

A320 NORMAL PROCEDURES

Last Updated: **28th SEP 2025**

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SAFETY EXTERIOR INSPECTION – CM2

- Wheel Chocks
- Landing Gear Doors
- APU Area

PRELIMINARY COCKPIT PREPARATION OVERVIEW



1	AIRCRAFT SETUP	WX Radar, Engines, Landing Gear, Wipers	CM2
2	ELEC POWER	Battery Check & External power	
3	APU	RMP & ACP Setting Fire Test & Starting	
4	ADIRS	Alignment	



L	LIGHTS	CM1 + CM2
E	EFB	CM1 + CM2
A	ACCEPTANCE	Recall Warnings & Acceptance – CM1 TECH-LOG, MEL/CDL, QRH (A/C Config Summary, OEB) – CM1 + CM2
P	PERFORMANCE	Preliminary Takeoff Performance Calculation– CM1 + CM2
BEFORE WALKAROUND		PM

PRELIMINARY COCKPIT PREPARATION – EXPANDED

AIRCRAFT SETUP	
WEATHER RADAR ¹ <i>This is the only step that is to be done in the transit checks.</i>	Radar – OFF
	Windshear / PWS– OFF
	Gain knob – AUTO/CAL
	Mode Selector – As Required
ENGINE	Masters Switch 1 and 2 – OFF
	Mode Selector – NORM
LANDING GEAR	Lever – Down
WIPERS	Both Selectors – OFF

BATTERY CHECK & EXTERNAL POWER	
ELECTRICS	• A/C Not Electrically Supplied for > 6 hours ➤ Batt Voltage Check ² ○ Above 25.5 V – Batt 1,2 AUTO ○ At or Below 25.5 V – Charge for 20 mins and check again ³ • A/C Electrically Supplied within < 6 hours ➤ Batt 1,2 AUTO ⁴ ○ EXT PWR ON if AVAIL light is on.

1. Procedures throughout this document refer to Collins WXR-1200. For Honeywell RDR-4000 (installed in some aircraft like AP-BMX), please refer to the [A320 Line Training](#) Document.

2. Check batteries voltage with Batt Pb OFF.

3. Charge with Batt Pb on AUTO & EXT PWR ON. Check charging on ELEC page (i.e. battery contactor closed).

4. Batt voltage >25.5 ensures a charge above 50%. If APU is to be started on batteries then start within 30 mins of putting Batt Pb on AUTO (delay of more than 35 mins can lead to battery charge of <25% of max capacity).

APU	
• RMP ○ Power – ON ○ Nav Light - OFF ○ SEL Light OFF ○ FREQ – TUNE (communication frequencies) • ACP ○ INT Knob – Check Volume ○ VHF & HF (if req) – Check Transmission and Reception ¹ • APU ○ Fire Test – Perform ² ○ Start – Perform ³ ○ Bleed – ON (temperature as required) ⁴	

1. HF check only when no personnel in immediate vicinity & refueling operation.

2. Automatic shutdown of APU & discharge of APU fire extinguisher bottle may occur if APU FIRE test pb is pressed for more than 3 seconds. APU fire pb switch is lighted partially if AC power not available.

3. Use ground support & delay APU start. After master switch, wait 3s before selecting APU START pb. Keep external power on to reduce APU load especially in hot weather. Follow LIM-APU-Start/Shutdown during refueling/defueling.

4. Do not use APU bleed with LP or HP ground air unit connected. To determine if HP ground air unit is connected, check BLEED page to see if there is pressure in the bleed air system.

ADIRS

- ALL IR Modes – SEL to NAV
- A complete IRS alignment must be performed in the following cases:
 - Before the first flight of the day, or
 - When there is a crew change, or
 - When the departure airport is located between latitudes 2 ° North and 2 ° South, or
 - When the GPS is not available and the NAVAID coverage is poor on the expected route, or
 - When the GPS is not available and the expected flight time is more than 3 hours.
- A fast IRS alignment must be performed if:
 - A complete IRS alignment is not necessary and
 - Difference between IRS position & FMGC position is at or above 5 NM (Position Monitor Page).

LIGHT UP

- Cockpit Lights – As Required

EFB

- Check Version and Start Initialization.
- IPAD:
 - Jeppesen FD Pro – Check Updated.
 - Fly Smart Version – Check Updated.
 - Select QRH > A/C Registration (MSN) > Check Revision Date.
 - Digital Crew App:
 - Manuals – Check Updated.
 - Circulars – Check Updated.
 - Operator's Data – EO SID Check Updated.

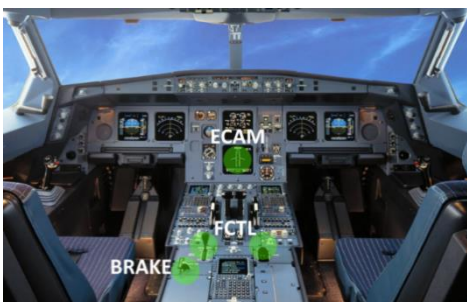
AIRCRAFT ACCEPTANCE

- Certificate of Airworthiness.
- RCL – Push for 3 second to recall all cleared/cancelled warnings.
- Technical Log – Check
- MEL/ CDL – Check and activate in the performance application.
- QRH:
 - OEB – Check
 - OPS > A/C CONFIG SUMMAR – Check
- A/C Acceptance – Perform
- In icing condition with OAT +3°C or below, check taxi-in time of the previous flight to determine the remaining taxi-out time before next engine acceleration for ice shedding (PRO-NOR-SUP-ADVWXR).

PRELIMINARY PERFORMANCE

- Airfield Data – Obtain
- Preliminary Performance – Compare OPT CONF vs CONF2 (STD) performance.
 - Compare: FLEX temp, V speeds, stop margin & 2nd seg climb grad using both FLEX & TOGA thrust.
 - Evaluate your priority: Lower EGT, earlier liftoff, shorter stopping distance, or better climb gradient.
 - Select the configuration: That best supports your chosen priority.
 - If no specific priority applies: Choose the higher flap setting if difference in FLEX temp is less than 3°C.
- NAV Charts – Prepare

BEFORE WALKAROUND

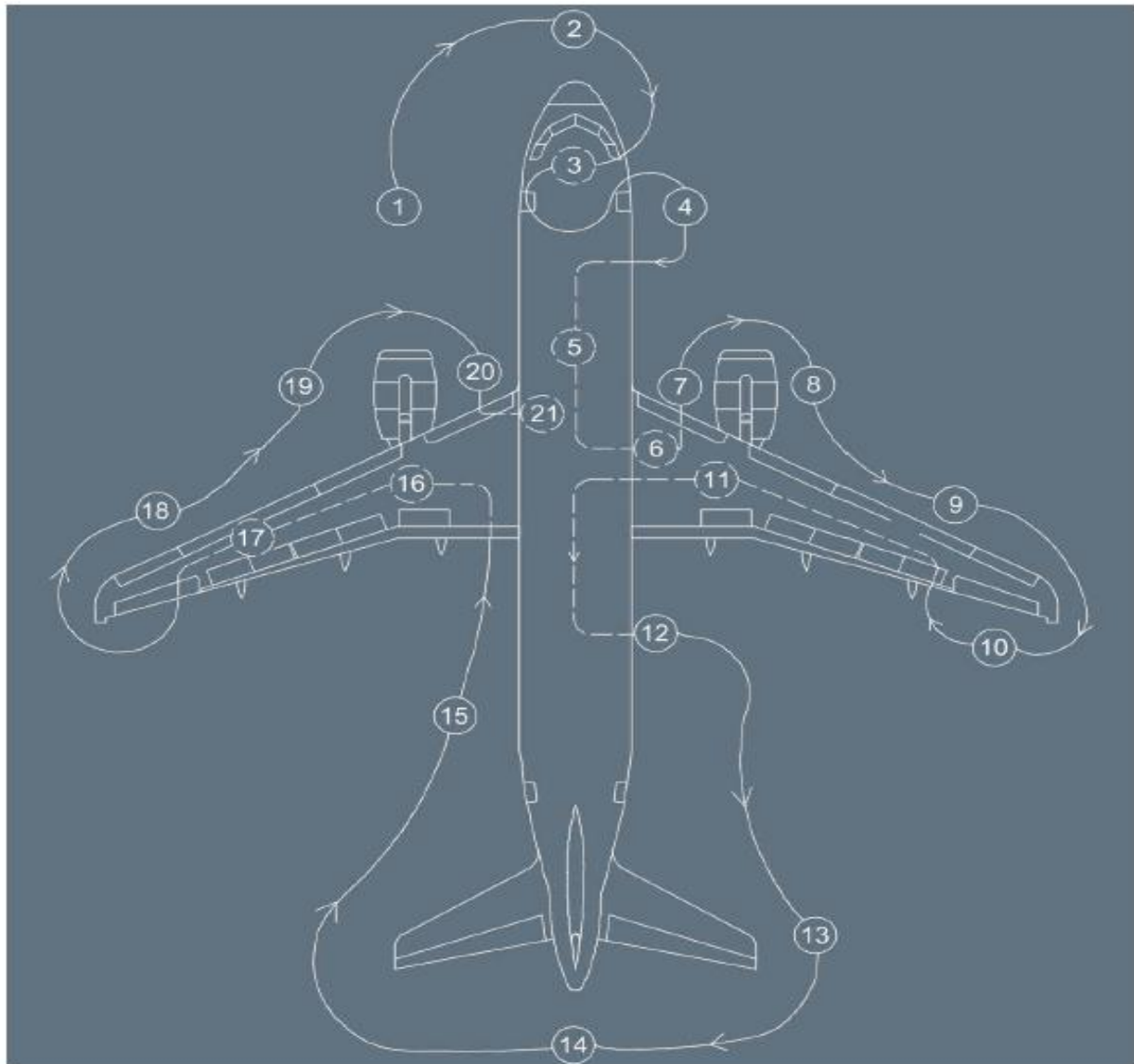


BEFORE WALKAROUND – SEATED	• ECAM SD PAGES: ○ ENG – Check Oil Quantity ¹ ○ HYD – Check Reservoir Fluid Level ² ○ DOOR – Check Oxygen pressure ³ • FCTL: ⁴ ○ Flaps – Confirm Flap position agrees with the handle position. ○ SPD Brake – Check retracted and disarmed. • Brakes: ○ Parking Brake: ▪ ACC Pressure – Check in Green ⁵ ▪ Parking Brake Handle – ON ⁶ ▪ Brake Pressure Indicator – Check Normal ○ Alternate Brake – Check: ⁷ ▪ Yellow Elec Pump – Off ▪ Chocks – On ▪ Parking Brakes – Off ▪ Brake Pedals – Press to Check Pressure on Brake Pressure Indicator ⁸ ▪ Brake Pedals Release – Parking Brakes ON
BEFORE WALKAROUND – STANDING	• Emergency Equipment – Check ⁹ ○ Life Jackets ○ Smoke Hoods ○ Gloves ○ Axe ○ Portable Fire Extinguisher ○ Oxygen Masks (goggles attached) ○ Escape Ropes • CB Panels – Check: ○ Overhead (49 VU) ○ Rear (121, 122, 123, 124, 125 VU) • Landing Gear Pins – Onboard and Stowed
1. FCOM Limitations ENG OIL. Oil quantity >9.5qt + Estimated Consumption (approx. 0.5 qt/h). 2. Fluid volume may change due to environmental conditions. If OAT is greater than 20°C, fluid level above normal range (up to half of normal range) is acceptable, else contact maintenance. 3. If half boxed in amber, refer to FCOM LIM-OXY Minimum Flight Crew Oxygen Pressure. 4. For a flight control surface/handle position disagree, check with maintenance before applying hydraulic power. 5. Use yellow electric pump to recharge if required. Yellow & Green systems required ground clearance before use. 6. With 1 brake > 500°C, or 350°C with brake fans ON, avoid parking brakes unless necessary. Parking brake must be on for exterior inspection to check brake wear indicators. 7. Check before first flight of the day. 8. Pressure must build up without delay symmetrically on left & right sides for the same application simultaneously applied on left & right pedals. With full pedal deflection, the pressure must be between 2000 and 2700 PSI. 9. Imagine yourself wearing a "Life Jacket" and a "Smoke Hood". Then putting on your "Gloves" with "Axe" in one hand and "Fire Extinguisher" in the other. You then use the "Rope" to exit the cockpit to breathe fresh "Oxygen".	

EXTERIOR WALKAROUND

Flight crew must perform a complete walkaround before each flight and ensure:

- General condition of the aircraft is satisfactory.
- Visible aircraft components and equipment are safe.
 - No impact/damage to the structure.
 - No evident fuel, oil, or hydraulic leak.
 - All ground access doors are closed.
- Parking brake must be ON in order to check the brake wear indicators.



BEFORE BOARDING CLEARANCE

CM1			CM2															
Man			Check															
Cabin Crew Briefing <table border="1"> <tr> <td>A</td> <td>Air Travel</td> <td>Taxi & Flight Time, Routing, FL & WX.</td> </tr> <tr> <td>B</td> <td>Baggage</td> <td>Baggage & seating related CG issues.</td> </tr> <tr> <td>C</td> <td>Communication</td> <td>Intercom, discrete code & cockpit door.</td> </tr> <tr> <td>D</td> <td>Documents</td> <td>Valid crew (cabin/cockpit) documents.</td> </tr> <tr> <td>E</td> <td>Emergencies</td> <td>Evacuation, emergency descent etc.</td> </tr> </table>			A	Air Travel	Taxi & Flight Time, Routing, FL & WX.	B	Baggage	Baggage & seating related CG issues.	C	Communication	Intercom, discrete code & cockpit door.	D	Documents	Valid crew (cabin/cockpit) documents.	E	Emergencies	Evacuation, emergency descent etc.	<u>Aircraft Onboard Documents</u> • Certificate of Registration • Certificate of Airworthiness • Air Operator Certificate • Insurance Certificate • Certificate of Radio Installation • Mobile Wireless License • Weight Certificate • Noise Certificate • RVSM Certificate • IPAD Approval • Fuel Carnet • Residual Disinfection Certificate • Dent and Repair Chart • Emergency Equipment Location Chart • GACA Foreign Operator Authorization <u>Other</u> • SAFA checklist * • Misc. Blank Forms File • Latest revision record (within 20 days) • Flight Pack List
A	Air Travel	Taxi & Flight Time, Routing, FL & WX.																
B	Baggage	Baggage & seating related CG issues.																
C	Communication	Intercom, discrete code & cockpit door.																
D	Documents	Valid crew (cabin/cockpit) documents.																
E	Emergencies	Evacuation, emergency descent etc.																
Machine • Technical Status																		
Environment • Weather conditions • Cabin Status (temperature, catering etc.)																		

