraulic system. You have completed all the non-normal procedures….and then Hydraulic Green System Low Pressure occurs.

1. How are the three hydraulic systems powered?
Reference: TM 12.1.2 / TM 12.1.3 / TM 12.1.4

Green System. Two pumps (one on each engine) pressurize the green system. An electric pump, which can be manually or automatically controlled, and a ram air turbine (RAT) can also pressurize the green system.

Yellow System. The yellow system is pressurized by the engine 2 pump or an electric pump that can be

manually or automatically controlled. A hand pump is provided for operation of the cargo doors when electrical power is not available.

Blue System. The blue system is pressurized by the engine 1 pump or an electric pump that can be manually controlled.

2. Name some of the major users of the GREEN system.
Reference: TM 12.1.5

Emergency Generator, Landing Gear, Nose wheel Steering, Normal Brakes, 1/2 Flaps, 1/2 Slats, Yaw Damper 1 (-300), Spoilers 1&5, 1/2 Aileron & Elevator, and 1/3 Rudder

3. The __Blue__ hydraulic system supplies the parking brake.
Reference: TM 14.1.11

When the parking brake is ON:
- blue hydraulic system or accumulators supply brake pressure
- triple indicator indicates brake pressure

4. (True or False) The purpose of the priority valve in the Green Hydraulic System is: If Green system pressure becomes low, it cuts off pressure to heavy load items in order to retain pressure for flight controls, normal and alternate braking.
Reference: TM 12.1.1

If the pressure of the green system is low, a priority valve cuts off power to the heavy load using units (emergency generator, nose wheel steering, and landing gear) in order to retain pressure for normal braking and flight controls.

(Blue system provides pressure for Alternate Brakes and the Parking Brake.)

5. (Yes or No) Is nose wheel steering available with the Priority Valve closed, due to the pressure of the green system low?
Reference: TM 12.1.1

If the pressure of the green system is low, a priority valve cuts off power to the heavy load using units (emergency generator, nose wheel steering, and landing gear) in order to retain pressure for normal braking and flight controls.

Scenario #2: You are number two for takeoff at CDG, all systems normal…

6. When will the GREEN ELEC pump operate automatically?
Reference: TM 12.1.2

In flight (GREEN ELEC pump pb in AUTO), if one engine fails, the electric pump runs automatically for 25 seconds when the landing lever gear is selected up.

7. When does the Yellow electric pump automatically turn on?
Reference: TM 12.1.3

With the YELLOW ELEC pump pb in AUTO, the electric pump runs automatically:
— in flight, if engine 2 fails and the flap lever is not at 0 (except when the green electric pump is operating for landing gear retraction).
— on the ground during cargo door operation.

8. The RAT will deploy automatically if: __both engines fail__, or a low fluid level in the Green and Yellow Reservoirs or a low fluid level in the Green and Blue Reservoirs.
Reference: TM 12.1.2

9. During a Green System low level what will happen?
Reference: TM 12.1.2

If green reservoir low level is detected, both fire shutoff valves automatically close to preserve fluid for RAT operation in case of subsequent yellow or blue reservoir low level.

10. On the -200, when does the Blue Electric Pump run automatically?
Reference: TM 12.1.4

(A330-200). In the event of an engine 1 failure, in addition to a PRIM 1 or PRIM 3 loss : The BLUE ELEC PUMP runs automatically in flight to ensure sufficient authority on the electrical rudder, thereby counteracting the yaw sideslip induced by asymmetrical thrust.

Landing Gear and Brakes.

Landing Gear Scenario #1: You are on the approach into KCLT at 200kts and you extend the Landing Gear. You get an ECAM message L/G NOT DOWNLOCKED. You accomplish ECAM action and do not get gear down and locked indication. After having completed all the non-normal procedures you successfully get the landing gear down and locked using the Landing Gear Gravity Ext Procedure.

1. What is the maximum gear extension altitude?
- ***a. 22,500 feet.***
- ***b. 23,000 feet.***
- ***c. 21,000 feet.***
- ***d. 20,000 feet.***

Reference: PH 1.3.1

2. What Hydraulic system operates the normal gear operation?
Reference: TM 12.1.5

Green

3. How many Landing Gear Control and Interface Units (LGCIU) are installed and what is their function?
Reference: TM 14.1.2

Two LGCIUs provide sequencing, operation, monitoring, and indications for the landing gear.

Landing gear proximity sensors provide signals to the LGCIUs for processing and monitoring landing gear position, shock absorber status (air/ground mode), and gear doors position. One LGCIU controls one complete cycle of the gear and then automatically switches to the other unit. If one unit fails, the other takes over. In case of a proximity sensor failure, the affected LGCIU will provide signals regarding gear and shock absorber position to the other LGCIU which in turn, automatically assumes control of the landing gear operation.

