AIRBUS A319/320/321

Technical Ground School Study Guide

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TGS – PART ONE

Chapter 6: Ice & Rain Protection

1. When should engine anti-ice be used?

Ground and takeoff:
- Outside Air Temperature (OAT) is 10°C (50°F) or below **and**
- visible moisture in any form is present (i.e., clouds, fog with visibility of 1 mile or less, rain, snow, sleet, or ice crystals), **or**
- when operating on ramps, taxiways, or runways where surface snow, standing water, or slush may be ingested by the engines or freeze on engines, nacelles, or engine sensor probes.

In flight:
- Total Air Temperature (TAT) is 10°C (50°F) or below **and**
- visible moisture in any form is present (i.e., clouds, fog with visibility of 1 mile or less, rain, snow, sleet, or ice crystals).

Engine anti-ice operation:
- Engine anti-ice must be ON during all ground and flight operations when icing conditions exist or are anticipated (except during climb and cruise when the temperature is below -40°C SAT).
- Engine anti-ice must be ON prior to and during descent in icing conditions (including temps below -40° SAT).

Caution: Do not rely on airframe visual icing cues to turn engine anti-ice ON. Use the temperature and visual moisture criteria specified below. Delaying the use of engine anti-ice until buildup is visible from the flight deck may result in severe engine damage and/or flameout.

2. After takeoff, when should WING ANTI-ICE be selected ON, if needed?

Wing anti-ice operation:
- Select WING ANTI ICE ON after thrust reduction altitude
- Normally, WING ANTI ICE should be selected OFF at the FAF
- If in severe icing conditions, WING ANTI ICE may be left ON for landing

Wing anti-ice is not permitted on the ground or in flight when the TAT exceeds 10°C.

3. On approach, when should WING anti-ice be selected OFF?

Wing anti-ice operation:
- Select WING ANTI-ICE ON after thrust reduction altitude
- Normally, WING ANTI ICE should be selected OFF at the FAF
- If in severe icing conditions, WING ANTI-ICE may be left ON for landing

4. When will probe heat automatically come on?

- On the ground, low power is applied to the heaters when at least one engine is operating.
- In flight, the heating system automatically changes to high.
- The probe heaters can be activated manually prior to engine start by placing the PROBE/WINDOW HEAT pb ON.

Note: The TAT probes are not heated on the ground.

5. What happens to engine RPM when either engine anti-ice valve is open?

The N1 limit for that engine is automatically reduced, and if necessary, the idle N1 is automatically increased for both engines in order to provide the required pressure. Additionally, continuous ignition is activated for that engine.

6. What part of each wing is anti-iced with pneumatic bleed air?

The three outboard slats on each wing.

7. What would happen if the RAIN RPLNT pushbutton was pushed on the ground with the engines shut down?

The RAIN RPLNT pb is inhibited on the ground with the engines stopped.

8. Is electrical heat applied to the galley/lavatory drain masts anytime there is aircraft electrical power on the aircraft?

The drain masts are heated any time the electrical system is powered.

9. What happens to the heat at the drain masts when the aircraft is on the ground?

On the ground, the heat is reduced to prevent injury to ground personnel.

10. When are the windshields and side windows heated automatically on the ground?

The windshields and side windows are electrically heated for anti-icing and anti-fogging. The system is controlled automatically by the Window Heat Computers which provide regulation, protection, and fault indications. Windshield heat automatically operates at low power on the ground with at least one engine operating. In flight, the windshield heating system changes to normal. The changeover is automatic. Only one heating level exists for the windows. The system can be activated manually prior to engine start by placing the PROBE/WINDOW HEAT pb ON.

Chapter 10: Pneumatics

1. In flight, what happens if HP bleed air pressure is insufficient?

Air is normally bled from the Intermediate Pressure stage of the high pressure compressor. When IP stage pressure and temperature are insufficient, a high pressure bleed valve opens to supply bleed air from the High Pressure stage. In flight, if the pressure is insufficient even with the HP stage valve open, the engine speed is automatically increased to provide adequate air pressure.

2. The APU BLEED pb FAULT light illuminates amber when?

This amber light illuminates and an ECAM caution appears when the system detects an APU bleed leak.

3. Can external air be used to supplement low APU bleed pressure?

No

4. When does the crossbleed valve open with the X BLEED selector in AUTO?

- The crossbleed valve is open if the APU bleed valve is open.
- The crossbleed valve is closed if the APU bleed valve is closed, or in the case of a wing, pylon, or APU leak (except during engine start).

5. What controls and monitors the pneumatic system?

Operation of the pneumatic system is controlled and monitored by two Bleed Monitoring Computers. The BMCs provide indications and warnings to the ECAM and centralized fault display system.

6. Is it permissible to allow simultaneous introduction of external air with another source supplying the system?

Do not use external conditioned air simultaneously with the airplane air conditioning packs.

Chapter 10: Air Conditioning

1. What would an amber temperature indication in either the Pack Outlet Temperature or Pack Compressor Outlet Temperature indicate?

The temperature changes from green to amber if the temperature exceeds the advisory threshold.

2. When would the LO selection on the PACK FLOW selector (A319/320) be used?

PACK FLOW Selector (A319/320)
- LO: if number of pax is less than 50 or for long haul flights.
- HI: for abnormally hot and humid conditions.
- NORM: for all other operating cases.

ECON FLOW Selector (A321)
- ON: ECON FLOW if number of pax is less than 140.
- OFF: for normal flow

3. If bleed air is being supplied by the APU or if one pack fails, what will the pack flow rate be?

During single pack operation or if the APU is supplying bleed air for air conditioning, pack controllers select high flow (A319/320) or normal flow (A321) automatically, regardless of selector position.

4. With the APU supplying bleed air what will be the pack flow if the PACK FLOW (A319/320) selector is LOW?

- A319/320 – HIGH
- A321 - NORMAL

5. The pack flow control valve automatically closes for engine start when the mode selector is moved to IGN/START. When does the valve automatically reopen?

Reopening of the valves is delayed for 30 seconds to avoid a supplementary pack closure during second engine start.