* SAFA (Safety Assessment of Foreign Aircraft) CHECKLIST

RAMP INSPECTION CHECKLIST									
Date:		Flight No:		Sector:					
Station:		A/C Reg:		A/C Type:					
Prepared by Safety & QA	FLIGHT DECK			Checked					
	A01	General Condition..... Cleanliness & tidiness	☐	Procedures					
	A03	Emergency Equipments..... As per FCOM	☐	Aircraft Equip					
	A04	OM, Jeppesen /ipad..... Upto date	☐	Crew Item					
	A05	Checklists/QRH..... Upto date	☐	Aircraft Docs					
	A07	MEL..... On board / ipad	☐	Crew Item					
	A08	Certificate of Registration..... Doc Folder	☐	Aircraft Docs					
	A09	Noise Certificate CAA (PAK)..... Doc Folder	☐						
	A10	AOC..... Valid & Doc Folder	☐						
	A11	Radio License..... Valid & Doc Folder	☐						
	A12	Certificate of Airworthiness Valid & Doc Folder	☐						
	A13	Operational Flight Plan..... Approved, signed by PIC & proof of Fuel scoring on FPL	☐						
	A14	Mass & Balance Manual..... Upto date	☐						
		Load (Trim) sheet Accuracy	☐	Aircraft Docs					
	A17	Harness..... For each Flight crew including Torso restrain for pilots	☐	Aircraft Equip					
	A19	Flash Light (Torch)..... For each crew & serviceability	☐						
	A20	Flight Crew License..... Available	☐	Crew Item					
	A21	Flight Log Book /ipad Available	☐						
	A22	Maintenance Release & Boxes filled..... Proper documentation of Maint. Work & signed off Captain's acceptance	☐	Aircraft Docs					
	A23	Defect Notification & rectification..... C/F items as per MEL chapter, category & time limit mentioned in Tech Log including Placarding. C/F summary list signed off	☐						
	A24	Preflight Inspection..... Complete	☐	Procedures					
	Captain / First officer <table border="1"> <tr> <td>Name</td> <td>Signature</td> </tr> <tr> <td></td> <td></td> </tr> </table>					Name	Signature		
	Name	Signature							

S&QA/06/SAFA/2017(OPS)
Rev. 04 (26th Oct., 2017)
(IA)

CREW ITEMS

1) IPAD
2) DOCS
3) TORCH

AIRCRAFT DOCS

1) TECH LOG
2) DOC FOLDER
3) CHECKLISTS
4) FLIGHT PLAN
5) TRIM SHEET

AIRCRAFT EQUIP

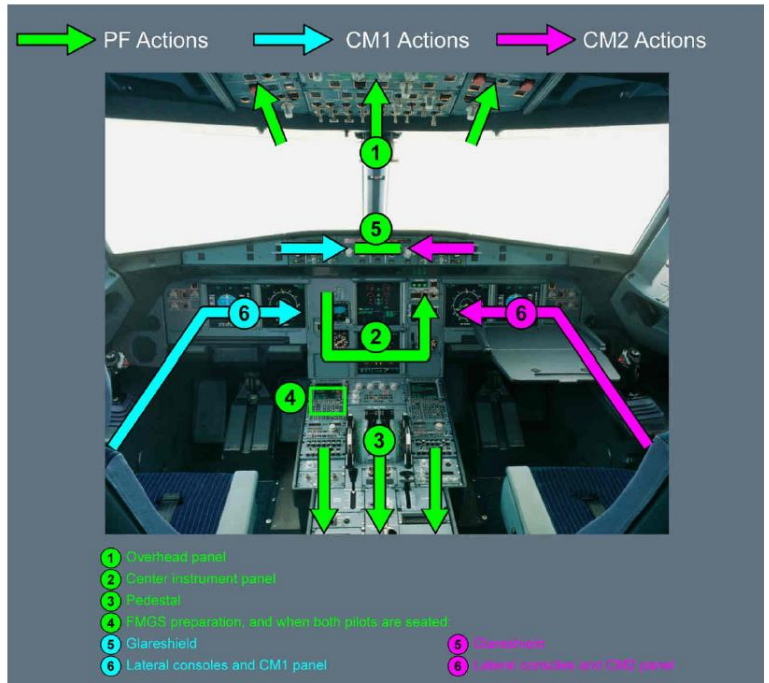
1) HARNESS
2) EMER EQUIP

PROCEDURES

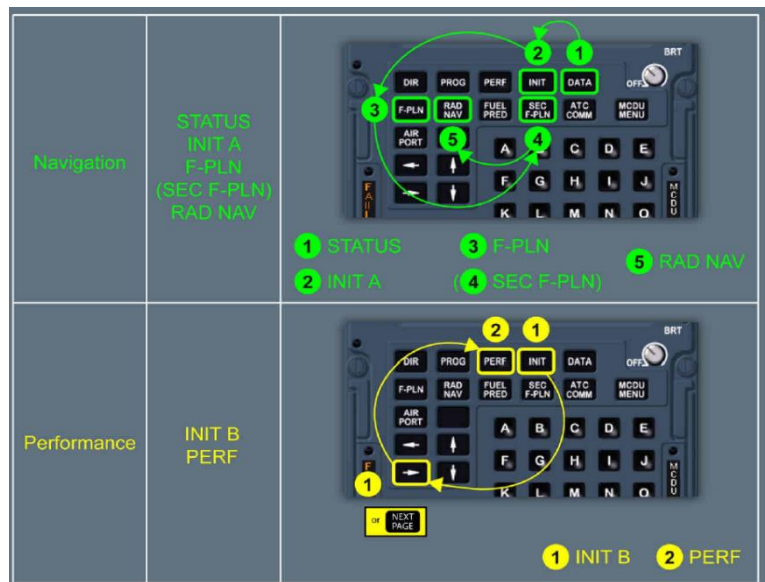
1) CLEAN COCKPIT
2) PROPER PREFLIGHT

COCKPIT PREPARATION

- A fast **IRS alignment** must be performed if a complete IRS alignment is not necessary and the difference between the IRS position and the FMGC position is at or above 5 NM.
- Pack Flow:** LO if the number of occupants is below 141 and HI for abnormally hot and humid conditions.
- BAT buttons OFF then ON to initiate a charging cycle. After 10 secs **charging current** should be < 60 A & decreasing. If not, then after the end of the charging cycle perform this check again.
- If center tank is < 200 kg for the flight and if affected by FUEL CTR TK PUMPS LO PR cautions the set FUEL MODE SEL to MAN and CTR TK PUMPS to OFF. If the FUEL MODE SEL is unduly left in the MAN position on ground, when CTR TK PUMPS or CTR TK XFR pb-sw are not in the OFF position then there is a possibility of fuel spillage. Do not transmit on HF during refueling, defueling or fuel transfer. Only perform HF radio checks when appropriate (i.e. no personnel in the immediate vicinity).



- Third **ACP PA knob** on RECEIPT allows CVR recording of cabin announcements. Set volume $\geq$ medium range.
- Use of the ISIS bugs function is not recommended.
- If clock date is incorrect set it manually and keep the mode to internal (INT) for the whole flight. **Clock date initialization must be completed in less than a minute** otherwise, CFDS will have to be reset by a maintenance procedure in order to synchronize the lower ECAM time display with the cockpit clock display. For time precision keep the clock in GPS or INT by syncing it with GPS at least once per day.



- Insert the weights in **FMGC** after completing all other insertions to avoid cycles of prediction computations.
- Thrust Reduction Altitude – 1000 feet AAL. Acceleration Altitude – 3000 feet AAL.
- Cost Index – As mentioned in the flight plan. Keep a track of latest circulars.
- Check the accuracy of tropopause value to ensure accuracy of FMS predictions.
- Do not engage autothrust on ground, as it may generate the AUTO FLT A/THR OFF warning at engine start.
- Note **altimeter readings** (QNH) on the CFP. Maximum altitude difference between:
 - PFD and PFD = ± 20 feet.
 - PFD and Elevation = ± 75 feet (RVSM tolerance).
 - PFD and ISIS = ± 100 feet.

- To prevent hearing damage while performing oxygen mask test, inform ground crew connected to the intercom system that a loud noise may be heard in the headset. After testing, check that there is no **REGUL LO PR** message on **DOOR/OXY** page. Due to residual pressure between the LP valve and oxygen masks, an LP valve failed in the closed position may go undetected during oxygen masks test. Absence of **REGUL LO PR** message ensures that LP valve is open.
- PERF APPR QNH Field – INSERT
- EFB / MCDU GEEN DOT – COMPARE (PM compares green dot speed computed by FMGS and Performance Application. A discrepancy indicates different TOW in both systems.
- Check that CAB PRESS page displays **LDG ELEV AUTO**.
- Check on STS page if **INOP SYS** display is compatible with MEL.
- Check **IRS alignment** on POSITION MONITOR page. Distance between each IRS and the FMS position should be lower than 5 NM. Confirm on ND aircraft position with that of airport, SID and surrounding NAVAIDs.
- Releasing the parking brake prevents the critical structures from being exposed to high temperature levels for an extended time. However, if operational conditions require (e.g., slippery tarmac), parking brake may remain applied.

DEPARTURE DISCUSSION

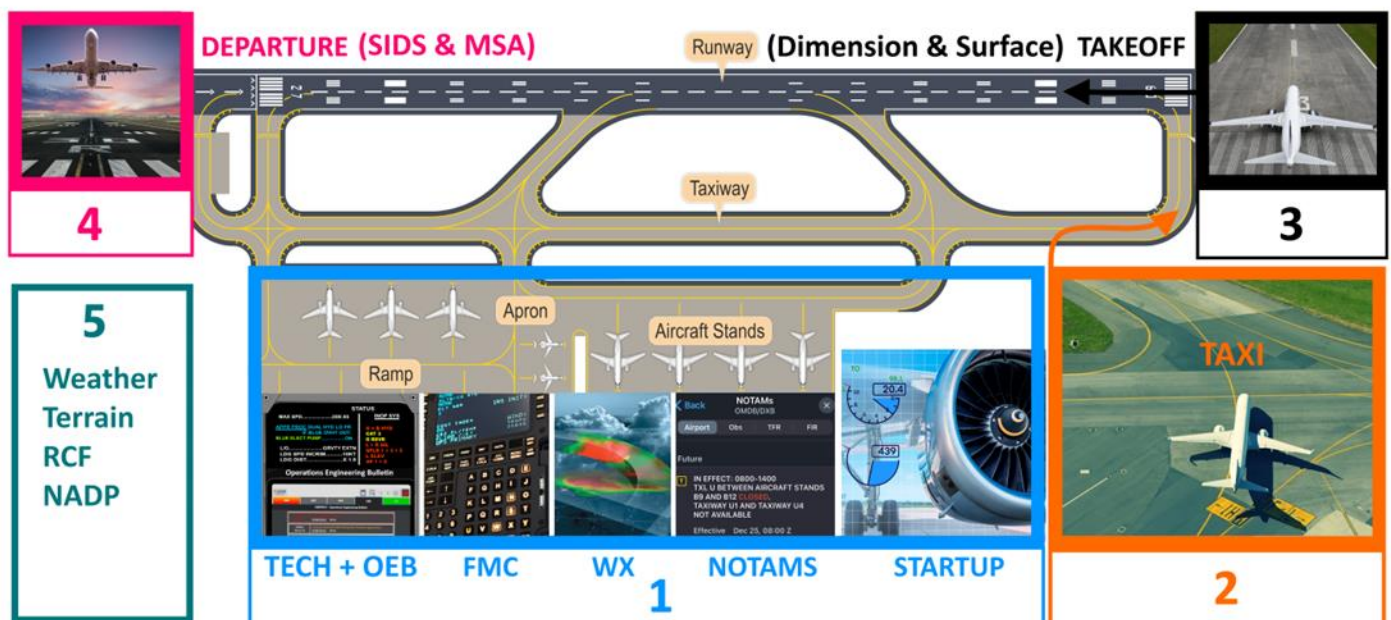
The main purpose of a discussion is that all team members should have the same game plan to achieve the target which in this case is a safe flight from A to B. The game plan in this case comprises of:

- Identifying threats.
- Identifying deviations from routine line operations.
- Agreement on: “Actions to Mitigate Identified Threats” and “Strategies to Tackle Deviations”.

Instead of giving too much importance to “which crew (PF or PM)” will brief “which element” and losing the bigger picture, it is important to keep the discussion interactive and in a logical sequence so that in the end everyone has the same mental image regarding the game plan.

DISCUSS YOUR WAY OUT: YOUR PRE-FLIGHT POWER MAP

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DEPARTURE DISCUSSION

AIRCRAFT	- FMS - DATA Page - A/C & Engine Type - APD & Nav Database Date - FMS INIT- B Page - Block Fuel (FOB on EWD) - TOW & LW - Extra Fuel/Time at Destination - PERF TAKEOFF Page - TO RWY - TO CONF - Flex / TOGA - V1, VR, V2 - Transition Altitude - Thrust Reduction / ACC Altitude - F-PLN & PROG Page - Route Waypoints - Time, Distance and Fuel - Strategy in secondary flight plan
WEATHER & NOTAMS	- Airfield weather and applicable procedures - Applicable NOTAMS and procedures
STARTUP & TAXI	- ATC Procedures (push and start procedures) - A/C Procedures (engine start etc.) - Routing to the anticipated runway
RUNWAY	- Dimensions (Length, Width, Stopway) - Surface Condition - Lighting - Packs / Anti ice – On/Off Takeoff
DEPARTURE	- Normal SID – Routing and Constraints - Engine Out SID – Routing and Constraint - Navigation Frequencies to be used (RAD NAV) - MSA
SPECIAL PROCEDURES	- NADP - Vicinity Weather - Terrain - Failures (Communication, Technical etc.) - Contingencies – DGR, EO, Memo Items etc.

A320-200

ENG
V2527-A5

ACTIVE NAV DATA BASE
10MAR-06APR UAL7110301

SECOND NAV DATA BASE
←10FEB-09MAR

CHG CODE
UAL

IDLE/PERF
+0.0/+5.4

SOFTWARE
STATUS/XLOAD>

INIT FUEL PREDICTION ↔

TAXI 0.7 ZFW/ZFWCG 123.6/32.6

TRIP/TIME 23.3/0408 BLOCK 30.2

RTE RSV/ % 0.0/0.0

ALTN /TIME ---, /---

FINAL /TIME 4.0/0045 TOW/ LW 154.8/131.5

MIN DEST FOB 4.0 TRIP WIND HD000

EXTRA/TIME 2.9/0033

TAKE OFF

V1 128 FLP RETR F=143 RWY 14R

VR 133 SLT RETR S=188 TO SHIFT (FT) []

V2 136 CLEAN O=202 FLAPS / THS 1/DN0.7

TRANS ALT 5000 FLEX TO TEMP 15°

THR RED/ACC 1990/1990 ENG OUT ACC 1990

UPLINK < TO DATA NEXT PHASE >

FROM
FIST5A
LFB014R
H144°
900
C144°
D144H→
C356°
TOU
(SPD)
(LIM)
DEST
EGLL27R

UTC
0000
BRG144°
0000
TRK144°
0002
0005
0005

THV001 ↔
SPD/ALT
141/ 490
153/ 900
/ 4
/ 3130
250/ FL85
250/ FL100

DIST
532

EF0B
4.4

CLIMB THV001

CRZ FL360 OPT FL360 REC MAX FL385

<REPORT

BRG /DIST
123° /1.7

PREDICTIVE
<GPS
REQUIRED ACCUR ESTIMATED
1.00NM HIGH 0.08NM

TO LFB014R
GPS PRIMARY

DIR PROG PERF INIT DATA

F-PLN RAD NAV FUEL PRED SEC F-PLN MCDU MENU

SEC INDEX
←COPY ACTIVE
<SEC F-PLN PERF>

Strategy Review

DEPARTURE BRIEFING AS PER AIRBUS OPERATIONAL PHILOSOPHY (FCTM)

PF	PM
Cockpit door closed - Set an environment with no distraction	
<i>Basically all the Normal Stuff</i>	Plan - T.O RWY (Intersection) - SID designator - First cleared altitude - MSA/MORA for climb trajectory - Extra fuel and time
Plan - Hotspots of planned taxi route - Stop margin for RTO - EOSID - Return/diversion considerations - Special operation - Non-standard operation	<i>Basically all the Abnormal Stuff</i>
Identified THREATS	
  Airport Briefing > Identified Hazards >	
MITIGATIONS (Strategies + Revision of applicable memo items etc.)	
MISCELLANEOUS	

EMERGENCY BRIEFING

- This will be left/right hand seat takeoff.