The LGCIUs also send landing gear proximity sensor information to other aircraft systems.

4. (True or False) The lights on the LDG GEAR panel will illuminate if the LGCIU #1 is not supplied with electricity?
Reference: TM 14.2

This panel is connected to LGCIU1, which receives signals from proximity detectors. The lights on the LDG GEAR indicator panel do not illuminate when LGCIU1 is not supplied with electricity.

5. What does the RED ARROW on the landing gear selector lever indicate?
Reference: TM 14.2.1

This red arrow illuminates if the landing gear is not locked down when the aircraft is in the landing configuration, and the altitude is less than or equal to 75 feet. A red warning appears on ECAM.

6. What does the red UNLK light in the LDG GEAR indication panel mean?
Reference: TM 14.2

UNLK: Illuminates red if the gear is not locked in the selected position.

7. What happens to the gear doors and nosewheel steering after emergency gear extension?
Reference: TM 14.1.4

If the normal gear extension system fails, extension is accomplished by gravity. Two selector switches located on the center instrument panel are used to electrically shut off hydraulic pressure to the gear,

unlock the doors, and unlock the gear which extend by gravity. Locking springs assist downlocking. The gear doors remain open and nose wheel steering is deactivated.

Brake Scenario #1: You have just landed in KPHL on a contaminated runway with the autobrakes armed. You notice the DECEL light does not illuminate….

8. What do the green DECEL lights on the AUTO BRK pushbuttons indicate?
Reference: TM 14.2.2

The DECEL light illuminates green only if the autobrake function is active and when actual aircraft deceleration corresponds to predetermined rate. (In LO or MED: 80% of the selected rate; in MAX: 100% of the selected rate, 8.7 ft/s2). This occurs approximately 8 (5) seconds after activation for LO (MED) using brakes alone. Predetermined rates can also be achieved by reversers alone or a combination of both reversers and brakes. Note - On slippery runways, the predetermined deceleration may not be reached due to antiskid operation. In this case DECEL light will not illuminate. This does not mean that autobrake is not working.

9. When is brake pressure applied to the brakes during landing using the LO setting? MED?
Reference: TM 14.2.2

The spring loaded MAX, MED, and LO pbs arm the appropriate deceleration rate.
- — MAX mode is normally selected for takeoff.
- — If the pilot aborts the takeoff, maximum pressure goes to the brakes as soon as the system generates the ground spoiler deployment order.
- — MED or LO mode is normally selected for landing.
  - LO mode sends progressive pressure to the brakes 1 second after the ground spoilers deploy in order to decelerate the aircraft at 5.9 ft/s2.
  - MED mode sends progressive pressure to the brakes starting at ground spoilers deployment in order to decelerate the aircraft at 9.8 ft/s2.

10. Above what speed is the nose wheel steering angle reduced when using the steering hand wheels?
Reference: TM 14.1.5

When using the hand wheels, nose wheel steering angle is reduced above 10 knots ground speed. As speed increases, the angle decreases progressively to 0° at 100 knots.

11. At what speed during takeoff, is rudder pedal nose wheel steering angle reduced?
Reference: TM 14.1.5

When using the rudder pedals during takeoff, nose wheel steering angle is reduced above 100 knots ground speed. As speed increases, the angle decreases progressively to 0° at 150 knots. When using the rudder pedals during landing, rudder pedal steering is not available until below 100 knots, where the angle increases progressively to full authority at 40 knots.

12. How many brake systems are on the aircraft?
Reference: TM 14.1.6

2; Normal and Alternate. (or 3 if you count the anti-skid system)

13. (Yes or No) The Brake and Steering Control Unit (BSCU) controls all normal braking functions?
Reference: TM 14.1.6

A Brake and Steering Control Unit (BSCU) controls all normal braking functions (antiskid, autobrakes and brake temperature indications).

14. What system pressure is indicated on the Triple Indicator?
Reference: TM 14.2.2

BRAKES and ACCU PRESS indicator (Triple Indicator)
ACCU PRESS indication:
— green band: allowed pressure area in the brake accumulators. Provides full pressure to the brakes.
— amber band: forbidden pressure area. Necessitates a repressurization of the accumulators.

BRAKE pressure indication: Indicates blue pressure delivered to left and right brakes measured upstream of the alternate servovalves.