6. How is temperature in the flight deck and cabin controlled?

The zone controller is a dual-channel computer which regulates the temperature of the flight deck and two cabin zones (FWD & AFT). It receives information from various temperature and flow sensors, compares these signals with the zone temperatures selected by the crew, and then directs the pack controllers to deliver air at the coolest demanded temperature to the mixing unit. Individual zone temperature is adjusted by mixing hot bleed air, through the trim air valves, into the zone distribution network.

7. Can the zone controller override the crew selected pack flow?

The zone controller may override pilot selected pack flow, or it may increase APU speed or engine idle to meet temperature demands. I guess it just depends on its mood.

8. The ram air inlet flaps, for the ACM heat exchangers, automatically close under two conditions regardless of heat exchanger requirements. What are those two conditions?

The ram air inlet flaps close temporarily at takeoff thrust application and at touchdown to prevent ingestion of debris.

9. When is the RAM AIR pushbutton used?

During flight, if both packs fail, or in case of smoke in the cabin, a ram air inlet may be opened allowing ambient air to enter the mixing unit.

10. What ECAM page should be selected to verify aft cargo compartment temperature?

COND

11. What ground warning notice is given when a problem occurs with the ventilation system when the engines are stopped?

The external horn sounds.

12. What indications on the ventilation panel are given if smoke is detected in the avionics ventilation duct?

- The FAULT lights illuminate in both the BLOWER and EXTRACT pbs
- The SMOKE light illuminates in the GEN 1 LINE pb on the emergency electrical panel.

13. When would we use the ON position of the ECON FLOW selector (A321)?

PACK FLOW Selector (A319/320)
- LO: if number of pax is less than 50 or for long haul flights.
- HI: for abnormally hot and humid conditions.
- NORM: for all other operating cases.

ECON FLOW Selector (A321)
- ON: ECON FLOW if number of pax is less than 140.
- OFF: for normal flow

Note: If the APU is supplying bleed air for air conditioning, pack controllers select high flow (A319/320) or normal flow (A321) automatically, regardless of selector position.

14. What would the FAULT light in the AFT ISO VALVE pb indicate?

Illuminates amber when either inlet or outlet valve is not in the selected position.

Chapter 10: Pressurization

1. With the LDG ELEV selector at 2, what would be the landing elevation?

2,000 feet

2. When does the pressurization system switch auto-controllers?

In the automatic mode, one cabin pressure controller is active and the other serves as a backup. If the active controller fails, the backup automatically resumes control. After each landing, the two controllers swap roles.

3. If SYS 1 (or SYS 2) were displayed in amber on the CAB PRESS page, what would be indicated?

SYS 1 or SYS 2 appears in green when active and in amber when faulty.

4. What is indicated if the Cabin Vertical Speed is indicated in amber?

The cabin vertical speed is in the advisory range.

5. What occurs when the DITCHING pushbutton is selected ON?

The system sends a "close" signal to the:

- Outflow valve
- Emergency ram air inlet
- Avionics ventilation inlet and extract valves
- Pack flow control valves
- Forward cargo isolation outlet valve (if installed)

In other words, all exterior openings below the flotation line are closed.

6. With the LDG ELEV selector in AUTO, what altitude is used for landing field pressurization reference?

FMGS data is used.

7. What is the one limitation for opening the RAM AIR inlet?

Open only if differential pressure is less than +1 PSI.

8. Will the ram air inlet open if the DITCHING pb has been selected ON?

No

9. When operating pressurization in AUTO, if the pilot suspects the selected controller is malfunctioning, how can he swap controllers?

Attempt to select the other system by switching the MODE SEL pb to MAN for at least 10 seconds, then return it to AUTO.

10. If one cabin pressure controller fails, how is pressurization maintained?

In the automatic mode, one cabin pressure controller is active and the other serves as a backup. If the active controller fails, the backup automatically resumes control.

11. What is the caution about pressing the DITCHING pushbutton ON while on the ground with low pressure conditioned air connected?

If on the ground, with low pressure conditioned air connected, all doors closed, and the DITCHING pb is switched ON, a differential pressure will build up.

12. What indications on the ventilation panel are given if smoke is detected in the avionics ventilation duct?

- The FAULT lights illuminate in both the BLOWER and EXTRACT pbs
- The SMOKE light illuminates in the GEN 1 LINE pb on the emergency electrical panel.

Chapter 11: Hydraulics

1. Name some of the major users of the GREEN system.

- Landing gear
- Nosewheel steering
- Normal brakes
- Reverser 1
- Various actuators on flaps, slats, rudder, elevator, stabilizer, ailerons, and spoilers.

2. The yellow system has an engine driven pump, what other means do we have to pressurize the yellow system?

- Yellow electric pump
- Power Transfer Unit
- Hand pump for cargo doors

3. How many pumps does the yellow hydraulic system have excluding the PTU?

- ENG 2 Pump
- Yellow electric pump
- Hand pump for cargo doors

4. What is the purpose of the hand pump?

The hand pump is provided for operation of the cargo doors when electrical power is not available.

5. When does the PTU automatically activate?

When the differential pump pressure output between the green and yellow systems exceeds a predetermined value (500 psi).

6. Will the PTU operate during Cargo Door operation?

PTU is inhibited for 40 seconds after cargo door operation.

7. When is the PTU tested?

The PTU is inhibited during the first engine start and automatically tested during the second engine start.

8. How are the three hydraulic systems powered?

SOURCE	**GREEN**	**BLUE**	**YELLOW**
Engine Pump	1. Engine 1 pump		1. Engine 2 pump
PTU	2. PTU		2. PTU
Electric Pump		1. Blue Electric pump	3. Yellow Electric pump
RAT		2. Ram Air Turbine (RAT)	
Hand Pump			4. Hand pump for cargo door operation

9. Is it possible to pressurize the green hydraulic system on the ground via the PTU?

Yes

10. With the airplane on the ground and the blue electric pump switch in AUTO, the blue pump will be energized when?

- Ground – pump operates when either engine is running and AC power is available.
- Flight – pump operates continuously unless the BLUE ELEC PUMP pb is OFF.

11. What is the purpose of the PTU?

The PTU is a reversible motor-pump located between the green and yellow hydraulic systems. It enables the green system to pressurize the yellow system, and vice versa, without fluid transfer. The PTU is automatically activated when the differential pump pressure output between the green and yellow systems exceeds a predetermined value. On the ground, when the engines are not operating, the PTU enables the yellow system electric pump to pressurize the green system.

