AIRBUS A319/320/321

Technical Ground School Study Guide

July 1, 2004

(Updated 1/18/05)

PART ONE

Chapter 6: Ice & Rain Protection

1. Is it permitted to select WING ANTI-ICE pushbutton on the ground?

On the ground, the valves only open for 30 seconds for system testing. They close automatically:

- Upon touchdown,
- If a leak is detected, or
- If electrical power is lost.

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

2. 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

3. 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.

4. 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.

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

The three outboard slats on each wing.

6. 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.

7. 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.

Chapter 7: Electrical

1. What does the EXT PWR pb AVAIL light mean?

AVAIL light illuminates green if:
- External power is plugged in, and
- External power parameters are normal.

2. If an IDG is disconnected, can it be reconnected in flight?

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

3. What is the difference between this EMER ELEC PWR MAN ON pb switch and the RAT MAN ON pb on the hydraulic panel?

The EMER ELEC PWR MAN ON pb switch selects manual RAT extension. Emergency generator coupling occurs three seconds after the RAT is supplying the emergency generator.

The RAT MAN ON pb is used to deploy the RAT manually and will only pressurize the blue system, but not activate the emergency generator.

4. What does the RAT & 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.

5. Prior to the first flight of the day, what should the battery voltage be?

≥ 25.5 Volts

6. During preflight, what options are available if the battery voltage for either battery is below 25.5 volts?

A battery charging cycle of 20 minutes is required.

BAT 1 and 2 … AUTO
EXT PWR … ON
Check on ECAM ELEC page, battery contactor closed and batteries charging.

After 20 minutes:
BAT 1 and 2 … OFF
BAT 1 and 2 Voltage … Check ≥ 25.5V

If battery voltage ≥ 25.5V:
BAT 1 and 2 … AUTO

7. 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.

8. What are the cautions regarding the disconnecting of an IDG?

Do not disconnect the IDG when the engine is not operating (or not windmilling) because starting the engine after having done so will damage the IDG.

Holding this pb in for more than approximately 3 seconds may damage the disconnection mechanism.

9. What is the normal source of power for 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.

10. Can the APU generator power all buses on the ground?

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

11. If the green AVAIL 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)?

The APU will be the source of power. Although external power has priority over the APU generator, the EXT PWR pb must be pushed and indicate ON to use external power as the source.

12. If both engines are started at the gate using external electrical power, the EXT PWR ON light will remain illuminated. After engine start will that ON light extinguish automatically?

No – The ON light remains illuminated even if the engines generators are supplying the aircraft.

13. If both main AC buses lose electrical power with airspeed above 100 knots, what will happen?

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. A generator control unit controls generator output, which is considerably lower than that of the main generators.

14. What buses will the emergency generator supply?

Once the emergency generator is up to speed it will supply power to the AC ESS BUS and DC ESS BUS (via the ESS TR) in addition to the AC ESS SHED and DC ESS SHED buses. During RAT deployment and emergency generator coupling (approximately 8 seconds), the batteries supply power to these buses.

After landing, the DC BAT bus is automatically connected to the batteries when airspeed drops below 100 knots. When the speed decreases below 50 knots, the AC ESS bus is automatically shed, and power is lost to the CRTs.

Chapter 8: Fire Protection

1. What action arms the engine fire extinguishing squibs?

The ENG FIRE pb:

- Silences the aural fire warning
- **Arms the fire extinguisher sqibs**
- Closes the LP fuel valve
- Closes the hydraulic fire valve
- Closes the engine bleed valve
- Closes the pack flow control valve
- Disconnects the FADEC power supply
- Deactivates the IDG

2. If a failure in both engine fire loops occurs within 5 seconds of each other, what will occur?

A fire warning.

3. If an APU start is initiated on battery power only, is fire protection available?

Yes

4. 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.

5. Can the APU FIRE test be performed with the APU running?

Yes – The automatic shutdown of the APU on the ground will not occur while the flight crew is performing this test.

6. 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.

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

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.

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.

Chapter 9: Aircraft Fuel

1. What is the total fuel capacity of the Airbus 319/320/321?

	A319/320	A321
Wing Tanks	27,500 lb	27,500 lb
Center Tank	14,500 lb	14,500 lb
ACT	-	10,500 lb
TOTAL	**42,000 lb**	**52,500 lb**

2. Is refueling possible if the aircraft batteries are the only source of power?

External power, the APU, or battery power can be used for refueling.