15. What is the maximum allowable brake temperature for takeoff?

- ***a. 425°C.***
- ***b. 315°C.***
- ***c. 300°C.***
- ***d. 600°C.***

Reference: PH 1.8.2

16. When will the Autobrakes activate? What speed must be met or exceeded during rejected takeoff to activate?
Reference: TM 14.1.9

Automatic braking is activated when the ground spoilers extend. Therefore, during a rejected takeoff below 72 knots, the autobrakes will not activate since the ground spoilers do not extend below that speed.

17. What do the blue ON lights on the AUTO BRK pushbuttons indicate?
Reference: TM 14.2.2

The ON light illuminates blue to indicate positive arming.

18. What does the ECAM WHEEL page green AUTO BRK indicate?
Reference: TM 14.2.4

AUTO BRK indication Displayed:

- green when autobrake is armed
- amber associated with an ECAM caution in case of autobrake system failure or failure of both BSCU channels.

MAX, MED or LO indicates the selected rate (green). Not displayed when autobrake is faulty.

19. If on a slippery runway, and the DECEL light does not illuminate, does this mean the autobrake is not working?
Reference: TM 14.2.2

No. On slippery runways, the predetermined deceleration may not be reached due to antiskid operation. In this case DECEL light will not illuminate. This does not mean that autobrake is not working.

20. When using the alternate brake system on accumulator pressure only, how many brake applications are provided?
Reference: TM 14.1.10

If neither normal nor alternate braking is available, the brake accumulators can provide at least seven full brake applications.

Accumulators maintain adequate parking brake pressure for at least 12 hours.

21. With loss of the anti-skid system, how does the pilot regulate brake pressure to avoid wheel locking?
Reference: TM 14.1.10, TM 14.2.2 (Note - Poor question, should include PH 2i.13 and REF QRH pg 80, with 1000 psi)

If the antiskid is not available, braking is achieved by the pedals, and brake pressure must be limited by monitoring the blue system brake and accumulator pressure indicator to prevent wheel locking.

If neither normal nor alternate braking is available, the brake accumulators can provide at least seven full brake applications.

• Max BRK PR 1000 psi (Anti-Skid not operative)

MAX BRK PR ..... 1000 psi
Monitor brake pressure on BRAKES PRESS indicator. Limit brake pressure to approximately 1000 psi and at low ground speed adjust brake pressure as required.

Autoflight.

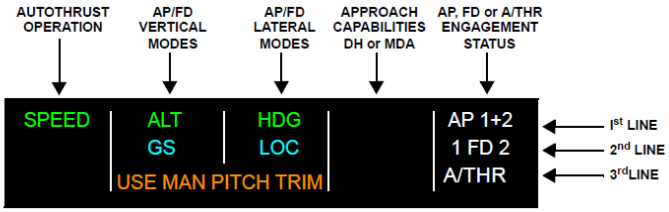
Scenario #1: EGLL to KPHL. During a normal taxi out…

1. If maintenance were to arm autothrust on the ground (using green pb) and it was not detected until after engine start, how would you know and how would you disarm it?
Reference: PH 2a.7.3

• Note •

Under no circumstances should the autothrust be armed (using the green pushbutton) or autopilots engaged while at the gate or on the ground. These are not normal procedures and will generate ECAM messages that are appropriate aircraft responses. (Example: If maintenance were to arm autothrust, after engine start the AUTO FLT A/THR OFF ECAM message would be generated. This indicates the aircraft has disarmed the autoflight system during engine start. Same would apply for autopilot.) Simply clear the ECAM message, then press an instinctive disconnect on thrust levers for autothrust or sidestick A/P disconnect for autopilot. System operation will be normal. If the normal disconnect methods are not used, a reoccurring ECAM message will appear at each subsequent engine start.

2. What color are the Armed Vertical Modes displayed in on the Flight Mode Annunciator in column two?
Reference: TM 5.2.2



In the three left columns:
— The first line shows the engaged modes in green.

— The second line shows the armed modes in blue or magenta. (Magenta indicates that the modes are armed or engaged because of a constraint.)

— The third line displays special messages:
• Messages related to flight controls have first priority:
— "MAN PITCH TRIM ONLY" in red, flashing for 9 seconds, then steady
— "USE MAN PITCH TRIM" in amber, pulsing for 9 seconds, then steady

3. On the ground with slats extended, when is the SRS Mode automatically engaged?
Reference: 5.1.3

SRS Mode. This vertical mode controls pitch to maintain a speed defined by SRS guidance (provided V2 is inserted in the MCDU PERF TO page, the slats are extended, and the aircraft is on the ground). It engages automatically when the thrust levers are set to TOGA or MCT/FLX detent. It disengages manually when another vertical mode is engaged or a speed is selected while in SRS mode. It automatically disengages when the aircraft reaches acceleration altitude or an FCU selected altitude.