12. If the YELLOW ELEC PUMP pushbutton is OFF, when will it come on automatically?

When the lever of the cargo door manual selector valve is moved to OPEN or CLOSE.

13. What occurs to the yellow hydraulic system functions when a cargo door is being opened or closed?

The other Yellow system functions are inhibited (except alternate braking and engine 2 reverser).

14. What is the difference in operation of the two RAT extension methods?

- Manual: The RAT MAN ON pb is used to deploy the RAT manually. Activating this pb will only pressurize the blue system, but will not activate the emergency generator.
- Automatic: If both AC bus 1 and 2 are lost and the airspeed is above 100 knots, the RAT automatically deploys and pressurizes the Blue hydraulic system, which drives the hydraulically driven emergency generator. Pressing the EMER ELEC PWR MAN ON pb has the same effect.

Chapter 11: Landing Gear

1. What is the maximum gear extended speed V_{LE}?

280 KIAS / 0.67M

2. What is the maximum gear extension altitude?

25,000 feet

3. What does the red UNLK light in the LDG GEAR indication panel mean?

- Illuminates red if the gear is not locked in the selected position.
- Illuminates green if the gear is locked down.

4. Will the lights on the LDG GEAR panel illuminate if the LGCIU #1 is not supplied with electricity?

No

5. Is nose wheel steering available with the green hydraulic pressure inoperative?

No

6. Is nose wheel steering available after manual gear extension?

No

7. When using the rudder pedals for nose wheel steering, the steering angle starts to reduce at _ 40 knots _ and progressively reduces to zero degrees at _ 130 _ knots?

When using the hand wheels, nose wheel steering angle is reduced above 20 knots ground speed. As speed increases, the angle decreases progressively to 0º at 70 knots.

8. After emergency gear extension do the gear doors remain open?

The gear doors remain open and the nosewheel steering is deactivated.

9. What does the RED ARROW on the landing gear selector lever indicate?

Illuminates if the landing gear is not locked down when the aircraft is in the landing configuration, and a red warning appears on the ECAM.

10. What sequences, operates, and monitors landing gear operation?

Two Landing Gear Control And Interface Units (LGCIU) provide sequencing, operation, monitoring, and indications for the landing gear and cargo doors. 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 cargo doors also have proximity switches that provide position information to the LGCIUs.

11. At what speed will the safety valve cut off hydraulic pressure to the landing gear?

260 KIAS

12. How is the landing gear held in place when retracted?

Mechanical uplocks hold the gear in the wheel wells.

13. What message is displayed on ECAM when the towing control lever is in the tow position?

A green NW STRG DISC message

14. When the towing control lever is in the tow position, a green NW STRG DISC message is displayed on ECAM. What happens to the message after the first engine is started?

The NW STRG DISC message changes to amber.

Chapter 11: Brakes

1. What is the purpose of the brake check accomplished immediately after the aircraft starts moving?

- To check brake efficiency,
- That green pressure has taken over, and
- Yellow pressure is at zero on the brake pressure triple indicator.

2. After touchdown, with the autobrakes selected, what control surface must move before autobraking will begin?

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

3. Does the alternate brake system have the same capabilities as normal brakes?

Braking capability is the same as normal brakes, except autobraking is not available.

4. The green DECEL light on the autobrake pushbutton illuminates when the actual airplane deceleration corresponds to what percent of the selected rate?

80%

5. What groundspeed is the antiskid system automatically deactivated?

20 knots

6. When using the alternate brake system on accumulator pressure only, how many brake applications can the pilot expect?

At least seven full brake applications.

7. Is the anti-skid system operational with yellow alternate brakes?

Antiskid is normally available using the yellow alternate brakes. During alternate braking, the antiskid system becomes inoperative:

- With electrical power failure,
- With BSCU failure,
- If the A/SKID & N/W STRG switch is selected OFF, or
- If the brakes are supplied by the yellow accumulator only.

8. What controls all normal braking functions?

The Brake and Steering Control Unit (BSCU) controls all normal braking functions (anti-skid, autobrakes, and brake temperature indications).

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

300° C

10. At the gate you notice brake temperatures above 300°C, you then select BRAKE FANS ON, when should the pilots turn the BRAKE FANS OFF?

Select brake cooling fans OFF when brake temperature decreases to approximately 250°C.

11. When will the Autobrakes activate? What speed must be met or exceeded during rejected takeoff to activate?

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

12. On slippery runways, antiskid operation may prevent reaching the predetermined deceleration, and the DECEL light will not illuminate. Is the autobrake still operative?

Yes

13. How long will the accumulator maintain adequate parking break pressure?

For at least 12 hours.

14. What happens to the other brake modes when parking brakes are applied (A319/320)?

All other braking modes and anti-skid are deactivated (A319/320 only).

Chapter 12: Flight Controls

1. What control surfaces do the FACs control?

The Rudder

2. When both sidesticks are operated simultaneously, is the sum of the sidestick inputs limited to Normal law deflection limits?

Yes – both inputs are algebraically added, however, the sum is limited to single sidestick maximum deflection.

3. Explain, in general terms, Pitch Attitude protection (Normal Law).

- Load factor limitation: Prevents the pilot from overstressing the aircraft, even if full sidestick deflections are applied.
- Attitude protection: Pitch is limited to 30º up and 15º down.
- High angle of attack protection: When the angle of attack exceeds Alpha Prot, elevator control switches to alpha protection mode in which angle of attack is proportional to sidestick deflection.
- High speed protection: Prevents exceeding V_{MO} or M_{MO} by introducing a pitch up load factor demand.
- Low energy warning

4. Can the rudders be moved with both FACs inoperative?

Yes – if both FACs fail, maximum rudder deflection can be obtained when the slats are extended.

The FACs perform the following functions:

- Normal roll (coordinating turns and damping dutch roll)
- Rudder trim
- Rudder travel limit
- Alternate yaw

5. What are the maximum winds for automatic approach, landing, and roll out?

Maximum Winds for Automatic Approach, Landing, and Rollout	
Headwind	**30 knots**
Tailwind	**10 knots**
Crosswind other than CAT II/III	**20 knots**

6. With the high angle of attack protection in mind, what will the airplane slow to if the sidestick is held full aft?

When the angle of attack exceeds Alpha Prot, elevator control switches to alpha protection mode in which angle of attack is proportional to sidestick deflection. However, Alpha Max will not be exceeded even if the pilot applies full aft deflection. The aircraft will not stall, but will descend at Alpha Max speed which is indicated by the top of the red strip on the airspeed scale.