Failure Before 100 Knots or V1

- For any failure before 100 knots or V1, clearly CALL OUT THE MALFUNCTION and I will call STOP or GO.
- If the call is STOP, I will apply the REJECTED TAKEOFF PROCEDURE and bring the aeroplane to a complete stop.
- I will set the PARKING BRAKE and call "ATTENTION CREW AT STATIONS".
- You will monitor REV GREEN and DECEL and silence any AURAL WARNING and inform ATC.
- Thereafter you will carry out ECAM actions on my command.
- IF EVACUATION is required, we will carry out the "Emergency Evacuation Checklist".

Failure After V1

- For any failure after V1, takeoff will be continued and NO ACTION BEFORE 400 feet AGL EXCEPT silencing of any AURAL WARNING and GEAR UP.
- Reaching 400 feet AGL, ECAM actions on my command.
- For engine failure / damage / fire, when ENGINE IS SECURED: Stop ECAM. Reaching 1500 feet AGL, push VS to Level Off, Accelerate and Cleanup.
- If ENGINE IS NOT SECURED: Continue climbing until engine is secured but ensure to accelerate at Max Engine out acceleration altitude, even if the engine is not secured.
- At GREEN DOT OPEN CLB, select MCT.
- Continue ECAM, check STATUS and consider RELIGHT.
- Follow (a) EO Routing (b) Radar Vectors (c) Immediate Turn Back.

REJECTED TAKEOFF:

Before 100 knots (Less serious. Abort is at Captain's discretion depending on the circumstances)
Any ECAM Warning / Caution.
Between 100 knots & V1 (More Serious. Be go minded except for a few situations, as mentioned below)
Severe damage
Fire warning
Sudden loss of engine thrust
Malfunctions / Conditions indicating that aircraft will not fly safely
Any ECAM is triggered
Tire failure within 20 knots of V1: Unless debris from tire causes noticeable engine parameter fluctuation, takeoff, reduce fuel load & land with full RWY length available.
Windshear.
Note: Exceeding EGT red line or nose gear vibration should not result in an abort above 100 knots *

* FCTM > Abnormal and Emergency Procedures > MISC > Rejected Takeoff.

COCKPIT PREPARATION	
GEAR PINS & COVERS.....	REMOVED
FUEL QUANTITY.....	KG/LB
SEAT BELTS.....	ON
ADIRS.....	NAV
BARO REF.....	(BOTH)



BEFORE PUSHBACK AND START CLEARANCE

	PF	PM
Seat Position	Adjust	
Fuel ¹	Cross Check on 2 Screens (ECAM FOB + SD) and 2 Documents (Flight Plan + Load Sheet)	
Load Sheet ²	Check / Revise	Check / Cross Check
FMS Takeoff Data	- Final Performance Data – Recompute - FMS Takeoff Data – Revise	- Final Performance Data – Recompute - FMS Takeoff Data – Cross Check - EFB/MCDU Green Dot – Compare ³
MCDU	FMS PERF TO Page	FMS F-PLN Page
External Power		Check AVAIL – Disconnection Request ⁴
Airconditioning		Disconnection – Request

1. Check computerized fuel figures for gross errors (Ref: Flight Plan Tables in FCOM performance). Also check that "Last Flight FOB + Uplift = Current FOB". Discrepancy allowed is 400 Kg for refueling up to 6 tons, 500 Kg between 6 and 12 tons and 600 Kg for more than 12 tons. Discrepancies above these figures require maintenance action.

2. Actual ZFW > Estimated ZFW by 2000 Kgs requires a new flight plan (OETB: FLT OPS/TECH/14/ Fri Apr 21 2017). No change in CG is required if passenger or weight changes (loading/off-loading) are restricted to (a) 1 passenger with baggage in Zone A or D OR (b) 2 passengers with baggage in zone B or C OR (c) 50Kg in forward or rear hold OR (d) 100 Kg in aft hold (Ref: Weight Report). CM2 will announce ZFW and ZFWCG, which will be inserted in FMS by CM1. CM2 will also announce TOCG and TO FUEL. CM1 will announce TOW from FMS and CM2 will confirm from Load Sheet. CM1 will cross check, record time and sign when all formalities are completed.

3. A discrepancy in Green Dot speed computed by FMGS and TAKEOFF application indicates a difference in TOW used in both systems.

4. Disconnection of external power with the EXT PWR pb ON may cause injury to the ground engineer.

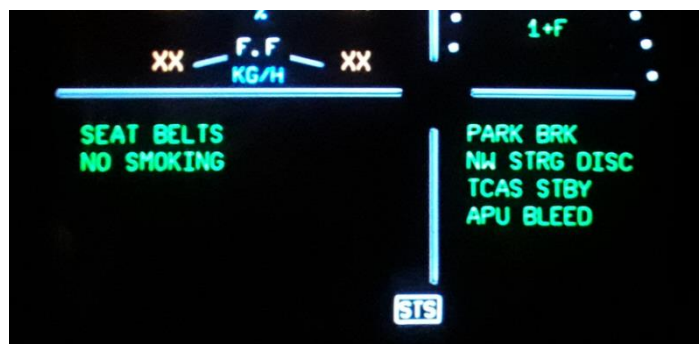
AT PUSHBACK AND START CLEARANCE

	PF	PM
Push / Start Clearance		From ATC & Ground ¹
Beacon	ON	
ATC Transponder		Set as Required
Windows / Doors ²	Check Closed	Check Closed PA Announcement ³
Slides ²	Check Armed	
Thrust Levers	Idle	
ACCU Press. Indicator	Check	
Pushback Required	NWS STRG DISC MEMO – Displayed ⁴	
	Before Start Checklist	
	Parking Brake – OFF ⁵ Announce – OFF Blocks Time	Note – Time Clock – Start
	Pushback Completed – Parking Brake ON Brake Pressure – Check Tow Bar – Disconnect	
Pushback Not Required	Parking Brake – ON Brake Pressure – Check	
	Before Start Checklist	
Checklist	BEFORE START PARKING BRAKE..... T.O SPEEDS & THRUST..... (BOTH) WINDOWS.....CLOSED (BOTH) BEACON.....ON	

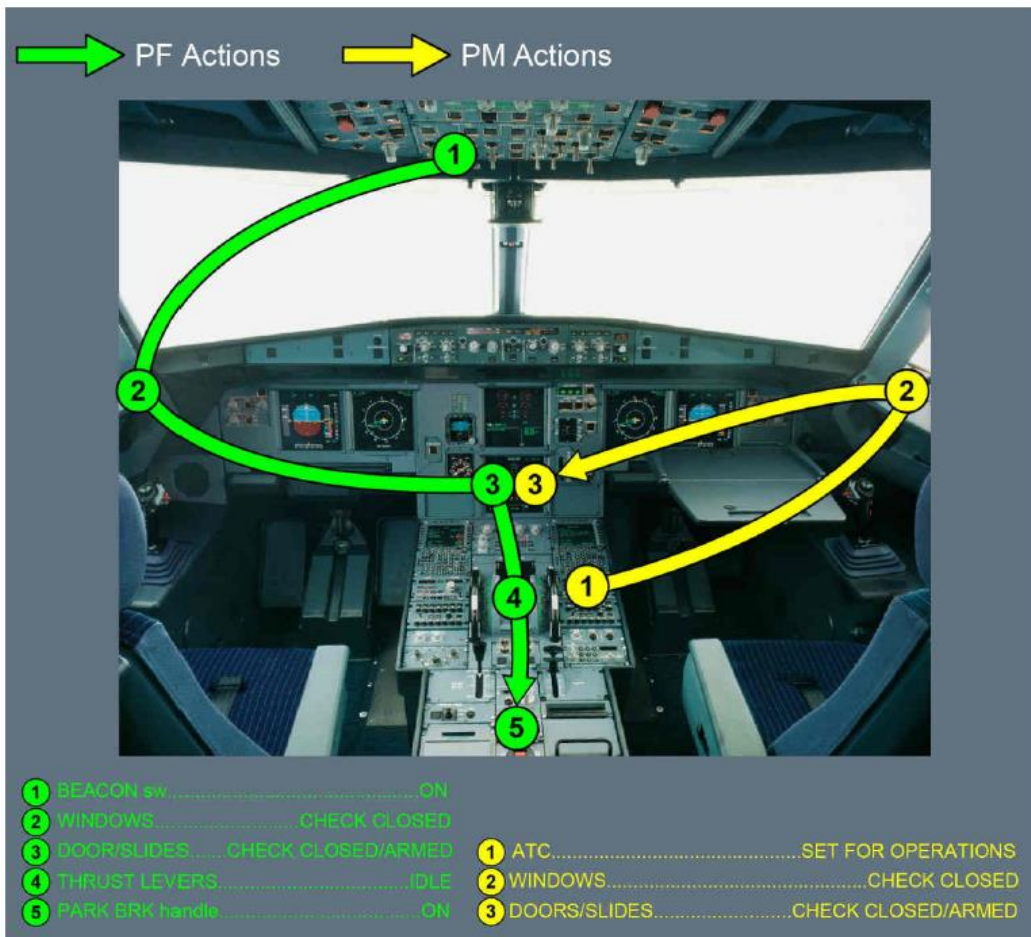
1. Confirm if they are ready and communicate to them start sequence and ATC push back clearance.
2. For sliding window check red indicator on its handle and for doors and slides check lower ECAM display.
3. “Cabin crew prepare for departure, arm the door slides and cross check”
4. If this message is not displayed but ground crew confirms that NWS bypass pin is in towing position, then do not start engine during pushback (to avoid possible nose landing gear damage upon green hydraulic pressurization). Ref to MEL (NWS Electrical Deactivation Box) for dispatch. In case of a power push, NWS selector should remain in normal position for steering (Ref: PRO-NOR-SUP-MISC-D Pushback with Power Push Unit).
5. When asked by ground crew.

 Before push and start, a quick look at the memo section of E/WD gives some great clues for do items that can be sometimes missed.

- 1) PARK BRK – Self-explanatory (covered by checklist).
- 2) NW STRG DISC – Refer to footnote no 4 above.
- 3) TCAS – As required at some aerodromes.
- 4) APU – Reminder to disconnect the GPU & AC Van.



BEFORE START FLOW PATTERN



ENGINE START – MANUAL

STARTUP COCKTAIL	
MANUAL ENGINE START WITH EXT PNEUMATIC & ELEC POWER FOLLOWED BY CROSS BLEED ENG START IN NORMAL AUTO MODE	
<u>BEFORE START</u> - PACKS – Both OFF - APU and ENG Bleeds – ALL OFF - X BLEED – OPEN <u>ENG 2 START</u> - ENG MAN START Pb – ON - N2 22% (or max motoring, min 20%) – ENG MASTER ON - EGT – Check increasing within 15 seconds - N2 50% – Check start valve closure (between 50-56%) - ENG MAN START Pb – OFF <u>AFTER ENG 2 START</u> - EXT POWER – Deselect to AVAIL & Disconnect - EXT Pneumatic – Remove - PACKS – Both ON - ENG Bleed 2 – ON	<u>ENG 1 START</u> - Area – Clear - ENG 2 Thrust – Adjust (for 30 psi) - ENG 1 – Start (normal auto mode) <u>AFTER ENG 1 START</u> - THRUST – Idle - X BLEED – AUTO - ENG BLEED 1 – ON <i>Note: This is a “Read and Do” Supplementary Procedure in FCOM</i>

ENGINE START – AUTOMATIC¹

	PF	PM
Thrust Levers ²	Idle	
Engine Mode Selector	IGN / Start	
Engine 1 Start	Announce	
Engine 1 Master Switch	ON ³	
Sequence of Events	Monitor: • N2 Increases – Start Valve Inline, Bleed Pressure Green, Oil Pressure Rises. • N2 16% – Indication of Active Ignitor A or B. • N2 22% – FF Increases (may cross approx. 200 Kg/h). • EGT & N1 – Increases within 15s (max) after fuel is ON. • N2 50% – Start valve closure starts & Igniter indication Off.	
Idle Parameters	Approx: ⁴ • N1 – 20%. • N2 – 60%. • EGT – 400°C. • FF – 300 Kg/h. • Grey Background on N2 Indication Disappear ⁵	
After Engine 1 Start	Follow Procedures For: • All Engines Taxi • One Engine taxi	

1. Manual starting (FCOM PRO-NOR-SUP-ENG – CM2 reads & CM1 acts) is recommended in following cases:

- After a Start Abort, due to:
 - Engine Stall
 - Engine EGT Over Limit
 - Low Start Air Pressure
- When Expecting a Start Abort, due to:
 - Degraded bleed performance in hot and high conditions
 - High Residual EGT / Reduced EGT margin in hot and high conditions
 - Marginal performance of external pneumatic cart
 - Intermittent ECAM ENG IGN FAULT during first start of the day
- A Dry Crank is performed

2. Engines start regardless of the thrust lever position. However, thrust rapidly increases to the corresponding thrust lever position causing a hazardous situation if thrust levers are not set to IDLE.

3. ON when all amber crosses & messages have disappeared from engine parameters (on upper ECAM) and bleed pressure is available (on lower ECAM). In case of electrical supply failure during start (loss of ECAM DUs), abort start and perform a 30s dry crank.

4. Approximate ISA Sea level values rounded off to memorize easily.

5. During start if fuel leak is reported from the engine drain mast, run the engine at idle for 5 min. If leak does not disappear then maintenance action is required.

AFTER START PROCEDURE FOR ALL ENGINE TAXI

	PF	PM										
Engine 2 Start ¹	Announce											
Engine 2 Master Switch	ON ²											
Idle Parameters	Check ³											
Engine Mode Selector	Normal ⁴											
APU Bleed	OFF ⁵											
Eng 1 + 2 Anti-ice	As Required ⁶											
Wing Anti-ice ⁷	As Required											
APU Master Switch	OFF (if not required)											
Ground Spoilers		Arm										
Rudder Trim		Reset Pb Press – Check Neutral										
Flaps		Takeoff Position ⁸										
Pitch Trim Handwheel		Set										
ECAM Status	Check Not Displayed – If displayed then check ECAM status											
N/W STEER DISC MEMO	Check – Not Displayed											
Ground Crew	Announce: “Clear to Disconnect” “Hand Signal on the Left / Right”											
Checklist ⁹	<table><tr><th colspan="2">AFTER START</th></tr><tr><td>ANTI ICE.....</td><td></td></tr><tr><td>ECAM STATUS.....</td><td>CHECKED</td></tr><tr><td>PITCH TRIM.....</td><td>%</td></tr><tr><td>RUDDER TRIM.....</td><td>NEUTRAL</td></tr></table>		AFTER START		ANTI ICE.....		ECAM STATUS.....	CHECKED	PITCH TRIM.....	%	RUDDER TRIM.....	NEUTRAL
AFTER START												
ANTI ICE.....												
ECAM STATUS.....	CHECKED											
PITCH TRIM.....	%											
RUDDER TRIM.....	NEUTRAL											

1. Sequence of events and idle parameters – Same as for engine 1.

2. PTU FAULT is triggered, if the last engine is started within 40s following the end of the cargo doors operation. The warning can be reset by switching the yellow ELEC pump ON, then OFF.