4. What happens if the instinctive disconnect pushbuttons are pushed and held for more than 15 seconds?
Reference: TM 5.1.11

Caution

If an autothrust instinctive disconnect pb is pressed and held for more than 15 seconds, the autothrust system is disconnected for the remainder of the fl***ight***, including alpha floor protection. The autothrust system can only be reset during the next FMGEC power-up (on the ground).

Scenario #1 Continued: EGLL to KPHL. During a normal descent…

5. Altitude constraints are presented as a small circle in white, amber or magenta. What does each color represent?
Reference: TM 10.2.7

Altitude Constraints
• Magenta constraint is predicted to be met when the aircraft is in managed lateral and vertical modes.
• Amber constraint is predicted to be missed. In this situation the aircraft is in the managed lateral and vertical modes; however, the FMGC will not be able to meet the altitude constraint.

- White constraint is not being considered by the FMGC.

6. Will the G/S mode engage without the LOC mode engaged and why?
Reference: TM 5.1.3 (Note - poor question because reference does not say why)

No. The G/S mode does not engage unless the LOC mode is engaged or if the aircraft is above the G/S and its trajectory does not intercept the G/S.

7. What display confirms that the ILS is ARMED for the approach for the flight director or autopilot to capture?
Reference: PH 2f.5

Verify GS and LOC annunciate blue on FMA

8. After selecting APPR pb on the FCU, the _second_ _autopilot_ can be engaged.
Reference: TM 5.1.5 (Note - poor question because reference only specifies it will remain engaged. Also, PH 2f.7 - Select APPR on FCU, Select second autopilot on. Even PH 2f.5 says to engaged the second autopilot.)

Only one autopilot can be engaged in flight except when the ILS approach is armed or engaged; the second autopilot will remain engaged until the completion of the go-around phase. AP1 is active and AP 2 is standby.

9. (True or False) The autopilot will automatically disengage during a RNAV approach upon reaching DA minus 50'.
Reference: TM 5.1.5

Autopilot Disengagement. The autopilot(s) will disengage if one of the engagement criteria is lost, or:
- The takeover switch or the corresponding AP switch is pressed
- The sidestick is moved beyond the load threshold (Disengagement through rudder pedals is only active on the ground.)
- The other autopilot is engaged, except when LOC G/S modes are armed or engaged, or ROLL OUT and GA modes are engaged
- Both thrust levers are set to TOGA detent on the ground (prevents takeoff with autopilot engaged following a touch and go.)
- Reaching DA - 50' with APPR engaged on a NON-ILS (RNAV) approach

10. When is SRS active?
Reference: TM 5.1.3 (Note - Poor question because reference addresses when it engages not when it's active)

This vertical mode controls pitch to maintain a speed defined by SRS guidance (provided V2 is inserted in the MCDU PERF TO page, the slats are extended, and the aircraft is on the ground). It engages automatically when the thrust levers are set to TOGA or MCT/FLX detent**.** It disengages manually when another vertical mode is engaged or a speed is selected while in SRS mode. It automatically disengages when the aircraft reaches acceleration altitude or an FCU selected altitude.
Note **-** In engine out conditions, the SRS mode does not automatically disengage at EO ACC ALT.

Flight Controls.

Scenario #1: You are in flight, on vectors around weather, climbing through FL250 and in moderate turbulence. You get an ECAM indicating you have a PRIM fault

1. How many PRIM computers do we have, and what are their functions?
Reference: TM 9.1.1

Three flight control primary computers (PRIMs) for normal, alternate, and direct control laws, as well as speedbrake and ground spoiler control, and protection speed computation

2. How many SEC computers are there and what are their functions?
Reference: TM 9.1.1

Two flight control secondary computers (SECs) for direct control laws including yaw damper function, as well as rudder trim, rudder travel limit and (A330-300) pedal travel limit.

3. What is the significance of the /R on the FLT CTL PRIM & SEC pushbuttons?

Reference: TM 9.2.3

Switching OFF then on resets it.

Scenario #1-continued: you have completed the non-normal procedures and, you are becoming concerned that the turbulence is increasing.

4. In normal law what are the pitch and bank limits?

a. 30 degrees nose up and 15 degrees nose down 67 degrees bank.
b. 30 degrees nose up and 15 degrees nose down 76 degrees bank.
c. 15 degrees nose up and 30 degrees nose down 67 degrees bank.
d. 30 degrees nose up and 25 degrees nose down 76 degrees bank.
Reference: TM 9.1.5

Attitude protection. Pitch is limited to 30° up, 15° down, and 67° of bank. These limits are indicated by green "=" signs on the PFD. Bank angles in excess of 33° require constant sidestick input. If the input is released, the aircraft returns to and maintains 33° of bank

5. When are the Wing Tip Brakes activated?
Reference: TM 9.1.4

Four Wingtip Brakes (WTBs) are activated in case of asymmetry, overspeed, or symmetrical runaway. The WTBs lock the flap or slat surfaces and prevent further movement. They cannot be released in flight.