7. The FLAP lever sends signals to what computer to command movement?

Slat Flap Control Computer (SFCC)

8. What will the aircraft do in alternate law with speed stabilities, if the Vmo or Mmo is exceeded?

A nose-up command is introduced any time the airplane exceeds V_{MO}/M_{MO} to keep the speed from increasing further. This command can be overridden by sidestick input.

9. If the flight controls degrade to alternate law, what will happen when the landing gear is extended (if no autopilots are engaged)?

Direct law automatically becomes active. If an autopilot is engaged, the airplane will remain in alternate law until the autopilot is disconnected.

10. Can the pilot make a flight control input that will over-stress the airplane in direct law?

Yes – there are no protections provided in direct law.

11. Is there any rudder pedal feedback for the yaw damping and turn coordination functions?

No

12. High-speed protection will introduce a pitch up load factor demand. Can the pilot override this command while in <u>normal</u> law?

The pilot cannot override the pitch up command.

13. When is the low energy warning (SPEED, SPEED, SPEED) available?

When change in flight path alone is insufficient to regain a positive flight path (thrust must be increased). Available in CONF 2, 3, or FULL, between 100' and 2,000' RA when TOGA not selected.

14. A nose-up command is introduced any time the airplane exceeds Vmo/Mmo to keep the speed from increasing further. During alternate law can this input be overridden?

This command can be overridden by sidestick input.

15. In case of complete loss of electrical flight control signals, can the aircraft be temporarily controlled by mechanical mode?

Pitch control is achieved through the horizontal stabilizer by using the manual trim wheel. Lateral control is accomplished using the rudder pedals. Both controls require hydraulic power. A red "MAN PITCH TRIM ONLY" warning appears on the PFD.

16. If the takeoff configuration is 1+F and the pilot does not select configuration 0 after takeoff, what will happen?

The flaps retract automatically at 210 knots.

17. How does the crew know whose sidestick has priority?

Sidestick priority logic:

- When only one pilot operates the sidestick, it sends control signals to the computers
- When the other pilot operates his sidestick in the same or opposite direction, the system adds the signals of both pilots algebraically. The total is limited to the signal that would result from the maximum deflection of a single sidestick.
- Both green CAPT and F/O SIDE STICK PRIORITY lights flash and a "DUAL INPUT" audio voice message is given every 5 seconds as long as both pilots operate their sidesticks simultaneously.
- A pilot can deactivate the other sidestick and take full control by keeping his priority takeover pb depressed.
- To latch the priority condition, press the takeover pb for more than 40 seconds. This allows the pilot to release his takeover pb without losing priority. However, a pilot can at any time reactivate a deactivated sidestick by momentarily pressing the takeover pb on either sidestick.
- If both pilots press their takeover pbs, the pilot that presses last gets priority.
- ***In a priority situation:***
    - A red light illuminates in front of the pilot whose sidestick is deactivated.
    - A green light illuminates in front of the pilot who has taken control, if the other sidestick is not in the neutral position (indicates a potential and unwanted control demand).
    - A "PRIORITY LEFT" or "PRIORITY RIGHT" audio message is given each time priority is taken.

Chapter 13: Instruments/Navigation/Communication

1. When would the GPWS FLAP MODE pushbutton be selected?

Flap mode is inhibited to avoid nuisance warning when landing with a reduced flap setting.

2. If a TERR pb FAULT light illuminated, would that affect the basic GPWS modes?

This amber light illuminates, along with an ECAM caution, if the terrain detection function fails. The terrain is not shown on the ND. The basic EGPWS modes 1 to 5 are still operative.

3. When will the Digital Flight Data Recorder operate?

On the ground, flight information and operational data is furnished automatically for five minutes after electrical power is supplied to the airplane, or when at least one engine is operating. It operates continuously in flight, whether or not the engines are operating. The system stops automatically five minutes after the last engine is shut down. The recorder can be manually activated by the GND CTL pb on the overhead panel.

4. What does the APPR pushbutton do?

Arms, disarms, engages, or disengages the approach modes:

- LOC and G/S modes if an ILS approach is selected in the active F-PLN.
- APP NAV-FINAL modes if a non-precision approach is selected in the active F-PLN.

5. Is the radar display available in all modes of the ND selector on the EFIS Control Panel?

Any ND mode except PLAN.

6. With the TERR ON ND pushbutton off, what happens if a terrain caution is generated?

If the system generates a caution or warning while the TERR ON ND is not switched ON, the terrain data is automatically displayed on the ND and ON light illuminates on the TERR ON ND pb.

7. Does the EGPWS use radar signals to "ground map" terrain?

The enhanced function is based on a worldwide terrain database. It provides Terrain Awareness Display (TAD) which predicts terrain conflict and displays the terrain on the ND, and Terrain Clearance Floor which triggers a warning. The TAD function computes a caution and warning envelope ahead of the aircraft and when the boundaries of this envelope conflict with the database terrain information, it generates alerts.

8. When the TO CONFIG pushbutton is depressed, a take-off power application is simulated. What are some of the systems are being checked by this test?

If the airplane is not properly configured for takeoff, the following warnings and cautions are triggered when the TO CONFIG pb is pressed or when takeoff power is applied:

- SLATS/FLAPS NOT IN T.O. RANGE
- PITCH TRIM NOT IN T.O. RANGE
- SPEED BRAKES NOT RETRACTED
- SIDESTICK FAULT
- HOT BRAKES
- DOORS NOT CLOSED (tested only if engines are operating)

9. What components are not checked by the T.O. CONFIG test, but will trigger a warning when TOGA power is applied?

The following are only triggered when takeoff power is applied:

- PARK BRAKE ON
- FLEX TEMP NOT SET (not displayed if thrust levers are set in the TOGA detent)

10. When is side stick position and max sidestick deflection displayed on PFD?

The stick position indicator is displayed by both PFDs on the ground with at least one engine running. It only displays the combined stick input, not the actual flight control positions. This display cannot be used for flight control checks.