3. Both pack valves reopen with 30 s delay after the second engine N2 is above 50 %.

4. This is a cue to do “After Start” procedure.

5. This action enables to avoid ingestion of engine exhaust gases. If APU is necessary for performance purpose then bleed can be selected ON before takeoff.

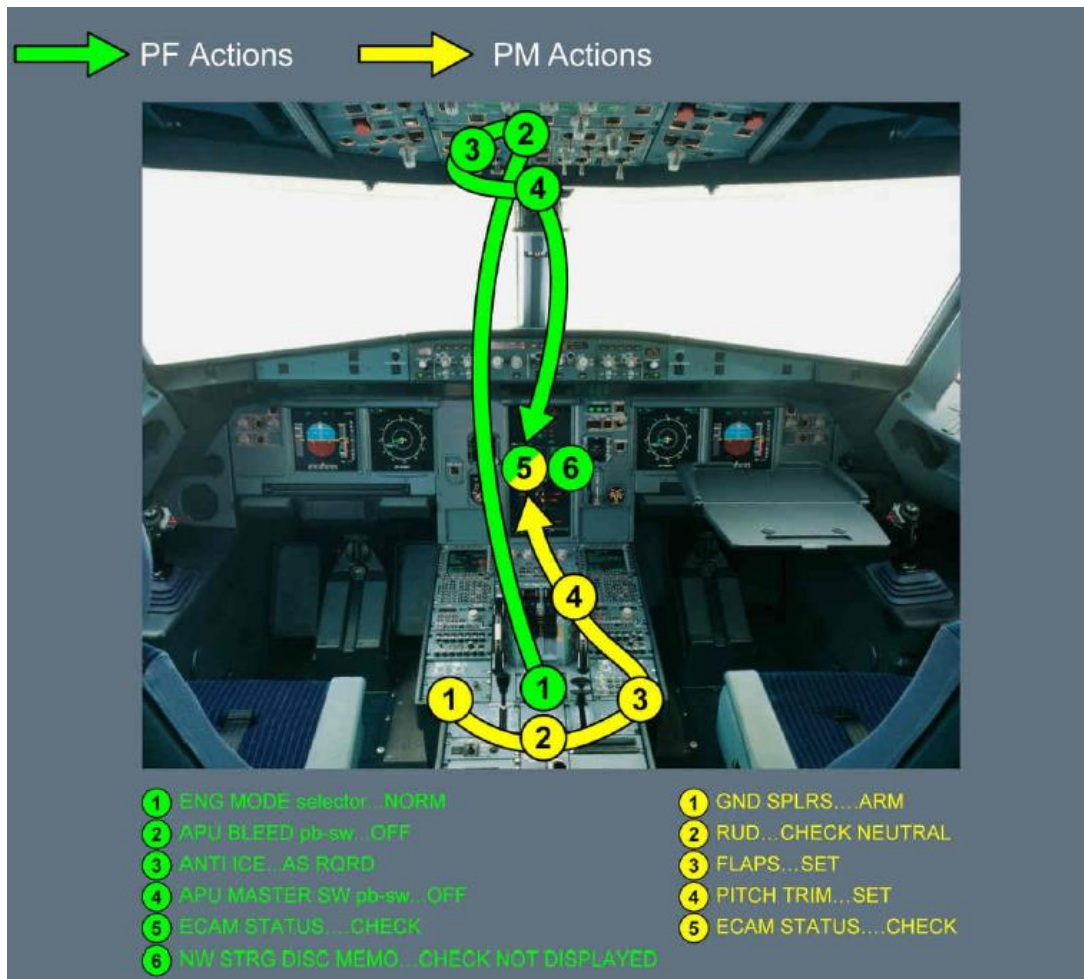
6. Must be ON during all ground operation, when icing conditions (OAT/TAT < 10°C with visible moisture) exist or are anticipated. During ground operation in icing conditions with OAT +3°C or less, carry out ice shedding procedure from PRO-NOR-SUP-ADVWXR – ENGINE OPERATIONS ON GROUND IN ICING CONDITIONS.

7. APU bleed not authorized for using wing anti ice. In icing conditions, wing anti-ice **may be** turned on to prevent ice accretion on the wing leading edge. It **must be** turned on if there is evidence of ice accretion, such as ice on the visual indicator, or on the wipers, or with the SEVERE ICE DETECTED alert. Ice accretion is considered severe when the ice accumulation on the airframe reaches approximately 5mm thick or more.

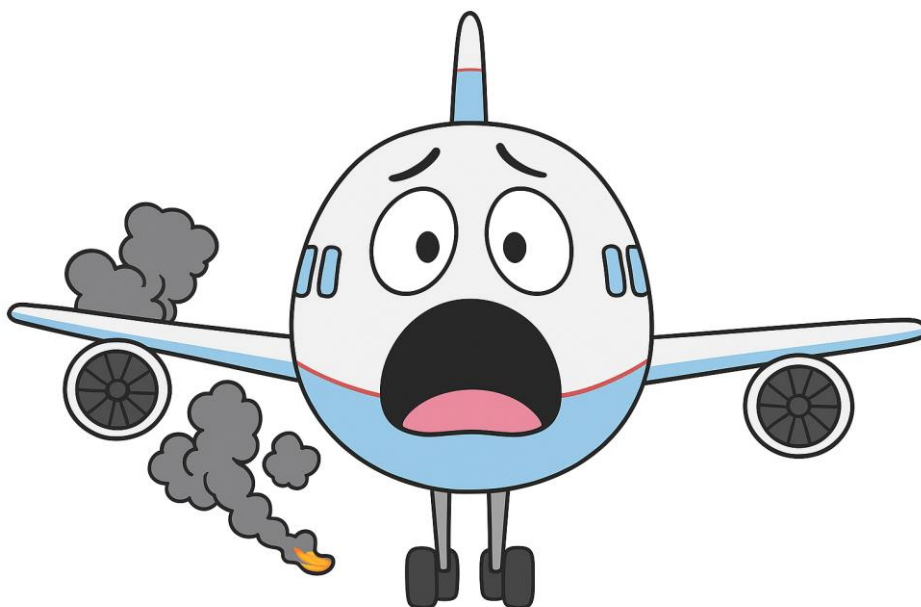
8. In icing conditions with rain, slush or snow, maintain flaps retracted until takeoff point.

9. After receiving the hand signal from the ground crew, CM1/CM2 will call "HAND SIGNAL RECEIVED AND BYPASS PIN SIGHTED". Then CM1 will ask for "AFTER START CHECKLIST".

AFTER START FLOW PATTERN FOR ALL ENGINE TAXI



After start, to avoid thermal shock, operate the engine at idle or near idle for at least 2 min before advancing the thrust lever to high power. Taxi time at idle may be included in the warm-up period.



ALL ENGINES TAXI AT DEPARTURE ¹

		PF	PM
PRE-REQ	Flight Controls	Check Flight Controls Before or During Taxi	
	Taxi Clearance		Obtain
	Taxi / Turn Off Light	ON ²	
	Area Clearance	Call: "Clear Left Side"	Call: "Clear Right Side"
	Parking Brake	OFF – Brake Pressure Zero ³	
	Brake Pedals	Press & Call: "BRAKE CHECK"	Call: "PRESSURE ZERO" ⁴
	Brake Fans		As Required
CLEARANCE	ATC Clearance		Confirm
	AFS / Flight Instruments		FMS F-PLN (SID, TRANS) Initial CLB SPD & SPD Limit
			FCU Cleared Altitude HDG Preset
			FD Both ON
			PFD / ND – Check (Airspeeds, Altitude, Heading, FMA, SID)
	Departure Briefing	Confirm	
DO ITEMS	Auto Brakes		AUTO BRK MAX ON
	ATC Code / Mode		Confirm / Set
	Engine Mode Selector		As Required ⁵
	Weather Radar		Radar – ON / ALL ⁶ Predictive Windshear – Auto / ON
	Terrain on ND	As Required – However, consider Radar on PF side & Terrain on PM side	
	Final Check		TO Config – Test TO Memo – Check No Blue
		"CABIN SECURED FOR TAKEOFF" – Report Receive	
	Taxi Checklist	TAXI FLIGHT CONTROLS..... CHECKED (BOTH) FLAPS SETTING..... CONF ____ (BOTH) RADAR & PRED W/S..... ON & AUTO / ON & ON ENG MODE SEL..... ____ ECAM MEMO..... T.O NO BLUE - AUTO BRK MAX - SIGNS ON - CABIN READY - SPLRS ARM - FLAPS T.O - T.O CONFIG NORMAL CABIN..... READY	

1. Operate the engine at or near idle for at least 2 mins before advancing to high power. Taxi time at idle may be included in the warm up period. Speed 20 knots on straight taxi routes and for turns of 90° or more, speed less than 10 knots. Accelerate to 30kts, then one smooth brake application to decelerate to 10kts. The aircraft is correctly aligned when the centerline is lined-up between the PFD and ND. A/C needs a runway width of 30M (98 feet) for a 180° turn. The GS for the entire maneuver should be between 5 to 8 kts, to prevent the width of the turn from increasing.

2. PF may request PM to set exterior lights.

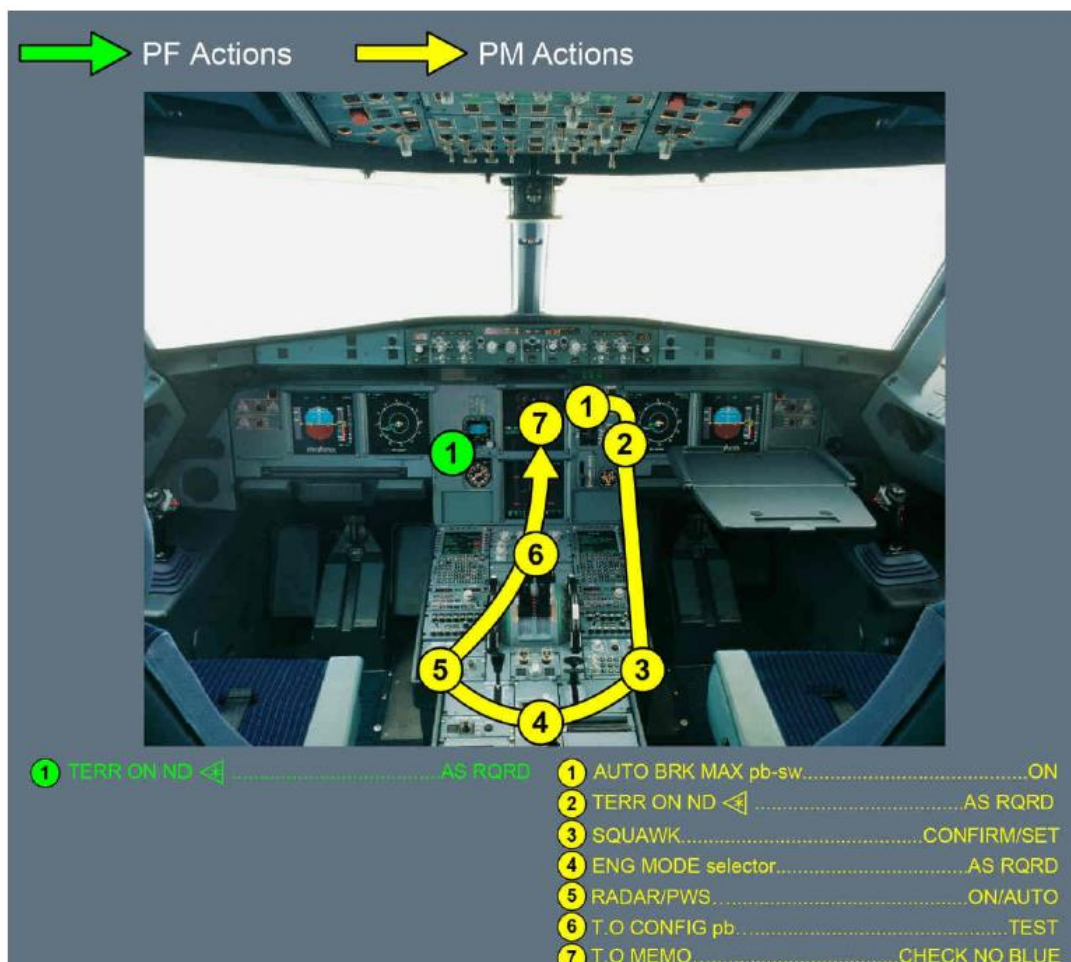
3. There may be slight residual pressure for a short time.

4. No pressure on triple gauge. If parked in wet conditions for long, first brake application at low speed is less effective.

5. Select IGN in heavy rain, standing water on runway or heavy rain or severe turbulence is expected after takeoff.

6. **For MSN 02155-03097 & 07784-07792:** Set Radar to ON. To check departure path set MULTISCAN to MAN. If weather is not significant, down tilt to display ground echoes. Once checked put it back to AUTO. **For MSN 02155-03097:** Gain must be manually set to +4, when MULTISCAN is set to AUTO & when flying below FL 200. Use manual tilt if weather display is ambiguous or unexpected, particularly below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells. If tilt is manual then set it to +4° if not suspecting adverse weather. **For MSN 04392-05746:** Set display mode to ALL. 30s required for 3D buffer to be filled. Ground echoes can be seen with display mode selector on MAP position.

ALL ENGINE TAXI FLOW PATTERN



180 DEG TURN ON RUNWAY (CM1 as PF)

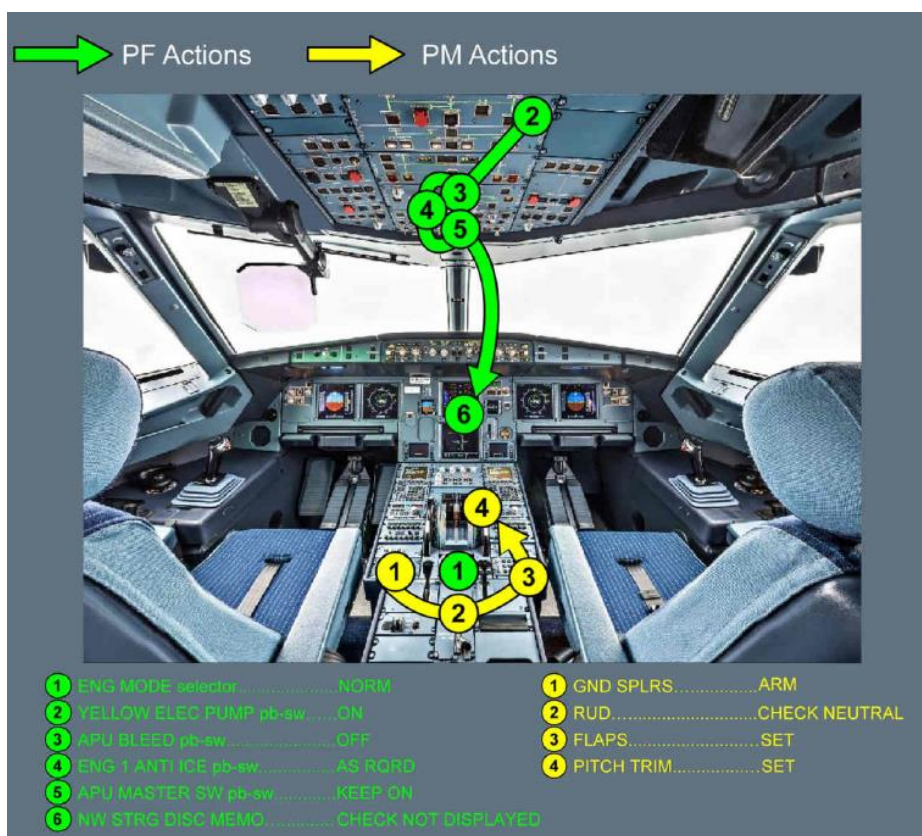
- Min runway width 30m (should give additional margin when runway is wet / contaminated).
- Ground Speed around 5-8 knots during the entire procedure (5 knots on wet runway).
- Taxi on the right of runway.
- Initial turn 25 deg from runway axis.
- When sitting over the runway edge line, turn right with full tiller deflection.
- Differential thrust and brakes can be used if required.
- When turn is complete, align with centerline and release tiller to neutral before stopping.