• Note •

If the flap WTBs are on, the pilot can still operate the slats; if the slat WTBs are on, he can still operate the flaps.

Scenario #1-continued: You have just sustained a lightning strike and have lost the remaining PRIMS and one SEC. After completing all the non-normals and are unable to recover the computers.

6. What protections are available in direct law?
Reference: TM 9.1.5

There are no protections provided in direct law; however, overspeed and stall aural warnings are provided. The PFD airspeed scale remains the same as in alternate law.

7. (Yes ***or No) Can the pilot make a flight control input that will over-stress the airplane in direct law?***
Reference: TM 9.1.5

Pilot control inputs are transmitted unmodified to the control surfaces, providing a direct relationship between sidestick and control surface.

8. In the case of complete loss of electrical flight control signals how can the aircraft be controlled in backup mode?
Reference: TM 9.1.6 and 1.7

(A330-300). In case of a complete loss of electrical flight control signals, the aircraft can be temporarily controlled by mechanical mode. Pitch control is achieved through the horizontal stabilizer by using the manual trim wheel(s). Lateral control is accomplished using the rudder pedals. Yaw damping is provided by the back up yaw damper unit. Both controls require hydraulic power. A red "MAN PITCH TRIM ONLY" warning appears on the PFDs.

(A330-200). Backup Control Module (BCM) Computer provides yaw damping, and direct rudder command with pedals, via an independent unit, in case of:

- Total electrical failure, or
- Loss of rudder control due to a flight control computer (PRIM and SEC) failure

9. Can the rudder be moved with a complete loss of flight control signals?
Reference: TM 9.1.3 (better reference 7h.1.6 and .7. Note - poor question because reference does not definitively answer question)

Yes. The rudder is electrically controlled by trim motors, or mechanically controlled by the rudder pedals. It is hydraulically actuated by either system. Rudder deflection is limited according to airspeed. If both SECs fail, maximum rudder deflection can be obtained when the slats are extended.

In case of a complete loss of electrical flight control signals, the aircraft can be temporarily controlled by mechanical mode. Pitch control is achieved through the horizontal stabilizer by using the manual trim wheel(s). Lateral control is accomplished using the rudder pedals.

A330-300**.** In case of a complete loss of electrical flight control signals, the aircraft can be temporarily controlled by mechanical mode. Pitch control is achieved through the horizontal stabilizer by using the manual trim wheel(s). Lateral control is accomplished using the rudder pedals. Yaw damping is provided by the back up yaw damper unit. Both controls require hydraulic power. A red "MAN PITCH TRIM ONLY" warning appears on the PFDs.

A330-200*.* In case of a total electrical failure, or loss of rudder control due to flight control computers failure, the Backup Control Module (BCM) controls the yellow hydraulic jack, or the blue hydrualic, if the yellow hydraulic jack is not available

The BCM computer provides yaw damping, and direct rudder command with pedals, via an independent unit, in case of:

- Total electrical failure, or
- Loss of rudder control due to a flight control computer (PRIM and SEC) failure.

It includes:

- Its own electrical generator, referred to as the Backu Power Supply (BPS), which is supplied by the B and Y hydraulic system.
- Its own sensors (gyrometers and pedals deflection)
- Control of the B and Y hydraulic actuactors.

When activated, as in yaw alternate law, there is no turn coordination.

10. How many and of what type computers are required for assuring safe flight and landing?
Reference: TM 9.1.1

One computer of either type is capable of controlling the aircraft and assuring safe flight and landing.

Fuel.

Scenario #1: You started to perform the preflight inspection and discover maintenance is working on the aircraft's Fuel system.

1. The minimum fuel temperature for JET A__ -40°C _ (200) and __ -40°C _ (300)?
Reference: PH 1.6.2 (Note - Poor question because it does not specify tank or altitude)

2. When does a wing tank pump FAULT light illuminate?
Reference: TM 11.2.1.

The amber light illuminates and the ECAM caution illuminates, when the delivery pressure drops. It is inhibited when OFF is selected.

3. When will the automatic aft fuel transfer for CG control normally occur?

a. During cruise phase of flight.
b. When CL thrust setting is made.
c. As the aircraft climbs above FL 255.
d. As the aircraft climbs above FL 235.