The ECAM F/CTL page must be used for flight control checks. When full sidestick (or rudder deflection greater than 22º) is applied, the F/CTL page is automatically shown for 20 seconds.

11. If continuous spurious caution messages are received that are known to be incorrect, is there any way to cancel this caution?

Press the EMER CANC pb on the ECAM control panel.

12. If the upper ECAM screen fails, will the crew still be able to see E/WD data?

E/WD has priority over the SD. If the upper ECAM screen fails (or is selected off), E/WD data is automatically transferred to the lower screen.

13. What information from the ADR is displayed on the PFD?

The Air Data Reference displays:

- Barometric altitude
- Speed
- Mach number

Note: The displayed vertical speed information is normally inertial. If inertial data is not available, barometric information replaces it automatically. In this case, the window around the numerical value becomes amber.

14. How many VOR and DME receivers are on board the aircraft?

- GPS, VOR, ILS, DME, RA: 2 each
- Marker Beacon: 1

15. Must the flight director be on for the windshear function of the FACs to operate normally?

No

16. Can the EMER CANC pb cancel any aural warning?

Warnings:
- Cancels (stops) an aural warning for as long as the failure condition continues.
- Extinguishes the MASTER WARN lights.
- Does not affect the ECAM message display.

Cautions
- Cancel any present caution (single chime, MASTER CAUT lights, and ECAM message) for the rest of the flight.
- Automatically calls up the STATUS page, which displays "CANCELLED CAUTION" and the title of the failure that is inhibited.

The EMER CANC pb should only be used in flight to suppress spurious MASTER CAUTIONS.

17. The predictive windshear system operates when the aircraft is below 1,500 feet AGL.

The ***Predictive Windshear System*** operates when the aircraft is below 1,500' AGL. It scans the airspace within 5 nm forward of the aircraft for windshears. When a windshear is detected, a warning, caution, or advisory message appears on the PFD and (depending on the range selected on the ND) an icon appears on the ND. Predictive windshear warning and caution are associated with an aural warning. During takeoff, both warnings and cautions are available within 3 nm. Alerts are inhibited above 100 knots and up to 50'. During landing, alerts are inhibited below 50'.

When the WINDSHEAR switch is in AUTO, the Predictive Windshear function is activated. Windshear areas are detected by the antenna scanning below 2,300' RA, even if the transceiver selector is set to OFF, and displayed on the ND if below 1,500'.

Predictive windshear aural alerts have priority over TCAS, EGPWS, and other FWC aural warnings. They are inhibited by windshear detection by FAC (Reactive) and stall warning aural messages.

The ***Reactive Windshear Detection*** function is available during takeoff from liftoff to 1,300 feet AGL, and on approach from 1,300 feet AGL to 50 feet AGL, when aircraft configuration is 1 or greater.

When a FAC detects windshear conditions, it triggers a warning:
- "WINDSHEAR" in red on both PFD's (for at least 15 seconds)
- An aural warning, "WINDSHEAR, WINDSHEAR, WINDSHEAR"

18. If the TERR ON ND pushbutton is selected ON, will this inhibit the weather radar display?

The weather radar image is not displayed although the weather radar is ON.

Chapter 14: Auto Flight System

1. What is the normal mode of FMGC operation?

The FMGC has three modes of operation:
- Dual Mode (normal mode of operation)
- Independent Mode
- Single Mode

2. What is the function of the LOC pushbutton?

To arm the LOC capture mode.

3. How do we know the FLIGHT GUIDANCE actually captured the localizer and glideslope?

GS and LOC capture mode annunciations:
- GS* in FMA column 2 annunciates green, and
- LOC* in FMA column 3 annunciates green.

4. Name some examples when the autopilot will disengage?

- Takeover or corresponding AP switch is pressed.
- Sidestick or rudder pedals are moved beyond the load threshold.
- Trim wheel is moved beyond the load threshold.
- 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.
- Reaching DA – 50' with APPR engaged on a non-ILS approach.

The autopilot will also disengage in normal law when:

- High speed protection is activated.
- Alpha prot is activated.
- Bank angle exceeds 45°.
- Rudder pedal deflection is greater than 10° out of trim.

5. When can the second autopilot be engaged?

Only one autopilot can be engaged in flight except when the ILS approach (APPR) is armed or engaged. The second autopilot will remain engaged until the completion of the Go-Around phase. AP1 is active and AP2 is standby.

6. How is the Autothrust system usually armed on the ground?

The A/THR System is armed on the *ground* by:

- Pushing the A/THR pb on the FCU when the engines are not running, or
- Setting the thrust levers at the FLX or TOGA detent when the engines are running.

The system is armed in *flight* by:

- Pushing the A/THR pb on the FCU while the thrust levers are out of the active range (A/THR pb light illuminates green),
- Engaging the go-around mode, or
- If A/THR is active, setting both thrust levers beyond the CL detent or at least one lever beyond the MCT detent will also cause it to revert to armed.

7. Does one FMGC acts as the "master" while the other acts as "slave"?

The master FMGC logic (Dual Mode) is as follows:

- If one AP switch is engaged, the related FMGC is the master
- If two AP switches are engaged, FMGC 1 is the master
- If neither AP is engaged:
  - FMGC 1 is master when the captain's FD pb is selected on
  - FMGC 2 is master when the FO's FD pb is selected on and the captain's FD pb is selected off
- If neither AP/FD is engaged, the A/THR is controlled by FMGC 1

8. What is TOGA Lock?

TOGA thrust is frozen and thrust lever movement will have no effect.
To cancel TOGA LK, disconnect the autothrust.

ALPHA FLOOR protection commands TOGA thrust regardless of the positions of the thrust levers. This protection is available from lift-off to 100 feet RA on approach.

ALPHA FLOOR calls up the following indications:

- "A FLOOR" in green surrounded by a flashing amber box on the FMA and in amber on the E/WD as long as α floor conditions are met.
- "TOGA LK" in green surrounded by a flashing amber box on the FMA when the aircraft leaves the α floor conditions. TOGA thrust is frozen and thrust lever movement will have no effect.