3. What is the maximum fuel imbalance between the left and right wing tanks (outer + inner) for the Airbus A319/320/321?

2,500 lb

4. Can fuel be transferred between wings or between wings and center tank during flight on the A319/320?

Except during normal fueling operations, fuel cannot be transferred from one tank to another.

5. If the boost pumps in the left fuel tank were OFF, how would the APU obtain fuel?

An APU fuel pump is in the left fuel manifold to provide fuel to the APU when the tank pumps are off.

6. If all criteria for center tank fuel usage have been met, when will the center tank pumps resume pumping after takeoff?

- The center tank pumps operate 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.

7. What happens to the center tank pumps if the wing inner cell is full (selector in AUTO)? (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.

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

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

Chapter 10: Pneumatics, Air Conditioning, & Pressurization

1. 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

2. 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.

3. 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.

4. 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.

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

FMGS data is used.

6. 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

7. 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.

8. 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.

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 is the one limitation for opening the RAM AIR inlet?

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

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

No

12. 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.

13. 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.

14. 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.

15. Is cargo heat provided to the forward cargo compartment?

No, although a portion of the avionics cooling air is exhausted through the cargo underfloor.

Chapter 13: Instruments/Navigation/Communication

1. 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.

2. In order to test the CVR, the Parking Brake Handle must be in what selected position?

Parking Brake … ON

3. If ACP #1 (Captain's) should fail, how would the pilot restore communications?

Select CAPT 3 on the Audio Switching panel. The captain uses his acoustic equipment and the third occupant’s ACP.

4. Do we have any operations, described in the pilot's handbook that requires the use of the maintenance panel on the upper right overhead?

Check all pb lights are extinguished.

5. 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.

6. Where is the standby compass?

On top of the windshield center post.

7. 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.

8. 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.

9. When the TO CONFIG pushbutton is depressed, a take-off power application is simulated. What are some of the systems that 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)

10. 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)

11. What does STS indicate when displayed on the EWD?

The boxed message STS is displayed in white on the lower part of the E/WD, during non-normal operations, to remind the crew that airplane systems are degraded. The STS message flashes after engine shutdown to alert maintenance of any other applicable messages.

12. How would the flight deck crew command an evacuation?

- Initiate the evacuation by using the PA system: "This is the captain, EVACUATE, EVACUATE."
- EVACUATION COMMAND pb … Press

13. When the Mode Selectors are positioned to NAV and the IRS not previously aligned what indications should be noted on the GNADIRS panel?

- ON BAT Light … Extinguished
- IR FAULT Lights … Extinguished
- IR ALIGN Lights … Illuminated or flashing
- ADR pb Lights … Extinguished

14. 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.

15. After pressing the EMER CANC pushbutton, how can the system be returned to normal?

Press the RCL pb on the ECAM control panel. This pb is used to call up the warning messages, caution messages, and the status page, that may have been suppressed by the activation of the CLR pb or by flight-phase related inhibition. If the RCL pb is held down for more than 3 seconds, the E/WD shows any caution messages that have been suppressed by the EMER CANC pb.

16. How could the status page be checked for inoperative systems or maintenance messages?

Press the STS pb on the ECAM control panel, which will display the STATUS page on the lower SD.

17. During the Securing checklist, should the PFD and ND displays be turned OFF?

No - **DIM** EFIS, ECAM, and MCDU display units.

18. If both upper and lower ECAM display units were selected off and the lower display was reselected on, what would be displayed on that screen?

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.

If the lower ECAM screen fails (or is switched off), or when only one ECAM screen is operative, SD information can be temporarily displayed by:

- Pressing and holding (for a maximum of 3 minutes) the applicable system key on ECAM control panel.
- Pressing the ALL button on the ECAM control panel repeatedly until the desired page is displayed.

19. Why is it very important to maintain a 'lights out' condition on the ECAM control panel during flight?

To ensure any current cautions or warnings are displayed immediately on the ECAM.

20. The STATUS page may be displayed manually by pressing the STS key on the ECAM control panel. If there are no status messages, what will the status page display?

The status page displays NORMAL for 5 seconds.

21. 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.

22. 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.

23. How do we know the ILS has been properly tuned and identified?

ILS identification is decoded by the ILS receiver, and displayed in magenta on the lower left of the ND.