Reference: TM 11.1.10

Aft fuel transfer can only be accomplished automatically, and normally occurs as the aircraft climbs above FL255 if the CG is forward of target. Typically, only one aft transfer occurs per flight. However, if in cruise the CG is sufficiently forward of the target and the trim tank is well below full, a further aft transfer is accomplished.

Aft fuel transfer is terminated when:

- actual CG approaches target CG,
- trim tank quantity approaches full,
- either inner tank quantity drops to about 13,800 lbs, or
- the crew manually selects either an outer to inner transfer, or a fwd transfer.

4. Where is the Fuel Temperature indication displayed?
Reference: TM 11.2.3

On the FUEL ECAM page below the tank. Fuel temperature is not indicated for the right outer tank.

5. The outer wing tank transfer valves normally open when either wing inner tank fuel quantity drops to __7720(-200)/7700(-300)__ pounds.
Reference: TM 11.1.10

A330-200.
1. center tank fuel transfers to the inner tanks.
2. each inner tank empties down to 8,830 lbs.
3. trim tank fuel transfers into the inner tanks (this may occur earlier for CG control)
4. each inner tank empties down to 7,720 lbs.
5. outer tank fuel transfers to the inner tanks.

A330-300.
1. inner tanks — down to about 8,800 lbs each
2. trim tank fuel transfers into the inner tanks (this may occur earlier for CG control)
3. inner tanks — down to about 7,700 lbs each
4. outer tanks fuel transfers into inner tanks.

6. What electrical power source(s) can be used to refuel the aircraft?
- ***a. External electrical power.***
- ***b. APU electrical power.***
- ***c. Battery power.***
- ***d. All the above.***

Reference: 11.1.9

Scenario #2: You are in level flight at FL 350 over the North Atlantic. You get an ECAM message for a Fuel system fault. You have completed all the non-normal procedures.

7. Is it possible to balance fuel if the crossfeed valve is failed closed?
- ***a. Yes, using QRH 'Fuel Transfer with FUEL (L or R) WING PUMP LO PR' procedures.***
- ***b. No. Fuel is trapped within the wings and not able to crossfeed.***

Reference: QRH, pg 72 (Note - Poor question since reference does not answer question since QRH no longer says: If the WING X FEED valve is failed closed")

1. OUTER TK XFER .....ON
[Connects the inner fuel tanks to the refueling manifold.]

During straight and level flight:

2. AP ..... Disconnect
3. Bank Angle ..... 3° toward lighter side

Note: Fuel transfer will only occur if the bank angle is at, or above, 2 to 3 degrees.
Balance the fuel with the bank angle.

4. Rudder ..... Use to Maintain Heading

8. What will cause illumination of the T.TANK MODE FAULT light?
Reference: TM 11.2.1

The amber light and ECAM caution illuminates when:
- The FMGS detects an excess aft CG, based on the THS position (independent of fuel quantity), or
- The FCMC is unable to carry out the forward transfer.
- The FUEL LO TEMP warning is triggered.

9. When is a forward transfer automatically initiated (A330-200)?
Reference: TM 11.1.10

The FCMC triggers a forward fuel transfer, if one of the following conditions are met:
- — The calculated CG = Target. Forward fuel transfer stops, when the computed CG = The target CG - 0.5%.
- — The fuel content of one of the two inner tanks decreases to 8830 lbs. Forward fuel transfer stops, when the fuel content reaches 11030 lbs.
- — The FMGS sends a time-to-destination signal is less than 35 minutes, or the aircraft descends below FL245. In this case, transfer is continuous, but is controlled by the inner tank high level to prevent overflow.
- — In electrical emergency configuration.

Note - If the center tank contains fuel and the CG is forward of 32% MAC, the transfer will be completed

in two steps:

- When the center tank quantity reaches 37520 lbs., the trim tank is decreased to 5290 lbs.
- When the center tank is empty, the trim tank will be emptied.

A forward transfer is normally directed to the inner tanks, and may be directed to the center tank, when it is not
empty. In emergency electrical configuration, the forward transfer is always directed to the inner tanks.

Fire Protection.

Scenario #1: February in KPHL:

1. You have a cold airplane and there is no external power available. Is a fire test required prior to starting the APU?

a. Yes.
b. No.

Reference: PH 2a.2.2, 2a.7.3

If an APU FIRE TEST ___ done in conjunction with the Safety & Power On Checklist...	Then this check is considered...
was	complete and not done during the Flightdeck Preparation Flow.
was not	not accomplished and must be done now.