Note: ALPHA FLOOR is inhibited:

- Under alternate or direct flight control law.
- In case of engine failure with flaps extended

9. What happens if the instinctive disconnect pushbuttons are pushed and held for more than 15 seconds?

The autothrust system is disconnected for the remainder of the flight, including alpha floor protection. The autothrust system can only be reset during the next FMGC power-up (on the ground).

10. What are the flight guidance modes called that are used for temporary lateral, vertical and speed revisions?

- Selected Modes: Used for temporary lateral, vertical, and speed revisions. The aircraft is guided according to values selected by the crew on the FCU. Selected modes are engaged by pulling the respective knob on the FCU.
- Managed Modes: Used for long term lateral, vertical, and speed profiles as determined by the FMGS and modified by entries on the MCDU. During takeoff, managed modes engage automatically when the pilot sets the thrust levers to TO or FLEX detent. In flight, managed guidance modes are armed or engaged by pressing the respective knob on the FCU.

11. On the ground with slats extended, when is the SRS Mode automatically engaged?

The Speed Reference System (SRS) 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 automatically when the aircraft reaches acceleration altitude or an FCU selected altitude.

The pitch guidance maintains airspeed at V2 + 10 knots. If an engine failure is detected, pitch guidance maintains the greater of V2 or current speed. This mode also protects against high pitch attitude and provides a minimum rate of climb.

12. During the ROLL OUT mode of an autoland approach, how is nose wheel steering controlled?

The autopilot provides inputs to the nosewheel steering unit during the ROLL OUT mode of an autoland approach. ROLL OUT mode engages at touchdown and guides the aircraft along the runway centerline. The PFD displays the yaw bar and no FD bars.

13. When will the autopilot automatically disengage during a RNAV approach?

When FINAL APP NAV modes are engaged, the AP will disengage at DA – 50’ (if entered), or 400’ AGL if no DA was entered. The FDs will revert to basic modes (HDG V/S).

14. At what altitude is the red AUTOLAND warning light “armed”?

The following situations, when occurring below 200’ RA with the aircraft in LAND mode, trigger the flashing AUTOLAND red warning, and a triple-click warning:

- Both APs OFF below 200’ RA
- Excessive deviation in LOC (1/4 dot above 15’ RA) or GLIDE (1 dot above 100’ RA). In addition, LOC and GLIDE scales flash on the PFD.
- Loss of LOC signal (above 15’ RA) or loss of GLIDE signal (above 100’). In addition, FD bars flash on the PFD. The LAND mode remains engaged.
- The difference between both radio altimeter indications is greater than 15’.

Go-Around is mandatory during a CAT II/III approach if AUTO LAND caution light illuminates during the approach.

15. When ALT CRZ is displayed on the FMA, the autopilot allows altitude to vary by how much to minimize thrust variations?

When the autopilot is maintaining the MCDU entered cruise altitude (ALT CRZ), the A/THR holds the target Mach, and the altitude varies ± 50 feet to minimize thrust variations.

16. At least one Flight Director must be on to arm the A/THR System on the ground.

See question #6 above.

17. How is TOGA LK canceled?

TOGA thrust is frozen and thrust lever movement will have no effect.
To cancel TOGA LK, disconnect the autothrust.

ALPHA FLOOR protection commands TOGA thrust regardless of the positions of the thrust levers. This protection is available from lift-off to 100 feet RA on approach.

ALPHA FLOOR calls up the following indications:

- "A FLOOR" in green surrounded by a flashing amber box on the FMA and in amber on the E/WD as long as α floor conditions are met.
- "TOGA LK" in green surrounded by a flashing amber box on the FMA when the aircraft leaves the α floor conditions. TOGA thrust is frozen and thrust lever movement will have no effect.

Note: ALPHA FLOOR is inhibited:

- Under alternate or direct flight control law.
- In case of engine failure with flaps extended

TGS – PART TWO

Chapter 16: POWERPLANT

1. During a manual start, are the automatic start interruption and auto-crank functions available?

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 (except if on the ground and the start EGT limit is exceeded before reaching 50% N_2) and auto-crank are not available.

2. How is autothrust disconnected to avoid thrust surges?

Autothrust instinctive disconnect pb.

3. How is the FADEC powered?

The system has its own alternator rendering it independent of the aircraft electrical system when N2 is above a set value. If this alternator fails, the FADEC automatically switches over to aircraft electrical power.

4. Continuous ignition is provided automatically when:

- ENG ANTI ICE is selected ON
- Engine flameout is detected in flight
- The EIU fails

5. Name some reasons that a manual start may be required?

After aborting a start because of:
- Stall
- EGT overlimit
- Low start air pressure

When expecting a start abort because of:
- Degraded bleed performance due to a hot condition or at a high altitude airfield.
- A mature engine in hot condition or at a high altitude airfield.
- Marginal performance of external pneumatic power.
- Tailwind greater than 10 knots.

6. What takes place when we push the MAN START button?

- The start valve opens if the ENG MODE selector is set to CRANK or IGN/START and N_2 < 20%.
- Both pack valves close during the start sequence.
- The blue ON light illuminates.

Note: The start valve closes automatically when $N_2 \geq 50\%$.

7. What is an indication that the start sequence is complete?

At ISA sea level (2-4-6-6):
- N1 approximately 19.5%
- EGT approximately 390°C
- N2 approximately 58.5%
- FF approximately 600 lb/hr
- **Gray background on N_2 indication disappears.**

8. What is the minimum oil quantity for dispatch?

13 quarts

9. Operationally, which engine do we start first? Why?

Engine 1 is started first under the assumption it will be a single engine taxi. This will ensure engine driven Green hydraulic pump pressure will be available for normal brakes and nosewheel steering.

10. If the #1 ENG MAN START pushbutton is depressed, will the engine begin to motor?

The start valve opens if the ENG MODE selector is set to CRANK or IGN/START and N_2 < 20%.

11. During a manual start of the #1 engine, does the ENG MAN START pushbutton have to be depressed to close the start valve?

When the ENG MASTER switch is selected ON, the FADEC controls the start sequence, including both fuel valves, ignition, and closing of the start valve.

12. Is there a mechanical connection between the thrust levers and the engines?

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

13. How many channels does the FADEC computer have?

Each FADEC is a dual channel (A & B) computer providing full engine management. One channel is always active while the other is a backup designed to takeover automatically in case of primary channel failure.