24. What does the amber "=" sign mean on the airspeed tape?

This symbol shows the V_{FE} corresponding to the next flap lever position.

25. How can a failed DMC be determined?

If a Display Management Computer fails, each of its associated display units display a diagonal line.

26. Can any communications radio be controlled from any RMP?

Any one RMP can tune any one of the aircraft radios. A green light to the left of the radio key indicates which radio is selected for tuning.

27. Could the lower ECAM information be displayed on the upper ECAM screen in the event of a failure of the lower ECAM?

If the lower ECAM screen fails (or is switched off), or when only one ECAM screen is operative, SD information can be temporarily displayed by:

- Pressing and holding (for a maximum of 3 minutes) the applicable system key on ECAM control panel.
- Pressing the ALL button on the ECAM control panel repeatedly until the desired page is displayed.

28. Which RMP is functional in the emergency electrical configuration?

Only RMP 1 is operational in EMER ELEC CONFIG.

29. What does the speed trend arrow on the PFD airspeed scale indicate?

Points to the speed value which will be attained in 10 seconds, if the acceleration / deceleration remains constant.

30. Is altitude alerting aural warning inhibited with the autopilot on?

Yes

Note – the altitude alert is also inhibited:

- When the slats are out and the landing gear is selected down,
- In approach after the aircraft captures the glide slope, or
- When the landing gear is locked down.

31. What are some possible causes for the IR ALIGN light to flash?

- IR alignment fault
- No present position entry after 10 minutes
- Difference between position at shutdown and entered position exceeds 1° of latitude or longitude

32. How many levels of notification are issued by ECAM? What are they?

- Warnings – Associated with the red MASTER WARN light, red system limitations, and require immediate action.
- Cautions – Associated with the MASTER CAUT light, amber system limitations, and require crew awareness but not immediate action.
- Alerts – Associated with degraded systems advisories which are still within operating limitations.

33. How could the pilot cancel an altitude alert (C CHORD)?

- Selecting a new altitude,
- Pushing the EMER CANC pb on the ECAM control panel, or
- Pressing either MASTER WARN pb.

34. If the entered position caused the ALIGN lights to flash and the coordinates are determined to be correct, how could the problem be corrected?

Wait at least three minutes after the aircraft comes to a complete stop.
MODE Selectors … OFF then NAV (within 5 seconds)
Select ALIGN IRS (3R) on MCDU during the 30-second alignment.

35. Would a fault in the #1 IR cause the #1 ADR to fail?

The ADR and IR parts of each ADIRU may operate independently and failure of one system does not render the other inoperative.

36. What would a flashing IR FAULT light indicate?

Attitude and heading information may be recovered in ATT mode.

37. What is the purpose of the T.O. INHIBIT or LDG INHIBIT?

During takeoff and landing T.O. INHIBIT or LDG INHIBIT memos are displayed in magenta to remind the crew that most of the failure titles and the associated checklists are suppressed. This prevents unnecessary distractions during critical phases of flight.

- The T.O. memo appears 2 minutes after the second engine is started or when the T.O. CONFIG TEST pb is pressed with one engine running. The memo is removed when takeoff power is applied.
- The LDG memo appears below 2,000' RA and disappears after touchdown (80 knots).

38. The altitude alert is inhibited only when:

- When the slats are out and the landing gear is selected down,
- In approach after the aircraft captures the glide slope, or
- When the landing gear is locked down.

Chapter 16: Powerplant

1. 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.

2. 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%.

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.

3. 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.

4. What is the minimum oil quantity for dispatch?

12.5 quarts

5. How is autothrust disconnected to avoid thrust surges?

Autothrust instinctive disconnect pb.

6. If a thrust lever is set between a detent, 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 is the maximum operating altitude of the APU?

39,000 feet

2. 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.

3. 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

4. What does LOW OIL LEVEL indicate? Where would you find US Airways operational restrictions regarding this message?

Limitations note: When the APU ECAM page LOW OIL LEVEL message appears, the remaining oil quantity allows normal APU operation for 10 additional hours.

5. 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%.

6. How many APU fire extinguisher bottles are installed?

One

7. If an APU fire occurs on the ground will the APU shut down automatically?

On the ground, detection of an APU fire causes automatic APU shutdown and extinguisher discharge.

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

In flight, there is no automatic APU shutdown, and the extinguisher must be manually discharged.