2. (True or False) This APU FIRE TEST will look just like one done with AC power on the aircraft.
Reference: PH 2a.7.3

Check:

- APU FIRE pushbutton illuminated
- SQUIB and DISCH lights illuminated
- MASTER WARN lights illuminated, CRC, APU FIRE warning on E/WD
- APU page on SD (only available with AC power)

3. You have successfully started the APU and are doing the external walk-around. What are the first external indications of an APU fire on the ground?
Reference: TM 8.1.3

On the ground, detection of an APU fire causes automatic APU shutdown and extinguisher discharge. In flight, there is no automatic APU shutdown and the extinguisher must be manually discharged.

An APU fire is indicated by an aural CRC and illumination of the APU FIRE pb and MASTER WARN lights.

If a fire occurs on the ground, a warning horn in the nose wheel well sounds, and the APU FIRE light illuminates on the external service interphone panel. The light extinguishes and the horn is silenced when the fire is extinguished.

Scenario #1 continued: KPHL - The A330-200 aircraft is powered up and the Captain starts the Flight Deck Prep Flow.

4. What is the meaning of the black diamond next to the Fire Test on the Captain's Flight Deck Prep flow?
Reference: PH 2.2.4

If a flow or checklist is preceded by the diamond symbol (◆), that item is accomplished only on the first flight of the day (i.e., the first flight entered into the FDML under the current day using local time).

5. What are the cockpit indications during an engine fire test?
Reference: PH 2a.7.3

- ENG 1 and 2 FIRE Pushbuttons illuminated
- SQUIB and DISCH lights illuminated
- MASTER WARN lights illuminated
- CRC
- ENG 1 and 2 FIRE warning on E/WD

• ENGINE page on SD
• FIRE lights (on ENG panel) illuminated

6. The flight takes off and is at cruise altitude now. A passenger enters the lav. and decides to smoke. Will the flight crew ~~will~~ receive an indication when the smoke detection system is activated? What are those indications?
Reference: TM 8.1.5

Yes. Lavatory smoke is indicated by an aural CRC, the illumination of the MASTER WARN light and a red ECAM message SMOKE LAVATORY SMOKE.

7. If the inflight entertainment equipment would start to overheat and smoke, how would the flight crew be notified?

a. The smoke would exit the tail of the aircraft and not be detected.
b. SMOKE light in the IFEC pushbutton.
c. ECAM message IFEC OVHT.
d. ECAM message SMOKE IFE BAY SMOKE.
e. Both b. and d.

Reference: TM 8.1.8 and QRH page 103 (Note - Poor question, should specify -200)

A330-200. The IFEC has a smoke detection system. The Smoke Detection Control Unit (SDCU) receives a signal from the detectors located in the air extraction duct of the IFEC. It transmits this signal to the ECAM, which displays a warning in the cockpit.

When smoke is detected, the SMOKE light on the IFEC pushbutton on the overhead panel illuminates in red and the ECAM triggers the smoke warning. SMOKE IFE BAY SMOKE (note - from QRH)

8. How many fire bottles are on each engine?
Reference: TM 8.1.2

Each engine is equipped with two identical detection loops (A & B) each of which contain five heat sensing elements (three for the -300 PW engine) and a computer (Fire Detection Unit - FDU). The sensing elements are located in the pylon nacelle and engine core sections. The FDU issues a fire warning when both loops detect an overheat in a particular area. If one loop fails, the fire warning system remains operational with the other loop. A fire warning is also issued if both loops fail within 5 seconds of each other. The -300 contains three heat sensing elements.

Each engine is equipped with two fire extinguishers which are discharged by pressing the associated AGENT DISCH pb on the respective engine FIRE panel.

9. How long will the engine run after the ENGINE FIRE P/B is pressed?

a. 10 seconds.
b. 20 seconds.
c. 30 seconds.
d. 40 seconds.

Reference: TM 17.2.2 (Note - Poor question, should specify at ground idle)

Releasing the ENG FIRE pb allows the flight crew to shut down the engine by closing the LP fuel valve. There is a time delay of about 40 seconds at ground idle as the engine burns the fuel left between the LP valve and the nozzles.

10. Will the APU shut down for a FIRE in flight?
Reference: TM 8.1.3 (Note - Poor question, should specify automatic shutdown)

On the ground, detection of an APU fire causes automatic APU shutdown and extinguisher discharge. In flight, there is no automatic APU shutdown and the extinguisher must be manually discharged.

Powerplant.

Scenario #1: A 330-200. AM in EDDF: You arrive at the aircraft, powered by Ext A & B. 15 minutes prior to engine start….

1. What do amber crosses on the engine gauges indicate?
Reference: TM 17.2.4

When one parameter becomes invalid, two amber crosses replace the associated digital indication. For EPR, EGT and N1 parameters, the needle and the box around the digital display disappear.

ENG FADEC GND PWR pb ON: The FADEC is supplied by the aircraft network for 5 minutes (except if the ENG FIRE pb is released out or if the FADEC generator is available). The ON light illuminates after a 2 second delay.