14. If a thrust lever is set between two detents, what rating limit will the FADEC select?

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

Chapter 16: APU

1. What are the altitude limits for APU generator and bleed air?

- APU generator – 100% load up to 25,000 feet (Note: APU GEN is available up to 39,000 feet).
- APU Bleed – Maximum altitude for APU bleed operation is 20,000 feet.

2. What are some of the causes for an APU automatic shutdown?

• Fire (on ground only) • Air inlet flap not open • Overspeed • No acceleration • Slow start • EGT overtemperature • No flame	• Reverse flow • Low oil pressure • High oil temperature • ECB failure • Loss off overspeed protection • Underspeed • DC power loss

3. When would the APU MASTER SW pb FAULT light illuminate?

This amber light illuminates and a caution appears on the ECAM when an automatic APU shutdown occurs.

4. If an APU fire occurs in flight will the APU shut down automatically?

APU will automatically shutdown due to fire on the ground only.

5. If EXTERNAL POWER were powering the aircraft, what indications would be seen during an APU fire test?

- A continuous repetitive chime sounds
- The MASTER WARN lights flash
- APU FIRE warning appears on the ECAM

On the APU FIRE panel:
- The APU FIRE pb illuminates red
- The SQUIB light illuminates white
- The DISCH light illuminates amber

Note: The automatic shutdown of the APU on the ground will not occur during the test.

6. The APU START pb green AVAIL light signifies that what?

This light illuminates when N is above 99.5% or 2 seconds after N reaches 95%.

7. How many APU fire extinguisher bottles are installed?

One

8. Will the APU bleed valve close automatically during climb? Will it reopen during descent?

No

9. When an APU auto shut down has occurred, what other indications are received in addition to the ECAM procedure?

APU MASTER SW pb amber FAULT light will illuminate.

10. With battery power only, what would an APU fire test look like?

- APU FIRE pb illuminated
- SQUIB and DISCH lights illuminated

11. After depressing the APU MASTER pb, the START pb is pressed. At this time the START pb illuminates blue. What does that mean?

- When the flap is completely open, the APU starter is energized.
- 1.5 seconds after the starter is energized, the ignition is turned ON.
- When N = 55%, the starter is de-energized and the ignition is turned OFF.
- 2 seconds after N reaches 95%, or when N is above 99%, The ON light on the START pb goes out.
- The APU may now supply bleed air and electrical power to aircraft systems.
- 10 seconds later, the APU page disappears from the ECAM display.

12. Can the APU be shut down from outside the aircraft?

APU SHUT OFF pb on External Power Panel.

13. Can you name some of the possible reasons for an APU auto shutdown?

Yes I can … see question #2.

Chapter 8: FIRE PROTECTION

1. What are the components of the APU fire detection system?

The APU is equipped with two identical detection loops each of which contain one heat sensing element and a FDU, located in the APU compartment. The APU is equipped with one fire extinguisher.

2. If a cargo smoke detector fails, does that render the system inoperative?

If one smoke detector fails, the system remains operational with the other detector.

3. When are the cargo fire bottle squibs armed?

When the Smoke Detection Control Unit issues a smoke warning.

4. Where are the engine fire loops installed?

Engine heat sensing units are located in:

- Pylon nacelle
- Engine core
- Fan section

5. If an APU fire occurs on the ground, what must be done to shut down the APU and extinguish the fire?

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.

6. How many fire extinguisher bottles are available for fighting an engine fire?

Two

7. How many cargo smoke detectors must sense smoke to issue a warning?

Both cargo compartments are equipped with smoke detector loops. The forward compartment contains two smoke detectors in the A319/320 and four smoke detectors in the A321. In the A319/320, the aft compartment contains two loops with two detectors each. In the A321, the aft compartment contains three loops with two smoke detectors in each. A Smoke Detection Control Unit issues a smoke warning when two smoke detectors of one loop detect smoke. If one smoke detector fails, the system remains operational with the other detector.

Cargo smoke is indicated by an aural CRC, the illumination of the MASTER WARN and CARGO SMOKE light on the CARGO SMOKE panel.

One extinguisher bottle supplies one nozzle in the forward compartment and two nozzles in the aft compartment. The agent is discharged by pressing either the FWD or AFT DISCH pb.

If the cargo smoke warning is activated in either compartment, the associated isolation valves close and the extraction fan stops.

8. How many fire extinguisher bottles are provided for the cargo compartments?

One extinguisher bottle supplies one nozzle in the forward compartment and two nozzles in the aft compartment.

9. What is required for a fire warning to be indicated in an engine or APU?

Each engine is equipped with two identical detection loops (A & B) each of which contain three heat sensing elements and a computer (Fire Detection Unit). The sensing elements are located in the pylon nacelle, engine core, and fan section. 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 ECAM will issue appropriate messages if any component of the detection system fails. An engine fire is indicated by an aural CRC, the illumination of the ENG FIRE pb, and MASTER WARN lights.

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

10. What external indications may be received in the event of an APU fire while on the ground?

- The red APU FIRE light illuminates and an external warning horn sounds
- The APU fire extinguisher discharges automatically 3 seconds after the appearance of the fire warning.
- The light extinguishes when the fire has been extinguished.

11. In case of lavatory smoke, would you get a warning in the cockpit?

Lavatory smoke is indicated by:

- Aural CRC
- Illumination of MASTER WARN light
- Red ECAM SMOKE LAVATORY SMOKE

12. How do you know when the engine fire extinguisher bottle has discharged?

AGENT DISCH illuminates amber when its fire extinguisher bottle has lost pressure.

Chapter 9: FUEL

1. Can fuel be suction fed to the engines?

If the wing tank pumps fail, suction feeding is possible only from the inner wing cells (A319/320), or the wing tank (A321).

2. The outer wing tank transfer valves (A319&320) automatically open when the wing inner cell fuel quantity drops to _1,650_ pounds.

3. When and how is fuel normally transferred from the outer to inner wing tanks?

The wing tank transfer valves automatically latch open when the wing inner cell fuel quantity drops to 1,650 lbs thus allowing the outer cell fuel to drain into the inner cell. The transfer valves open simultaneously in both wings and remain open until the next refueling operation. During steep descents and acceleration/deceleration, the transfer valves may open prematurely and trigger a LO LVL warning.