AFTER START PROCEDURE FOR ONE ENGINE TAXI

	PF	PM
Engine Mode Selector	Normal	
Yellow Electric Pump	ON	
APU Bleed	OFF	
Eng 1 Anti-ice	As Required	
APU Master Switch	ON ¹	
Ground Spoilers		Arm
Rudder Trim		Reset Pb Press – Check Neutral
Flaps		Takeoff Position
Pitch Trim Handwheel		Set
N/W STEER DISC MEMO	Check – Not Displayed	
Ground Crew	Announce: “Clear to Disconnect” “Hand Signal on the Left / Right”	

1. To provide power to the engine fire extinguisher bottles.

AFTER START FLOW PATTERN FOR ONE ENGINE TAXI



ONE ENGINE TAXI AT DEPARTURE

		PF	PM
PRE-REQ	Taxi Clearance		Obtain
	Taxi / Turn Off Light	ON	
	Area Clearance	Call: "Clear Left Side"	Call: "Clear Right Side"
	Parking Brake	OFF – Brake Pressure Zero	
	Brake Pedals	Press & Call: "BRAKE CHECK"	Call: "PRESSURE ZERO"
	Brake Fans		As Required
CLEARANCE	ATC Clearance		Confirm
	AFS / Flight Instruments		FMS
			F-PLN (SID, TRANS)
			Initial CLB SPD & SPD Limit
			FCU
			Cleared Altitude
SECOND ENGINE START			HDG Preset
			FD
			Both ON
		PFD / ND – Check (Airspeeds, Altitude, Heading, FMA, SID)	
	Departure Briefing	Confirm	
	Taxi	Taxi in a Straight Line	
	Eng 2 Start	Order ¹	
	Yellow Electric Pump		OFF ²
	APU Bleed		ON ³
	Eng 2 Thrust Lever		IDLE
	Eng Mode Selector		IGN / START
	Eng 2 Start		Announce
	Eng 2 Master Lever		ON ⁴
	Eng 2 Idle Parameters		Check
	Chrono		Start ⁵
	Eng Mode Selector		Normal
	APU Bleed		OFF
	Eng 1 + 2 Anti Ice		As Required
	Wing Anti Ice		As Required
	APU Master Switch		OFF (if not req)
	ECAM Status	CHECK	
	After Start Checklist	COMPLETE	
	Flight Controls	CHECK	

1. Second engine must be started soon enough before takeoff, to consider the engine start time and ensure the applicable engine warm-up time.

2. The yellow electric pump must be set to OFF to enable the PTU automatic test during engine 2 start.

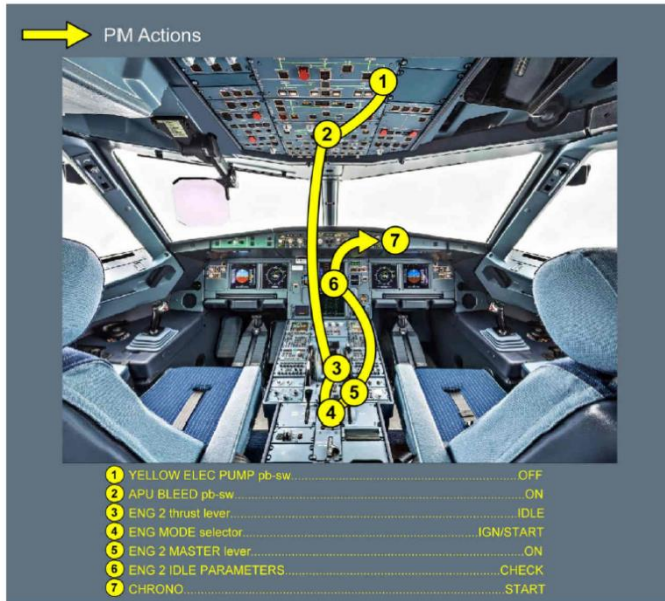
3. Check time 10 seconds.

4. Wait 10 seconds to ensure that bleed system valves are no longer in transit. This prevents ENG 1 stall. Taxi in a straight line for at least 5 s after the selection of the ENG 2 master lever to ON, to ensure that the PTU automatic test is completed.

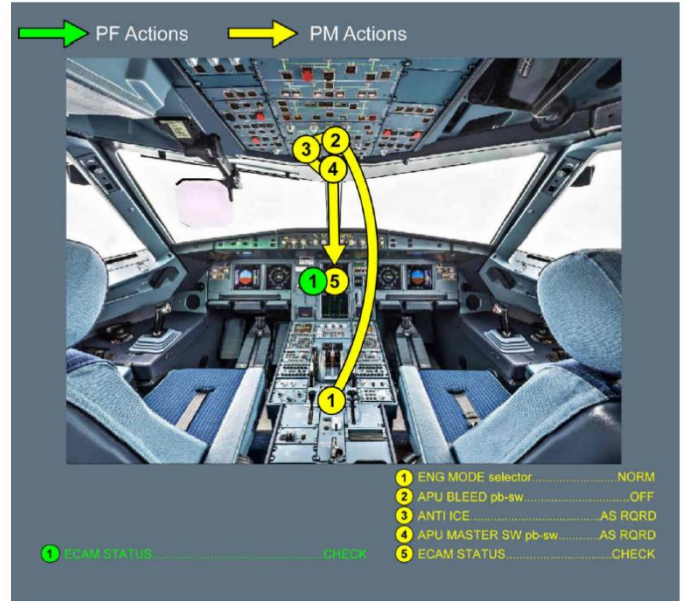
5. To monitor the warm-up time of engine 2.

SECOND ENGINE START FLOW PATTERN

First Part



Second Part



AFTER SECOND ENGINE START			
DO ITEMS	Auto Brakes		AUTO BRK MAX ON
	ATC Code / Mode		Confirm / Set
	Engine Mode Selector		As Required
	Weather Radar		Radar – ON / ALL Predictive Windshear – Auto / ON
	Terrain on ND	As Required – However, consider Radar on PF side & Terrain on PM side	
	Final Check		TO Config – Test TO Memo – Check No Blue
		“CABIN SECURED FOR TAKEOFF” – Report Receive	
	Taxi Checklist	TAXI FLIGHT CONTROLS..... CHECKED (BOTH) FLAPS SETTING..... CONF ____ (BOTH) RADAR & PRED W/S..... ON & AUTO / ON & ON ENG MODE SEL..... ____ ECAM MEMO..... T.O NO BLUE - AUTO BRK MAX - SIGNS ON - CABIN READY ✈ - SPLRS ARM - FLAPS T.O - T.O CONFIG NORMAL CABIN.....READY	

DEPARTURE CHANGE (By ATC or Weather)

	PF	PM
Final T/O Performance	Recompute	Recompute
FMS	Cross Check: - Revised FMS - Performance Data	Revise: - Runway - TO Data - Configuration - SID
Green Dot ¹	Compare: - Green Dot by Performance App - Green Dot by FMGS	
Flap Lever		Set Take Off Position
FCU ALT		Set
TO Config		Test
Re-Briefing	Complete	
Departure Change Checklist	<< DEPARTURE CHANGE >> RWY & SID..... FLAPS SETTING..... CONF ____ (BOTH) T.O SPEEDS & THRUST..... (BOTH) FCU ALT.....	

1. Discrepancy in green dot speed means difference in TOW value in both systems.



BEFORE TAKEOFF

	PF	PM
Brake Fans		Check ¹
Lineup Clearance		Obtain
TCAS		TA or TA/RA
Takeoff Runway	Confirm	
Approach Path	Clear of Traffic – Visually and through TCAS	
Exterior Lights	Strobe – ON ²	
Packs		As Required ³
Sliding Table	Stowed	
Cabin Crew		Advise ⁴
Checklist	LINE-UP T.O RWY..... (BOTH) TCAS..... PACKS 1 & 2.....	

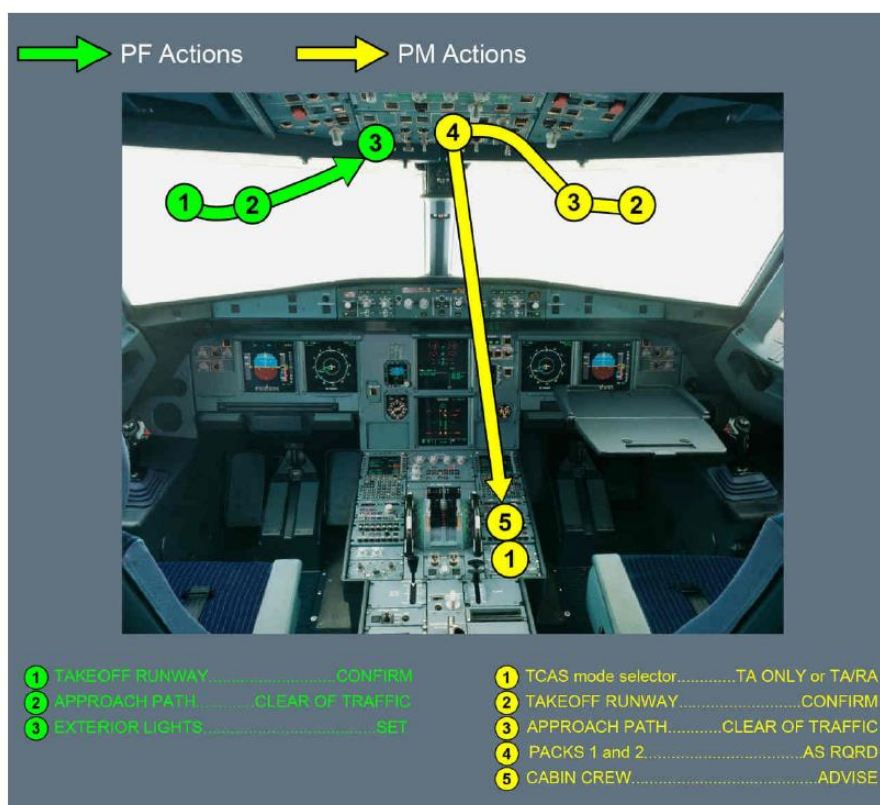
1. If an arc is displayed on WHEEL page above brake temp, set brake fans ON. Fan cools the temp sensor faster than the brakes since the sensor is not located within the brake material itself. Turning the fan OFF will indicate an increase in temp therefore select fans OFF if temp with fans ON is <150°C, else delay takeoff. Brake fans should not be used for takeoff (to prevent FOD to fans & brakes). Fans OFF brake temp limit for takeoff is 300°C. This limit is to ensure that, in case of hydraulic fluid leakage, the fluid that may come into contact with brake units, does not ignite in the wheel well. The limit does not respect maximum brake energy limitation, in case of a high energy rejected takeoff.

2. PF can request the PM to set the exterior lights.

3. Consider Packs OFF or APU bleed ON provided wing anti-ice is OFF. Packs OFF reduces fuel consumption & will improve performance when using TOGA thrust. During Flex T/O, it reduces takeoff EGT & therefore maintenance costs.

4. On PA – “Cabin Crew Take Your Seats for Takeoff”.

LINE-UP FLOW PATTERN



TAKEOFF

	PF	PM
Takeoff Clearance	 Weather around departure path Terrain around departure path Fuel check before takeoff	Obtain
Exterior Lights	NOSE, TURN OFF & LAND – ON	
Thrust Setting ¹	Announce – “TAKEOFF”	
Standard Takeoff ² X-wind < 20 & No Tailwind	- Thrust – N1 50% (1.05 EPR) - Brakes – Release - Thrust – FLX / TOGA ³ - Sidestick – ½ FWD up to 80, Neutral by 100 ⁴	Chrono – Start
Standard Takeoff ² X-wind > 20 or with Tailwind	- Thrust – N1 50% (1.05 EPR) - Brakes – Release - Thrust – N1 70% – FLX / TOGA ⁵ - Sidestick – Full FWD up to 80, Neutral by 100	
PFD / ND	Announce – FMA	- FMA – Monitor on PFD ⁶ - FMS Position – Monitor on ND ⁶
Below 80 Knots		Check – Takeoff N1(EPR) Announce – “THRUST SET” Monitor – PFD & ENG Indications ⁷
100 Knots	Cross Check	Announce – “1 HUNDRED KNOTS”
At V1 & VR		Announce – “V1” & “ROTATE”
Positive Climb	Order – “L/G UP”	Announce – “POSITIVE CLIMB”
Thrust Reduction Altitude ⁸	Thrust Levers – CL	Packs – On (if applicable) ⁹
Acceleration Altitude	Check Target Speed – Monitor FMA ¹⁰	
F Speed ¹¹	Flaps 1 – Order	Flaps 1 – Select
S Speed	Flaps 0 – Order	Flaps 0 – Select Spoilers – Disarm Ext Lights – Set ¹²

1. Check engine parameters within limits. Min visibility is 125m (Ref: Bulletin FLTOPS/SI/1/Thu Jan 03 2019).

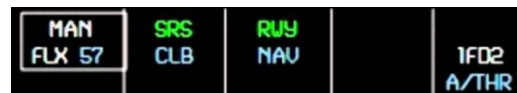
2. Rolling takeoff is also permitted.

3. Captain's hand will be on thrust levers until V1.

4. To counter nose-up effect of setting engine takeoff thrust. Speeds (80 & 100) are in knots.

5. Rapidly increase thrust to 70% (1.15 EPR) then progressively to reach takeoff thrust by 40kts ground speed. For background information, read “Engine Intermix Operation” in FCOM > Procedures > Special Operations.

6. Check FMA for MAN TOGA(FLX), SRS/RWY/BLANK, A/THR (Blue).
Check FMS position on ND (A/C on centerline). If GPS primary not available, check FMS position update.



7. Monitor Airspeed, N1 & EGT throughout takeoff. Below 80 knots, EGT over limit will trigger ECAM & takeoff can be aborted but above 80 it is inhibited. EGT can exceed red line above 80 but do not reject takeoff above 100 knots. ECAM procedure should be applied after lift-off when appropriate flight path is established and aircraft is at least 400 ft AGL.