Chapter 17: Flight Management

1. What action would the pilot take to SELECT SPEED?

Pull SPD OR MACH Selector knob on FCU.

2. How does the crew confirm that the data contained in the FMGC database is valid?

From the DATA INDEX page, select A/C STATUS [5L] and check database dates.

3. When would a takeoff shift be entered into the PERF TO page?

When the aircraft's takeoff position does not commence at the runway threshold.

4. What is the difference between OPT vs. REC MAX?

The recommended maximum altitude based on present GW and deviation from ISA. It gives the aircraft a 0.3g buffet margin, a minimum rate of climb at MAX CL thrust, and level flight at MAX CRZ thrust. It is limited to FL 390. With an engine out, it shows the recommended maximum EO altitude, computed for long-range cruise, anti-icing off.

The optimum flight level indicates the most economic flight level for a given cost index, weight, and weather data and is continuously updated in flight. It is a compromise between fuel and time saving, and may show steps due to slight GW, ISA, or wind changes. As a consequence, the pilot may observe jumps in optimum flight level.

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

Lateral mode will revert to HDG/TRK.

PART TWO

Chapter 11: Hydraulics, Brakes, and Landing Gear

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. When does the PTU automatically activate?

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

4. Will the PTU operate during Cargo Door operation?

PTU is inhibited for 40 seconds after cargo door operation.

5. 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.

6. 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.

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

No

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

No

9. 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.

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

- If both AC bus 1 and 2 are lost and the airspeed is above 100 kts, 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.
- 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.

11. 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.

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

Nose wheel steering is deactivated.

When the Emergency Gear Extension crank handle is operated:
- The cutoff valve shuts off hydraulic pressure to the landing gear system,
- Opens the gear doors, and
- Unlocks the gear, which extends by gravity.

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

At least seven full brake applications.

14. Which hydraulic system does the parking brake use?

Yellow hydraulic system or accumulators.

15. Is nose wheel steering available after emergency gear extension?

See question 12 above.

16. What system pressure is indicated on the Triple Pressure Indicator?

- ACCU PRESS – pressure in the yellow brake accumulators.
- BRAKES – yellow pressure delivered to the left and right brakes, as measured upstream of the servo valves.

17. 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.

18. How long will the accumulator maintain adequate parking brake pressure?

For at least 12 hours.

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

A safety valve shuts off hydraulic power to the gear when indicated airspeed is above 260 knots. The valve opens again when the airspeed decreases below 260 knots, provided the gear lever is placed down.

20. 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 message changes to amber.

Chapter 12: Flight Controls

1. 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.

2. What is the result if both sidesticks are moved at the same time and neither takes priority during flight with the autopilot OFF?

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.

3. 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

4. Does the SIDE STICK PRIORITY red arrow light illuminate in front of the pilot losing or gaining priority?

- 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).

5. After touchdown, what will the stabilizer trim do?

Stabilizer trim is automatically reset to zero as the pitch attitude becomes less than 2.5°.

6. When does an amber SPD BRK memo appear?

The memo flashes amber if the speedbrakes are extended when the thrust is above idle.

7. What happens to the aircraft if 45-degree bank is flown and the sidestick is released?

The aircraft returns to and maintains 33° of bank.

8. When a speedbrake surface (on one wing) fails, what happens to the symmetric surface on the other wing?

The symmetric surface on the other wing is inhibited.

9. When does full ground spoiler extension occur?

Full ground spoiler extension automatically at touchdown of both main gear or in the case of a rejected takeoff (speed above 72 knots) when:
- Both thrust levers are at idle (if the ground spoilers are ARMED), or
- Reverse thrust is selected on at least one engine with the other thrust lever at idle (if the ground spoilers are not ARMED)

Partial ground spoiler extension occurs when:
- Reverse thrust is selected on at least one engine with the other at or near idle, and
- One main landing gear strut is compressed.

10. Can the rudder be manually trimmed with the autopilot engaged?

The rudder trim rotary switch has no effect when the autopilot is engaged.

11. What is indicated by the low energy warning (SPEED, SPEED, SPEED)?

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.

12. Four Wingtip Brakes are activated in case of asymmetry, overspeed, symmetrical runway, or uncommanded movement. If the WTBs lock the flap or slat surfaces and prevent further movement, can the remaining surfaces be extended?

- 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.

13. What will the aircraft do in alternate law with speed stabilities, if the V_{MO} or M_{MO} 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.