4. Can either wing tank feed either or both engines?

The crossfeed valve permits one engine to be fed by both sides or both engines to be fed from one side. The valve is operated by two electric motors.

5. What is the normal fuel feed sequencing?

A319/320: Normal fuel feed sequencing is automatic. When there is fuel in all tanks, the center tank feeds the engines first (even though the wing tank pumps operate continuously).

With the fuel MODE SEL pb in AUTO, the center tank pumps operated for two minutes after both engines are started to confirm center tank pump operation prior to takeoff. After takeoff, the center tank pumps restart when the slats are retracted and continue to operate for five minutes after the center tank is empty or until the slats are extended.

With the MODE SEL pb in MAN, the center tank pumps operate continuously. The crew must select the CTR TK PUMP pbs OFF when the center tank is empty.

A321: The fuel transfer system controls the flow of fuel from the center tank to the wing tanks, which feed the engines. The tanks empty in the following sequence:

1. ACT transfers fuel into the center tank
2. Center tank transfers fuel into the wing tanks
3. Wing tanks

With the MODE SEL pb in AUTO, the Fuel Level Sensing Control Unit (FLSCU) has automatic control of the transfer valve. When the transfer valve is open, fuel from the wing tank pumps flows through the jet pump and creates suction. This suction moves the fuel from the center tank to the related wing tank. The FLSCU automatically closes the associated center tank transfer valve when the wing tank is full. The transfer valve reopens the center tank transfer valve when the engines have used 550 lbs of wing tank fuel.

With the ACT pb in AUTO, automatic control of the transfer occurs after takeoff at slats retraction. It is initiated if the center tank high level sensor has been dry for 10 minutes and fuel remains in either ACT. Fuel transfer from the ACTs to the center tank is made by pressurizing the ACT, closing the ACT vent valves, and opening the air shut-off and inlet valves. ACT2 transfers first.

With the MODE SEL in MAN, the center tank transfer valves open. Wing tank overflow must be prevented by selecting the CTR TK XFR pbs OFF when the wing tanks are full. They must also be selected OFF when the center tank is empty.

During transfer, if the center tank high level sensor gets wet, transfer from the ACT stops. The transfer valve opens when the center tank high sensor is dry for ten minutes.

IDG cooling is accomplished by fuel. Some fuel from the high pressure pump passes through the IDG heat exchanger and returns to the respective wing outer cell (A319/320) or wing tank (A321) through a fuel return valve. The fuel return valve is controlled by the FADEC which regulates IDG temperature.

A319/320: If the outer cell is full, the recirculated fuel overflows to the inner cell. To prevent wing tank overflow when the center tank is supplying fuel, the center tank pumps automatically stop when the wing inner cell is full. This allows the wing tanks to feed the engines until approximately 1,100 lbs of fuel has been used from the applicable wing tank(s); at which time the center tank pumps resume operation.

MODE SEL FAULT (A319/A320/A321): Amber light illuminates, and ECAM caution appears when center tank has more than 550 lbs of fuel and the left or right wing tank has less than 11,000 lbs.

ACT FAULT (A321): Amber light illuminates and ECAM caution appears when the center tank has less than 6,614 lbs of fuel and one ACT has more than 550 lbs of fuel.

6. What is the maximum fuel imbalance between the left and right wing tanks (outer + inner)?

Operational maximum fuel imbalance will be indicated by an ECAM advisory condition.

7. How can you know when the crossfeed valve is fully open?

The X FEED pb OPEN light illuminates green when the valve is fully open.

Chapter 7: ELECTRIC

1. What is the normal priority for supplying electric power to the aircraft?

- 1. Engine generators
- 2. External power
- 3. APU generator
- 4. Emergency generator (RAT)
- 5. Batteries

2. What does the EMER GEN red FAULT light indicate when illuminated?

This light illuminates red if the emergency generator is not supplying power when AC BUS 1 and AC BUS 2 are not powered.

3. What does the amber FAULT light in either BAT 1, BAT 2 pushbutton indicate?

The charging current for the corresponding battery is outside limits. In this case the battery contactor opens.

4. How long must the IDG pushbutton be held to achieve a disconnect?

Press IDG pb until the GEN FAULT light comes on but for not more than 3 seconds to avoid damage to the disengage solenoid.

5. What does the FAULT light indicate in the AC ESS FEED pushbutton?

The AC ESS BUS is not electrically supplied.

6. Are there any procedures in the Pilot's Handbook, which direct us to use the EMER GEN TEST switch?

None that I know of.

7. Can the batteries be depleted?

Battery automatic cut-off logic prevents complete discharge of the battery when the aircraft is on the ground and unpowered.

8. If the blue ON light is present in the EXT PWR pushbutton and a green AVAIL light on the APU START pb, what is the source of electrical power (with engines shut down)?

EXT PWR

9. What is the purpose of the static inverter?

In the event of total AC power loss, if the aircraft speed is above 50 knots, an inverter is connected to the HOT BAT 1 bus and inverts DC current to single phase AC current which is supplied to the ESS AC bus. This switching will occur regardless of the position of the BAT pbs. If the airspeed is less than 50 knots, both BAT pbs must be in auto position for the switching to occur.

10. What does the AVAIL light in the EXT PWR pb mean?

AVAIL light illuminates green if:

- External power is plugged in, and
- External power parameters are normal.

11. If an IDG is disconnected in flight, can it be re-connected?

Pressing the IDG pb disconnects the IDG from its driveshaft. Only maintenance personnel can reconnect it.

12. What is the normal source of power for the AC ESS BUS?

The AC ESS bus is normally powered by AC BUS 1 through the AC essential feed contactor.
The AC ESS FEED pb allows the pilot to transfer the AC ESS bus power source from AC BUS 1 to AC BUS 2.

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.

13. What is the AUTO function of the GALLEY pb?

Main galley, secondary galley, and in-seat power supply are supplied. The main galley (A319/320), all galleys (A321), and in-seat power supply are shed automatically when:

- In flight: only one generator is operating
- On the ground: only one generator is operating (All galleys are available when the APU GEN or EXT PWR is supplying power)

14. Can the APU generator power all busses on the ground?

The APU can supply the entire electrical system on the ground.