2. How are the FADECs powered?

- ***a. By the aircraft electrical.***
- ***b. By its own alternator.***
- ***c. It is a hydro-mechanical device and is needs no electrical power.***
- ***d. Both a and b are correct.***

Reference: TM 17.1.3 (Note - Poor question, to assure correct answer, should say normally powered since a is only true with a malfunction.)

The system has its own alternator rendering it independent of the aircraft electrical system when N_2 rpm is above a set value. If this alternator fails, the FADEC automatically switches over to aircraft electrical power.

3. (True or False) There is a mechanical connection between the thrust levers and the engines.
Reference: TM 17.1.4

There is no mechanical connection between the levers and the engines. The position of each lever (Thrust Lever Angle - TLA) is electronically measured and transmitted to the FADEC, which computes the thrust rating limit.

4. The indication that an engine start is over is:

- ***a. The high speed rotor indication is in a grey box.***
- ***b. AVAIL appears in the EPR gage for a few seconds.***
- ***c. No grey box around the high speed rotor indication.***
- ***d. Both b and c.***

Reference: TM 17.2.4 (Note - Poor question, this is the only occurrence of the term "high speed rotor" in the training manual in 17.1.2))

AVAIL - This is displayed in green to indicate a successful engine start on ground. It pulses in green to indicate a successful engine relight in flight. It triggers, when the engine is at or above idle.

-200 N3 - Digital indication, normally green, is doubly bright during engine start and located in a grey background box.

-300 HP rotor speed N2 - Digital indication, normally green. It is twice as bright during engine start, and located in a grey background box.

5. The TPS shows a flex temp of 56C while the OAT is 15C. Can the crew use a flex temp of 40C but still use the v-speeds for the 56C flex?
Reference: PH 5.7 (Note - Poor question, cited reference does not authorize or mention arbitrarily selecting a different Flex Temp)

No. From the reference - In the Thrust / V-Speed Section, is the current OAT at or below the assumed temp listed for the assigned runway? If Yes, Takeoff is authorized using Thrust / V-Speed Section data for that runway/flap combination.

However, a flex of 40C would be a more conservative operation as long as the TPS is valid and the Flex Temp is above OAT.

6. If a thrust lever is set between the MCT detent and TOGA detent, what limit is the FADEC going to use?

- ***a. MCT.***
- ***b. TOGA.***
- ***c. Proportional to the relative position between detents.***

Reference: TM 17.1.4

If a lever is set in a detent, the FADEC selects the rating limit corresponding to that detent. If the thrust lever is set between two detents, the FADEC selects the rating limit corresponding to the higher detent. This limit is displayed on the upper ECAM.

Scenario #2: In a 330-200 at cruise, FL 370.

7. What is the proper way to disconnect autothrust to avoid surges?
Reference: TM 5.1.11

The autothrust system is disconnected by any of the following actions:

- pressing either instinctive disconnect pb on the thrust levers. When the autothrust system is disconnected, thrust will immediately revert to a setting corresponding to thrust lever position. To avoid thrust surges, first set the thrust levers to match the existing power setting (TLA indicator) and then disconnect the autothrust system.
- placing both thrust levers to the idle detent
- pressing the A/THR pb on the FCU when the autothrust system is active

Scenario #3: The EPR was able to be reset and is normal now. Autothrust is on. A new problem presents itself. We seem to be limited to 55% of max EPR. The Intermediate Pressure Turbine Overspeed Protection has activated. (Note - Poor Scenario, " ***The EPR was able to be reset...*** " , reset from what since this is a new scenario?)

8. If a go around is needed, will we have TOGA thrust? Yes, after 4 seconds with thrust lever above MCT.
Reference: TM 17.1.3

Protection Against Intermediate Pressure Turbine Overspeed. The Intermediate Pressure Turbine Overspeed System (IPTOS) automatically limits the engine thrust up to 55% of the maximum takeoff thrust, to protect the integrity of the intermediate pressure turbine, in the case of an overspeed. The IPTOS protection remains active for the remainder of the flight. The IPTOS protection is deactivated if during the flight, the thrust lever is set at, or above MCT for at least 4 seconds.

9. When should max reverse be selected?

a. Immediately after touchdown.
b. When REV green is indicated.
c. Below 80 knots.
d. After spoiler deployment.

Reference: PH 2g.12.7 (Note - Poor question since max reverse is only required "consistent with runway conditions")

After touchdown and when the thrust levers are retarded to idle, select Idle Reverse. When REV green is indicated in the E/WD, select maximum reverse thrust consistent with runway conditions and modulate reverse thrust as required.