14. 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.

15. When is the flight mode of normal law active?

The flight mode becomes active shortly after takeoff and remains active until shortly before touchdown.

16. In general, how can flight in direct law be determined?

An amber message "USE MAN PITCH TRIM" appears on the PFD.

17. 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.

18. In general, how can flight in mechanical backup be determined?

A red "MAN PITCH TRIM ONLY" warning appears on the PFD.

19. 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.

20. On approach we select Flaps 1. What flaps/slats combination is received?

0° flaps; 18° slats

21. What happens to extended speed brakes when FLAPS FULL is selected on the A320?

If an inhibiting condition occurs, the speedbrakes retract automatically.
Speedbrake extension is inhibited if:

- SEC 1 and 3 have failed
- An elevator (L or R) has failed (only spoilers 3 and 4 are inhibited)
- Angle of attack protection is active
- **Flaps are in configuration FULL (A319/320) or**
- **Flaps are in configuration 3 or FULL (A321)**
- Thrust levers are above MCT position, or
- Alpha floor is active

22. Are hydraulics required to fly the aircraft in mechanical backup?

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.

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

This command can be overridden by sidestick input.

24. If both pilots press their takeover pushbuttons who gets priority?

The pilot who presses last gets priority.

25. 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.

Chapter 14: Autoflight System

1. What is the function of the LOC pushbutton?

To arm the LOC capture mode.

2. 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.

3. How do I confirm that I have actually ARMED the approach for the flight director or autopilot to capture?

GS and LOC armed mode annunciations:
- GS in FMA column 2 annunciates blue and
- LOC in FMA column 3 annunciates blue.

Non-ILS Approach: APP NAV in FMA column 3 annunciates blue.

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. How is Autothrust usually activated?

The system is activated when:
- Thrust levers are set in the active range when A/THR is armed,
- A/THR pb on the FCU is pressed when the thrust levers are in the active range, or
- Alpha floor protection is triggered, regardless of throttle position or arming status.

6. What is Alpha Floor?

A protection that commands TOGA thrust regardless of the positions of the thrust levers. This protection is available from lift-off to 100' RA on the 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 alpha floor conditions are met.
- TOGA LK in green surrounded by a flashing amber box on the FMA when the aircraft leaves the alpha floor conditions. TOGA thrust is frozen and thrust lever movement will have no effect.

Alpha floor is inhibited:
- Under alternate or direct flight control law.
- In case of engine failure with flaps extended.

To cancel ALPHA FLOOR thrust, disconnect the autothrust.

7. 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).

8. Will the G/S mode engage without the LOC mode engaged?

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 glideslope.

9. An amber THR LK flashes on the FMA. What does this indicate?

The thrust lock function prevents thrust variations when the autothrust system fails and disengages.

The thrust lock function is activated when the thrust levers are in the CL detent (MCT with one engine out) and:

- The pilot disengages A/THR by pushing the A/THR pushbutton on the FCA, or
- The A/THR disconnects due to a failure.

The thrust is locked or frozen at its level prior to disconnection. Moving the thrust levers out of the CL or MCT detent suppresses thrust lock and allows manual control by means of the thrust levers.

10. How is TOGA LK canceled?

To cancel TOGA LK, disconnect the autothrust.

Chapter 15: Oxygen

1. The passenger oxygen mask doors open automatically if the cabin altitude exceeds what altitude?

14,000 feet.

2. When crew oxygen is below 1000 psi, what reference chart is used and where is it located?

The Minimum Flight Crew Oxygen Pressure chart located in PHB Chapter 3, Normal Procedures.

3. How is passenger oxygen supplied?

The passenger oxygen system consists of chemical oxygen generators.

4. How long will the passenger oxygen system provide a supply of oxygen?

Once oxygen generation begins, it will continue until the chemicals have been depleted, a process which lasts approximately 13 minutes.

5. What does the MASK MAN ON pushbutton do when pressed?

The mask doors open. Illumination of the SYS ON light does not necessarily mean all masks have deployed. F/As may have to manually deploy some masks.

6. When will the flow of oxygen begin for the passengers after the oxygen mask doors open?

Oxygen generation for a particular group of masks begins when a mask is pulled toward the seat.

7. After a crew oxygen mask has been used, will pressing the RESET/TEST control slide cut off the oxygen mask microphone?

Yes

Updated 1/18/05, PHB Revision 22-04
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