8. NADP1 (thrust min 800ft, acceleration 3000ft) to be used. NADP n/a in significant turbulence or wind shear.

9. Packs ON before reducing thrust will increase EGT. Set Pack 2 ON 10s after Pack 1 for passenger comfort.

10. FMA changes at ACC ALT:

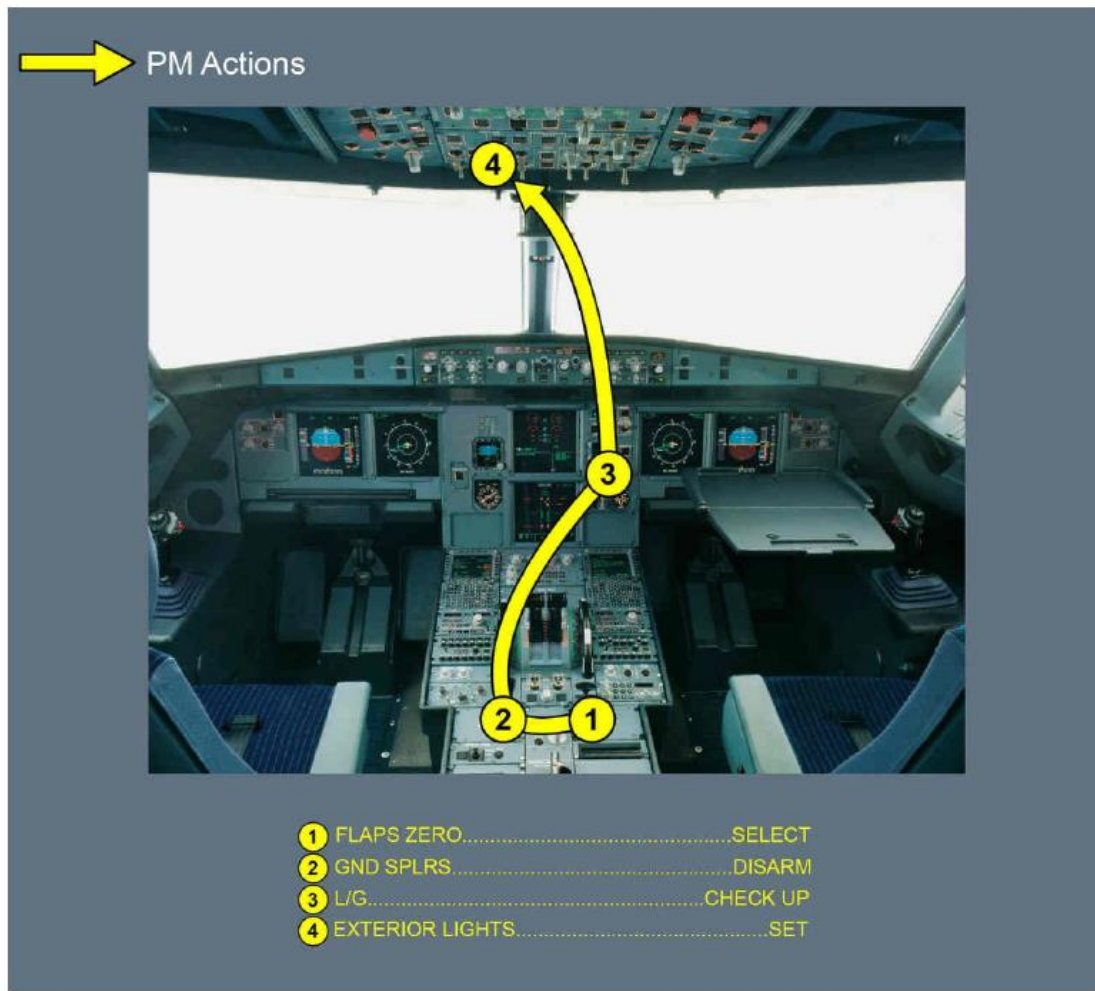


11. In CONF 1+F, F speed does not appear.

12. Nose light and Turnoff OFF, others as required.

Note: CM1 takeoff in contaminated runway, X-Wind >15 kts, RVR / V < 800m or TOGW > 90% of allowed max TOGW.

ACCELERATION FLOW PATTERN



AFTER TAKEOFF ¹

	PF	PM
TCAS		TA / RA
Engine Mode		As Required
APU		Bleed & Master Switch – As Req.
Anti-Ice		Engine Anti-ice – As Required ² Wing Anti-ice – As Required



1. Since there is no “After Takeoff Checklist”, just have a glance at the memo page to see if you forgot anything.

2. Engine anti-ice must be set to ON when icing conditions exist or are anticipated, except during climb and cruise when the SAT is below -40°C.

LOW VISIBILITY TAKEOFF

PREPARATION

- Review crew qualification & currency.
- LVP must be in force if RVR/VIS is < 400m.
- Takeoff Alternate is required if visibility is below landing minima.
- Review NOTAMS for closed taxiways, runways & construction.
- Uplift extra fuel for expected delays (higher of 30 mins or anticipated delay).
- Brief cabin crew about sterile cockpit (no unnecessary cockpit or intercom calls).

PERFORMANCE

- No contaminated runway takeoff if RVR/VIS < 200m.
- Auto Thrust & Auto Brake must be serviceable if RVR/VIS < 200m.
- Thrust Setting: Captain's discretion. Full thrust reduces time in low visibility but engine failure will make directional control more challenging whereas reduced thrust will increase time in low visibility but directional control will be relatively less challenging.
- Use flap settings that gives lowest takeoff speeds (payload permitting).

EXECUTION

- Be careful about taxi routing and CAT II/III holding points.
- Max taxi speed is 10 knots.
- Any checklist action is to be done while stationary with parking brakes ON.
- Double check runway direction after lineup (use localizer, ND, runway marking etc.)
- Use roll out bar (if available) for lateral guidance during takeoff.
- If visual references are lost below 100 knots, takeoff may be rejected.
- If takeoff is rejected then keep all landing lights on after stopping for emergency services to easily identify the a/c.
- If visual references are lost above 100 knots, takeoff should be continued.

HOW TO HANDLE TURBULENCE

QRH – Abnormal & Emergency Procedures – Miscellaneous – Severe Turbulence.

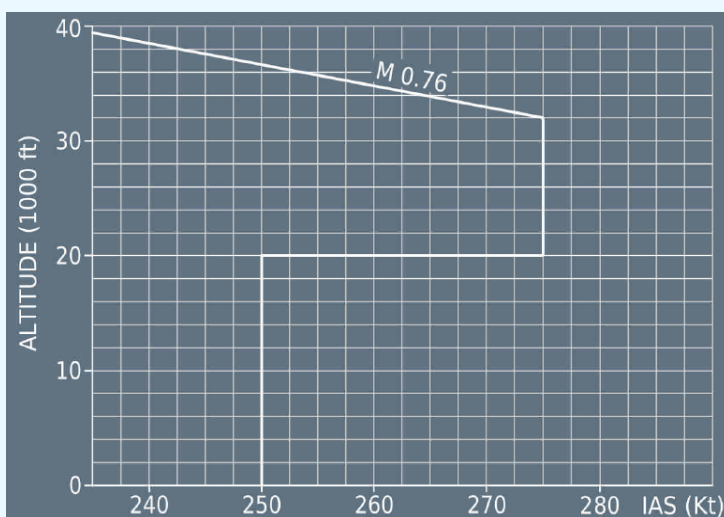
Wait for the target speed +20 knots (limited to VFE-5) before retracting the slats/flaps.

In moderate turbulence AP and A/THR ON with managed speed.

In severe turbulence AP ON with Thrust set to Turbulence N1 (QRH) and A/THR disconnected.

A/THR is, however, recommended during approach, in order to benefit from the GS mini.

CONF FULL provides better handling capability in turbulent conditions, however, CONF 3 provides more energy and less drag.



CLIMB

		PF	PM
	MCDU	PERF CLB	F-PLN
T	Transition Altitude	Set Standard ¹	
		Call – “Ten Thousand Feet Checks”	Call – “Ten Thousand Feet”
T	Ten Thousand Feet	EFIS – CSTR / ARPT	Landing Lights – Retract Seat Belts – As Req. EFIS – ARPT ECAM Memo / Pressurization – Review NAVAIDS – Clear Manually Tuned VORs SEC F-PLN – Copy active FPLN or as req. OPT / MAX ALT – Check ²
T	Tilt / Terrain	WX Radar – Adjust Tilt ³	Terrain OFF & WX Radar on ND At 10000 ft or Highest MSA, whichever is later
T	Twenty Thousand Feet	WX Radar – Adjust Gain ⁴	
	Speeds	ECON – Managed Best L/D – Green Dot Best ROC – Turbulence (thumb rule) Turbulence ⁵ : 250 up till FL200 275/76 above FL200	

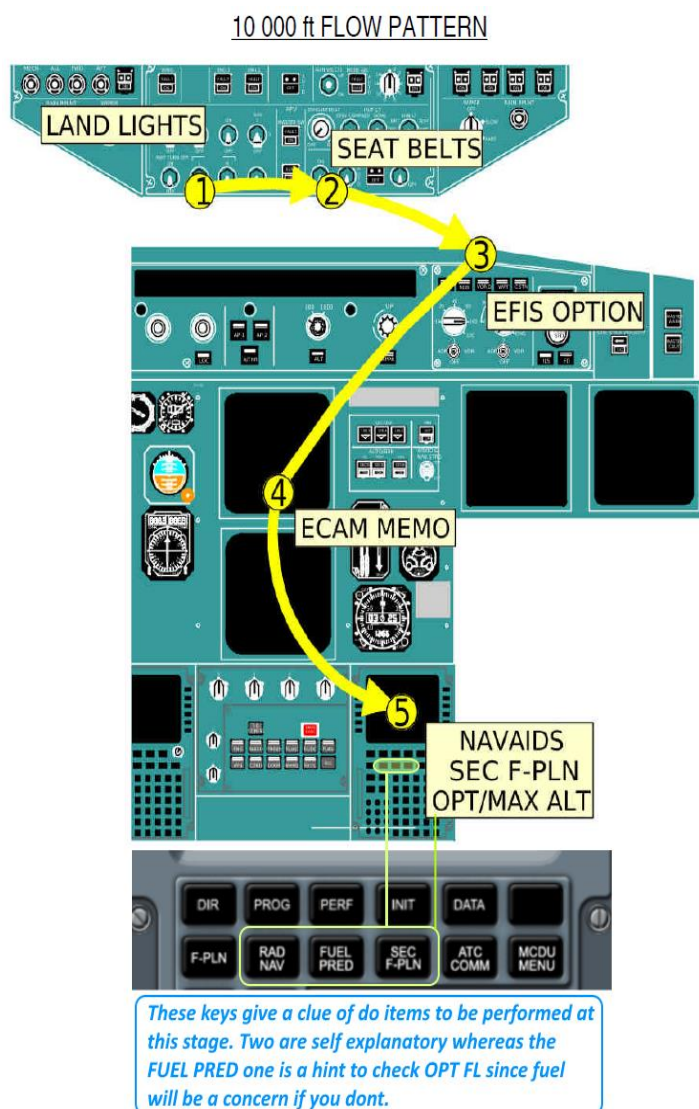
1. Call Outs: PF: “Set Standard”. PM: “Standard Set Cross Checked, Passing FL__”. PF: “Checked”. On STD, transponder does not transmit to ATC the standard barometric reference. Transmission is based on last QNH selected. Upon ATC notification of an incorrect reference, select 1013 manually then set STD. Transmitted aircraft altitude is not affected. Only FCU selected altitude may be misinterpreted.

2. If ATC limits CRZ FL to a lower level than the one in FMGS (higher is not an issue) then insert this lower CRZ FL in PROG page otherwise there will be no transition to cruise phase. Managed speed targets & Mach are not modified & SOFT ALT mode will not be available. FMA will display ALT instead of ALT CRZ. Soft Altitude (managed guidance) corrects minor deviations from Mach target by allowing ± 50 feet variation from the cruise flight level. This improves fuel efficiency & passenger comfort & minimizes changes in thrust. (basically, sacrifices altitude to maintain Mach target instead of doing so by changing thrust).

3. For MSN 02155-03097: If weather display is ambiguous or unexpected, use manual tilt in order to better analyze the weather situation. Particularly below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, switch to manual mode and adjust tilt setting downward until weather is detected or ground clutter appears on upper part of display. For MSN 04392-07792: Adjust radar as required.

4. For MSN 02155-03097: Set GAIN back to CAL from +4 when MULTISCAN selector is in AUTO & flying above FL200.

5. Ref to QRH abnormal & emergency miscellaneous section for severe turbulence procedure.



TOP OF CLIMB

	PF	PM
TOC	Rate of Climb – Adjust	TOC Fuel / Time – Note
ICAO: ICAO PANS-OPS Doc. 8168 (within or outside RVSM airspace): Rate of climb/descent to an assigned level, especially with autopilot, should be less 1500 ft/min throughout the last 1000 feet when the pilot is made aware of another aircraft at or approaching an adjacent level, unless otherwise instructed by ATC. This avoids unnecessary ACAS II RAs. These procedures are to be specified by operators. http://www.theairlinepilots.com/forumarchive/quickref/acas.pdf PIA OM Part A – 6.6.3 – Level Off: To prevent divergence of assigned level, or undesirable “g” forces, it is important to monitor closely the flight progress, especially when flying manually. Rate of climb/descent to be within 500/1000 ft/min (not to exceed 1000 ft/min) in RVSM airspace when approaching the selected altitude or when changing flight levels. Jeppesen - Air Traffic Control - UK Rules and Procedures – Maximum Rates of Climb and Descent: Approaching a flight level the vertical closure speed should not be excessive. About 1500ft to a level, the vertical speed should be a maximum of 1500ft per minute and ideally to between 1000ft per minute and 500ft per minute.		

HOW TO REMEMBER WHAT YOU NEED FOR FLIGHT INTO RVSM CRUISING LEVELS

It's all about Altitude & Maintaining it correctly	Required Equipment
What is the source of altitude?	ADR – So you need at least two.
What converts it into graphics for you to see?	DMC – So you need at least two.
Where do you see the Altitude?	PFD – So you need both of them.
How will you set the altitude you want to maintain?	FCU – One channel is good enough.
How will you hold the altitude accurately?	Autopilot – One is good enough.
Who will warn YOU, that you are not maintaining the altitude correctly?	FWC – One is good enough.
Who will warn ATC, that you are not maintaining the altitude correctly?	Transponder – One is good enough.

Items that need Dual channels have D (for Dual) in it. ADR, DMC, PFD.

A318/A319/A320/A321 FLIGHT CREW OPERATING MANUAL	PROCEDURES SPECIAL OPERATIONS REDUCED VERTICAL SEPARATION MINIMUM - RVSM
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		Comparison of Altitude Indication (ft)		
Flight Level	Speed or Mach Number	Difference between ADR1 and ADR2 (on PFDs)	Difference between ADR3 and ADR1/2 (on PFDs)	Difference between STBY ALTI and ADRs
FL 50	250 kt	50 (15 m)	65 (20 m)	130 (40 m)
FL 100	250 kt	55 (17 m)	80 (24 m)	185 (56 m)
FL 200	300 kt	90 (27 m)	135 (41 m)	295 (90 m)
FL 300	M 0.78	130 (40 m)	195 (59 m)	390 (119 m)
FL 390	M 0.78	130 (40 m)	195 (59 m)	445 (136 m)

CRUISE

		PF		PM
A	Altimeter			Note hourly readings (RVSM req.)
B	Boundaries	FIR Entry / Exit Time or other Area Procedures		
C	Collision Avoidance			TCAS – Set to ALL
D	Documentation			Flight Plan, Logbook, Debrief – Complete
E	ECAM	Memo and SD Pages – Review		
	Enroute			Enroute Alternates / ETP ¹
F	Fuel			Fuel Score – Every 30 mins
G	Gain & Tilt	WX Radar – Check Gain & Tilt ²		
H	High Altitude Winds			Wind Data Entries – Check ³
I	Inflight Performance	Vertical	UP Performance: Step Flight Level	DOWN Performance (if FMGS fails): - Green Dot Speed ⁴ - Single Engine Ceiling
		Lateral	- Waypoint Track & Distance - NAV Accuracy ⁵	

1. Note down actual weather for enroute alternates on flight plan. Suitable airport pairs should be entered on the ETP page for FMS to calculate the ETP that can be inserted as Place/Distance point in SEC F-PLN for enroute diversions. Single engine cruise distance in still air, ISA conditions is 350nm.

2. **For MSN 02155-03097:** GAIN to CAL above FL200 or +4 below FL200, if MULTISCAN is set to AUTO. If weather display is ambiguous or unexpected, use manual tilt in order to better analyze the weather situation. Particularly below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, switch to manual mode and adjust tilt setting downward until weather is detected or ground clutter appears on upper part of display. **For MSN 04392-07792:** Adjust radar as required. Regardless of auto or manual tilt, a range of 80nm for PF ND & 160nm for PM ND is a good combination for weather awareness (use shorter ranges for short-distance weather). Over water flights have no ground returns so as an initial setting, following approx. tilt settings can be used for radars without auto tilt function: -6° for 40nm, -2° for 80nm and -1° for 160 or 320nm.

3. When there is a difference of either 30° or 30 knots for the wind data and 5° C for temperature deviation.

4. Green dot speed can also be manually calculated as below:

A) Below 20,000 feet = $(2 \times \text{weight in tons}) + 85$.

B) For every 1000 ft above 20000 = $1 + A$.

e.g. At 20,000 feet and 60 tons, green dot = $(2 \times 60) + 85 = 205$. At 25000 feet it is $205 + 5 = 210$.

5. Perform NAV accuracy check if: "GPS Primary Lost" appears on ND, PROG page displays "LOW" accuracy, "NAV ACCUR DOWNGRAD" appears on MCDU or in "IRS Only Navigation". If error $\leq 3\text{nm}$ then FM position is reliable, if not then use raw data for navigation. In case of significant mismatch between display and real position use raw data navigation (possibly switching to ROSE VOR, so as not to be misled by FM data).



CRUISE BRIEFING

PF will brief on: (1) Engine failure drift down strategy (2) Pressurization failure (3) Operational threats: Terrain, weather etc. (4) Operational procedures: Special airspace rules, communication failure etc.

HOW TO HANDLE LOW FUEL TEMPERATURE

Fuel temperature will slowly reduce towards TAT. The rate of cooling of fuel can be expected to be in the order of 3°C/hour with a maximum of 12°C/hour in the most extreme conditions. If fuel temperature approaches the minimum allowed, the ECAM outputs a caution. Consideration should be given to achieving a higher TAT by descending or diverting to a warmer air mass. Below the tropopause, a 4000 ft descent gives a 7°C increase in TAT. In severe cases, a descent to as low as 25000 ft may be required. Increasing Mach number will also increase TAT. An increase of M0.01 produces approximately 0.7 °C increase in TAT. In either case, up to 1 hour may be required for fuel temperature to stabilize. The crew should consider the fuel penalty associated with either of these actions.

DESCENT PREPARATION

	PF	PM
Planning		Weather & Landing Info ¹ – Check ECAM Status – Check
	Nav Charts – Prepare Landing Conditions – Confirm ² Landing Performance – Compute & Cross Check ³	
	Auto Brake – As Req ⁴ GPWS LDG FLAP 3 – As Req	
Preparation	 • F-PLN A (DES WINDS / ARRIVAL) ⁵ • RAD NAV • PROG (BRG / DIST TO RWY) • PERF: ○ CRUISE (cabin descent rate) ○ DES (Mach / Speed) ○ APPR: ▪ QNH ▪ Temperature ▪ Destination Wind ⁶ ▪ Minimum ▪ Landing CONF ○ GO-AROUND: ▪ Thrust reduction ▪ Acceleration altitude • FUEL PREDICTION • SEC F-PLN (Alternate Runway etc.)  • Landing Elevation – Mode & Value	
Arrival Briefing		
Descent Clearance	Cleared Altitude – Set on FCU	Obtain from ATC TCAS – Set to Below ⁷

1. Obtain destination & alternate weather approx. 15 mins before TOD. Check fuel predictions for destination & alternate to estimate any extra holding time available. In low OAT conditions, consider altitude corrections for low temperature. In icing conditions with OAT expected to be +3°C or less then consider engine ice shedding procedure during taxi.

2. Check if landing conditions changed compared with a previous computation or dispatch conditions.

3. On WET runways (condition GOOD), crew may select REV IDLE, if inflight landing distance assessment is computed with (i) "MEDIUM–POOR" performance (ii) "No Reverser Credit" and the assessment result is within the LDA. Best combination to reduce fuel and brake wear is CONF3 + REV Idle + Autobrake LO. If landing distance is a priority then consider Flaps FULL + REV Max + Autobrake MED. Riding the brakes by overriding the autobrake or using autobrake MED with CONF3 and REV IDLE increases brake oxidation (which may be severe).

4. LO – Long runways, MED – Short or contaminated runways. Pedal braking may be considered on very long runways if it is anticipated that braking will not be needed or on very short runways to apply full manual braking without delay.

5. The FMS may have deleted the altitude constraints that are at or above the CRZ FL. If a TOO STEEP PATH message is displayed after the final descent point, do not use FINAL APP guidance for approach.

6. Do not insert gust value. Ground Speed Mini function (manage speed mode) takes into account instantaneous gust.

7. Just prior to TOD, cycling fasten seat belt sign twice gives a clue to the cabin crew about descent phase.

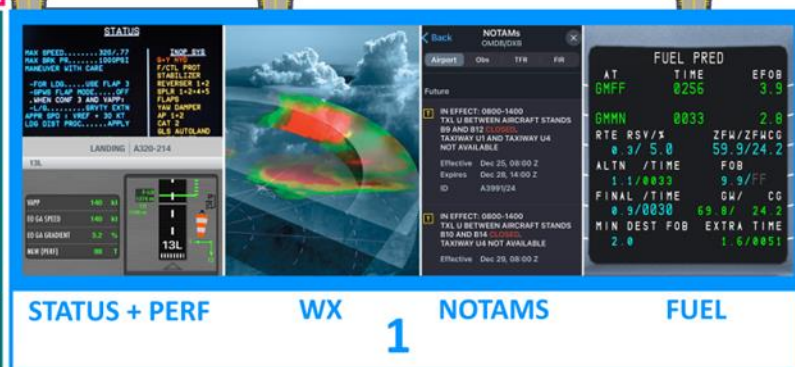
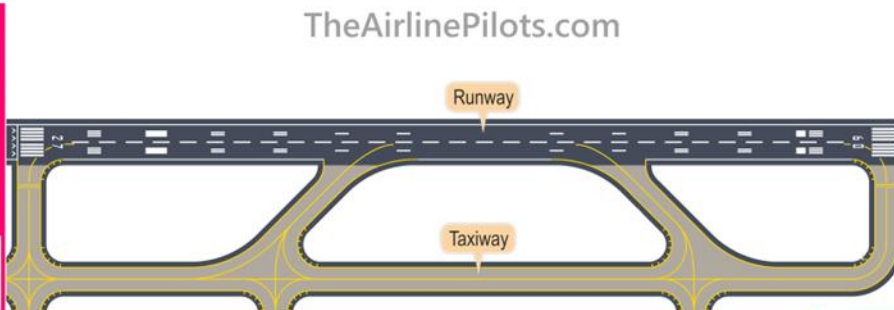
ARRIVAL DISCUSSION



AIRCRAFT	Technical Status & Landing Performance
AIRFIELD (DEST + ALT)	Weather (airfield) Terminal information – NOTAMS etc. Fuel – Extra Holding
STAR	• Routing and Constraints • Transition Level • MSA • RCF: Radio Communication Failure
APPROACH	• NAV Frequencies • Approach and Minima • Obstacles • Restricted / Prohibited areas
GOAROUND	• ATC Procedure • Aircraft Procedure
RUNWAY	Dimensions (Length, Width, Distance beyond G/S) Surface Condition Lighting
TAXI	Routing and Parking
SPECIAL PROCEDURES	Weather Avoidance (vicinity) Terrain Clearance Failures Management

DISCUSS YOUR WAY IN: YOUR ARRIVAL POWER MAP

TheAirlinePilots.com



ARRIVAL BRIEFING AS PER AIRBUS OPERATIONAL PHILOSOPHY (FCTM)

PF	PM
Cockpit door closed - Set an environment with no distraction	
<i>Basically all the Normal Stuff</i>	Plan - Arrival/transition designator - MORA/MOCA/MSA for planned trajectory - STAR - Runway and type of approach - Approach minimum - Go-around trajectory - Extra fuel and time
Plan - Guidance for approach - Landing flaps setting - Stop margin - Use of reverse thrust - Use of autobrake - Planned runway exit - Hotspots for taxi-in - Special operation - Non-standard operation	<i>Basically all the Abnormal Stuff</i>
Identified THREATS	
  Airport Briefing > Identified Hazards >	
MITIGATIONS (Strategies + Revision of applicable memo items etc.)	
MISCELLANEOUS	

DESCENT ¹

		PF	PM
	MCDU	PROG / PERF DES	F-PLN
	Speeds	Managed – If Not then: ○ 0.78 / 300 till FL100 ○ 250 below FL100	
T	Twenty Thousand Feet	WX Radar – Adjust Gain ²	
T	Tilt / Terrain	Tilt – Adjust WX Radar	Terrain ON ND ³
		Call – “Ten Thousand Ft Checks”	Call – “Ten Thousand Feet”
T	Ten Thousand Feet	EFIS – CSTR LS ⁴ – As Required NAV Accuracy – Check ⁵	Landing Lights – Set Seat Belts – ON EFIS – CSTR LS – As Required RAD NAV – Selected / Identified ENG MODE – As Req
T	Transition Level	Set QNH ⁶	
	Checklist	APPROACH BARO REF..... (BOTH) SEAT BELTS.....ON MINIMUM..... AUTO BRAKE..... ENG MODE SEL.....	

1. Approaching assigned level, monitor ROD (reduce to 1000 fpm or less). For a change of 1000 feet or less, descent rate not more than 500 fpm. Max ROD: 2000 fpm when descending below 5000 feet AGL and 1000 fpm below 2000 feet AGL.

2. For MSN 02155-03097: GAIN +4 below FL200, if MULTISCAN is set to AUTO. If weather display is ambiguous or unexpected, use manual tilt in order to better analyze the weather situation. Particularly below FL 200, for situations with low-level weather, weather with low reflectivity or in front of suspected active cells, switch to manual mode and adjust tilt setting downward until weather is detected or ground clutter appears on upper part of display. During approach keep tilt at +4° to avoid ground clutter. For MSN 04392-07792: Adjust radar as required.

3. Select at 10,000 feet or MSA whichever is higher. If NAV ACCURACY LOW – Do not use TERR ON ND.

4. Check LOC/GS scales & deviations and also IDENT on PFD. If wrong or no ident, check the audio ident.

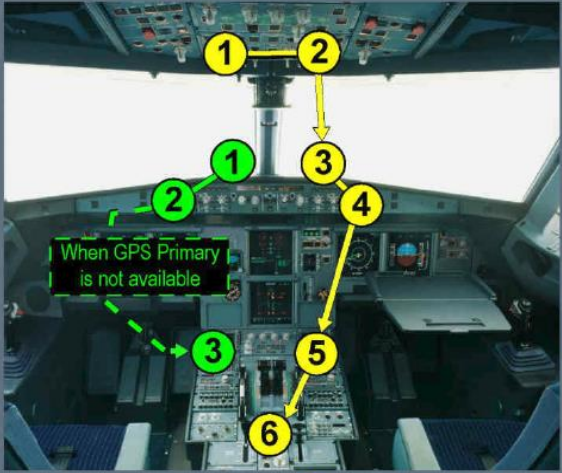
5. If GPS Primary function is not available, crosscheck NAV ACCURACY using the PROG page (BRG /DIST computed data), and the ND (VOR /DME raw data).

6. Approaching TL & when cleared for an altitude.

10 000 ft FLOW PATTERN

→ PF ACTIONS

→ PM ACTIONS



① LAND LIGHTS sw.....SET

② SEAT BELTS sw.....ON

① EFIS option pb.....CSTR

② LS pb.....AS RQRD

③ EFIS option pb.....CSTR

④ LS pb.....AS RQRD

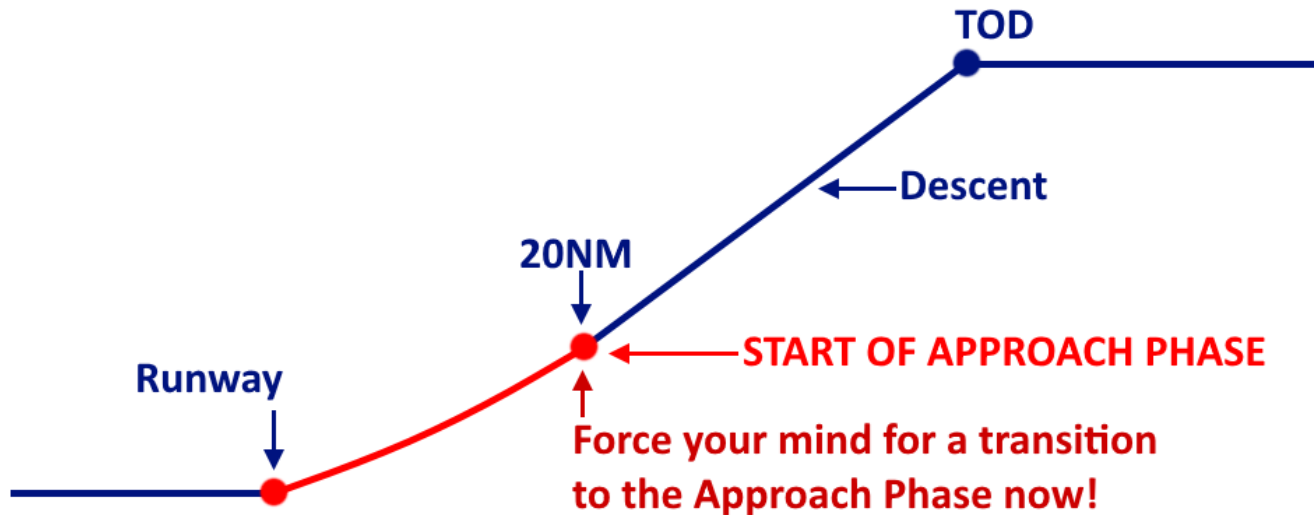
⑤ RADIO NAV.....SELECT/IDENT

⑥ ENG MODE selector....AS RQRD

③ NAV ACCY.....CHECK

HOLDING SPEEDS: See Jeppesen – Air Traffic Control – Flight Procedures (Doc 8168) – Holding Procedures.

APPROACH



Four things you “cannot afford not to think about”, while transitioning to the approach phase:

- **Speed** control (Green Dot) – Verify auto deceleration or carry it out manually (make yourself comfortable).
- **Arming** the Approach (APPR Pb) – Forget and see what happens.
- **Configuration** (Flaps / Gears) – Plan your points on the chart beforehand where you will take flaps / gears.
- **Go around** altitude setting (on FCU) – Plan ahead, it wasn't raining when Noah made the ark.

TYPE OF APPROACHES

Decelerated Approach: Refers to an approach where aircraft reaches 1000 feet in landing configuration at VAPP. In most cases, this equates to aircraft being in CONF1 and S speed at the FAF. This technique is recommended for ILS and FINAL APP (vertical managed guidance).

Early Stabilized Approach: Refers to an approach where the aircraft reaches FAF in landing configuration at VAPP. This technique is recommended for non-precision approaches (LOC FPA, NAV FPA and TRK FPA). To get a valuable deceleration pseudo waypoint and to ensure a timely deceleration, the pilot should enter VAPP as a speed constraint at the FAF.

Discontinued Approach

When at or above the FCU selected altitude:

- GO AROUND, or
- Discontinued Approach Technique^{*}
 - Announce “CANCEL APPROACH”
 - Disarm AP/FD Approach Mode – APPR / LOC Pb
 - Select Lateral Mode – NAV / HDG
 - Select Vertical Mode – VS / LEVEL OFF
 - Select and Adjust – SPEED

When below the FCU selected altitude,

- GO AROUND

** Since thrust levers are not set to TOGA, FMS does not engage the Go-Around phase and remains in the approach phase. It does not string the previous approach in the active F-PLN. Flying over, or close to the airport will sequence the destination waypoint and therefore there will be no “destination” in F-PLN. Lateral revision will then be required to redefine the destination.*

STANDARD ILS APPROACH ¹

	PF	PM
F-PLN Sequencing	Adjust ²	
Approach Phase ³	Activate or Set Green Dot Speed	NAV Accuracy – Check ⁴
Intercept Heading	APPR – Press AP – Engage Both	Cabin Crew – Advise “Cabin Crew take your Seats for Landing”
LOC / GS	Check Armed / Captured ⁵	
3NM from FDP	FLAPS 1 – S SPEED ⁶	
GS *	GO AROUND ALTITUDE – SET	
At 2000 Ft AGL (min)	FLAPS 2 – F SPEED ⁷	
When Flaps 2	L/G DOWN – Order	- L/G Down – Select - Auto Brake – Confirm / Change Mode - Lights: - Nose – TO - Turnoff – ON - Ground Spoilers – Arm
When L/G Down	FLAPS 3 – Order	Flaps 3 – Select ECAM – Check Wheel Page ⁸ Triple Indicator – Check Residual Pressure ⁹
When Flaps 3	FLAPS FULL ¹⁰ – TARGET SPEED	
		- Landing Memo – Check No Blue - Cabin Report – Receive - A/THR – Speed Mode or OFF - Wing Anti-Ice – OFF ¹¹
Checklist ¹²	LANDING ECAM MEMO.....LDG NO BLUE - LDG GEAR DN - SIGNS ON - CABIN READY - SPLRS ARM - FLAPS SET CABIN.....READY	
At 1000 Ft	Call – Checked ¹³	One Thousand – Monitor / Announce
At Minimum + 100		One Hundred Above – Monitor / Announce
At Minimum	Continue / Go Around – Announce	MINIMUM – Monitor / Announce

- For a planned CAT I approach at destination, company planning minima for destination's alternate will be NPA minima.
- Keep a meaningful TO waypoint. In HDG/TRK mode auto sequencing will be done if a/c flies close to the F-PLN route.
- APPR phase activates automatically when overflying DECEL pseudo waypoint in NAV mode. In HDG MODE activate it manually on PERF DES page, approximately 15 NM from touchdown (20 NM is more comfortable).
- If GPS Primary is lost. If NAV accuracy is low, at least one ND must be in ROSE LS / VOR depending on the approach.
- Glide interception from above: (1) APPR Pb pressed (2) Set FCU ALT above aircraft altitude (3) V/S Mode @ 1500-2000 fpm. Above 2000 speed will increase towards VFE. At VFE, AP will maintain VFE but reduce VS without mode reversion. Gear down and Flaps 2 will give the best rate of descent. (4) At GS* set missed approach altitude.
- For DECEL approaches, select FLAPS 1 at least 3nm before FDP. Establish on final descent with FLAPS 1 & S speed at or above 2000 ft AGL. If tailwind > 20 kts or GS angle is > 3.5° then an early stabilized approach is recommended.
- If Intercepting < 2000 ft AGL, Flaps 2 at one dot below flight path. SPD brakes not recommended below 2000 feet.
- One green triangle (and also “LDG GEAR DN” MEMO message) is sufficient to indicate gear down-locked.
- Alternate braking test at lowering gear may leave residual pressure. Apply residual braking procedure in that case.
- Retract speed brakes before selecting full flaps. To minimize flaps wear, extend flaps at VFE-15 when possible.
- “ON” only in severe icing (5mm+ accretion). With ice accretion, min speed should be VLS+10 in all CONF & VLS+5 in Full CONF. If there is ice accretion & wing anti-ice is not operative, then min speed should be VLS+10 / Green dot.
- LDG Memo appears at < 2000 ft. On GA if climb < 2200 ft, then on subsequent approach it will appear at < 800 ft.
- Stabilization height 1000 for CAT I & 1500 for CAT II/III. SPEED +10/-5 Kts (if tailwind at landing > 10kts, decelerated approach not permitted) – PITCH +10°/-2.5° – BANK 7° – SINK RATE 1000 fpm – LOC/GLIDE: ½ dot. Hands on thrust levers & sidestick with THRUST not below required minimum. All briefings & CHECKLISTS COMPLETED.

AUTOLAND WARNING



FLASHES when:

- The aircraft is close to the ground (<200ft), and
- AP is supposed to land the aircraft (engaged in LAND or FLARE mode), and
- Something from the following happens:
 - AP does not do what it is supposed to do:
 - Disengages
 - Long Flare
 - LOC problem (above 15 feet):
 - LOC deviation exceeds ¼ dot (scale flashes)
 - LOC signal is lost (FD vertical bar flashes)
 - GLIDE problem (above 100 feet):
 - GLIDE deviation exceeds 1 dot (scale flashes)
 - GLIDE signal is lost (FD horizontal bar flashes)
 - RA Problem:
 - They don't agree (difference greater than 15ft)

GO AROUND

	PF	PM
Initial Actions Simultaneously	Thrust Levers – TOGA ¹ Rotation – Perform ² Announce – Go Around Flaps	Verify if safely established in a Go-Around “Pitch and Power”
FMA	Announce ³	Flaps 1 notch up (if full then 3, if 3 then 2)
Positive Climb	L/G UP	
FCU	NAV / HDG – As Required ⁴ AP – As Required ⁵	Go Around Altitude – Check
Thrust Reduction ALT	Thrust Levers – CL	
Acceleration ALT	• Target Speed – Green Dot ⁶ • F Speed – Flaps 1 Order • S Speed – Flaps 0 Order	• F Speed – Flaps 1 Select <i>No Stopping at Flaps 2</i> • S Speed – Flaps 0 Select • Ground Spoilers – Disarm • Lights – Nose/Turnoff OFF ⁷
Plan of Action	• Divert – Enable Alternate • Second Approach – Activate Approach Phase	

1. TOGA detent engages the go around phase with associated AP/FD modes. If TOGA thrust is not required then thrust levers can be retarded after briefly putting them in TOGA detent. CL detent gives the benefit of A/THR.

2. Initially pitch 15° with all engine operating and approximately 12.5° with one engine, thereafter follow FD SRS.

3. MAN TOGA / SRS / GA TRK / A/THR in Blue.



4. Minimum 100 feet.

5. Go-around can be flown with both autopilots. Engagement of any other mode disengages AP2.

6. If speed does not increase, then check and pull the ALT knob.

7. Other lights as per policy.

RNAV (GNSS) APPROACH ¹ – FINAL APP GUIDANCE ²

	PF	PM
Descent Prep	- Aircraft Equipment – Check ³ - GPS Primary Availability – Check for RNAV(GNSS) Approach - F-PLN A – Set and Compare MCDU & Charted Paths ⁴	
	Go Around Strategy – Review ⁵	Weather – Check OAT and QNH ⁶
10,000 Feet	- GPS Primary – Check Availability ⁷ - NAV Accuracy – Check ⁸ - BARO Ref – Set ⁹	
Cleared for Approach	- APPR – Press ¹⁰ - APP NAV – Check armed / engaged - FINAL – Check armed ¹¹ - Configuration (as req for): - Decelerated approach. - OR - Early stabilized approach.	
Final Descent Point (FDP)	- FINAL APP – Check Engaged - Go Around Altitude – Set - Flight Parameters – Monitor ¹²	
Minimum + 100		ONE HUNDRED ABOVE – Monitor / Announce
Minimum	Announce: - Continue: AP/FD – As Required ¹³ - Go Around	MINIMUM – Monitor / Announce

1. ICAO PBN Equivalence: RNP APCH = RNAV (GNSS), RNP AR APCH = RNAV (RNP). For a planned NPA at destination, planning minima for destination's alternate will be NPA minima with RVR +1000m and MDA +200 feet.
2. For RNAV/GNSS approaches with LNAV & LNAV/VNAV minima & for conventional VOR/NDB approaches.
3. PRO-SPO-51 RNP APCH.
4. For "Too Steep Path" message after FDP, don't use FINAL APP guidance, use NAV/TRK FPA. MCDU & charted path tolerances are: 0.1° for vertical path & 1° for lateral track. For radio NAVAID approach; 3° for lateral track.
5. Degraded Nav Management: For RNAV(GNSS) with LNAV & LNAV/VNAV minima: Continue if GPS primary is lost on 1 ND only or NAV accuracy is downgraded on 1 FMGS only, otherwise discontinue. Also discontinue for position disagree. For VOR/NDB: Continue with raw data in NAV FPA for unsat vertical guidance & TRK FPA for unsat lateral guidance.
6. If OAT < Min Charted Temp, no vertical managed guidance. For ALT temp correction, use FS>INFLIGHT>ATMO. For RNAV (GNSS) APP with LNAV/VNAV minima, remote station QNH is prohibited.
7. On at least 1 FMS for RNAV(GNSS).
8. In case of low accuracy use TRK FPA mode.
9. Maximum discrepancy between altimeters is 100ft.
10. FDP is the waypoint from which starts the FMS segment with coded FPA, defined in NAV database by (i) a constant vertical flight path beyond this point (ii) a coded altitude constraint that may be "at" or "at or above". It is at or before FAF from which a constant vertical flight path is defined. It is recommended to arm the APPR mode when the TO waypoint is the FDP. If pressed earlier, FINAL APP mode may engage. Consequently, resulting speed and altitude management in FINAL APP may be inappropriate before FDP.
11. At the FDP, a blue arrow on the ND indicates FINAL APP engagement conditions are met, triggering automatic final descent. If conditions are unmet, the arrow appears white, and descent will not start automatically.
12. Check altitude at FAF and published points on the final leg. For RNAV(GNSS), XTK error must stay ≤0.1 nm; discontinue if >0.3 nm. With LNAV/VNAV minima, VDEV must stay ≤1/2 dot (50 ft); discontinue if >3/4 dot (75 ft).
13. If MAP not at RWY threshold, final segment not aligned with RWY track, strong offset between final segment & RWY threshold then AP/FD OFF at minima else AP/FD can be kept engaged below minima. Minimum use height for the AP in approach with FINAL APP, V/S or FPA mode is 250 ft AGL. After MAP disregard FD as it reverts to HDG/VS.

RNAV (GNSS) APPROACH – FPA GUIDANCE ¹

	PF	PM
Descent Prep	- Aircraft Equipment – Check ² - GPS Primary Availability – Check for RNAV(GNSS) Approach - F-PLN A – Compare MCDU & Charted Paths ³	
	Go Around Strategy – Review ⁴	
10,000 Feet	- GPS Primary – Check Availability ⁵ - NAV Accuracy – Check ⁶	
On Final Intercept HDG	- Lateral Guidance – Set (NAV / LOC) - Call for Flaps 1 - TRK/FPA – Select - Lateral Path – Intercept	
Before Final Descent Point ⁷	5 NM from FDP – Flaps 2 4 NM from FDP – L/G Down 3 NM from FDP – Flaps 3 2 NM from FDP – Flaps Full 1 NM from FDP – FPA Set 0.3 NM from FDP – FPA Engage + GA Altitude Set (when below GA altitude)	
After Final Descent Point	- Position / Flightpath – Adjust - Flight Parameters – Monitor ⁸	
Minimum + 100		One Hundred Above – Monitor / Announce
Minimum ⁹	Announce: - Continue: ➤ AP, FD – OFF ➤ Runway Track – Check Set (if req.) - Go Around:	MINIMUM – Monitor / Announce

1. For RNAV(GNSS) approaches using mixed NAV FPA guidance with LNAV minima only and for conventional VOR/NDB approaches using mixed NAV FPA or TRK FPA guidance. Also, for LOC only and BC approaches. Use TRK FPA if approach is not stored in database or nav accuracy is low.

2. PRO-SPO-51 RNP APCH.

3. Set VAPP at FDP. Disregard V/DEV info (yoyo) on PFD if “Too Steep Path” message appears after FDP. MCDU & charted lateral path tolerance in NAV FPA is 1° for RNAV (GNSS) and 3° for conventional radio NAVAID approach. In all other cases use TRK FPA mode.

4. Degraded Navigation Management: For RNAV(GNSS) with LNAV: Continue if GPS primary is lost on one ND only or nav accuracy is downgraded on one FMGS only, otherwise discontinue. Also discontinue for position disagree and when XTK error is >0.3 NM. For VOR/NDB in NAV FPA: Continue with raw data in TRK FPA for unsat lateral guidance.

5. On at least 1 FMS for RNAV(GNSS).

6. In case of low accuracy use TRK mode.

7. It is recommended to use early stabilized approach technique for vertically selected approaches. FDP is the ✕ symbol (Maltese Cross) on the approach chart if final approach guidance is not used.

8. For NAV FPA XTK error not >0.1nm. For LOC/BC lateral guidance not > ½ dot. For TRK mode, lateral limit is ½ dot or 2.5° for VOR & 5° for NDB. Cross check distance vs altitude and raw data in case of conventional NAVAID.

9. To prevent descending below MDA(H) add 50 feet margin for all NPA including where DA/MDA(H) is given. This shall not be applicable where LNAV/VNAV minima is used. (Ref: Bulletin FLTOPS/SI/1/Thu Jan 03 2019).

COMPARISON OF AN RNAV (GNSS) APPROACH WITH FINAL APP OR FPA GUIDANCE

Setting aside an overwhelming number of steps, a simplified common procedure to highlight and understand the basic difference between an RNAV GNSS approach flown with an FPA guidance and an RNAV GNSS approach flown with the Final Approach guidance is as follows:

- Approach at Green Dot speed.
- On final intercept heading or base leg, select Flaps 1 and fly the S Speed.
- Lateral Guidance – NAV / LOC to capture the centerline.
- 2 min before FDP, start configuring for flaps 2, gears down, flaps 3 and flaps full.

If S speed is around 180-190 knots, 2 mins would be roughly 6 nm. This is more flexible (especially for a last-minute change in approach) than the typical 5,4,3,2,1 method as you don't have to go heads down in FMS and Charts to plan and visualize your deceleration and configuration points. Just knowing the ETA of FDP would be enough.

- 1 nm from FDP:
 - For FPA Guidance:
 - Select TRK / FPA.
 - Set required FPA.
 - Engage FPA at 0.3 nm from FDP.
 - For Final APP Guidance:
 - Arm APPR
 - Check Arming / Engagement.
- GA Altitude Set when below GA altitude.

RNP APCH / RNAV(GNSS)

RNP APCH operations correspond to RNAV(GNSS) or RNAV(GPS) operations. The minimum equipment required to start RNP APCH operations is:

- One FMGC
- One GPS
- Two IRS
- One MCDU
- One FD
- One PFD on the PF side
- Two NDs (temporary display of ND info via PFD/ND switch is permitted on PM side)
- Two FCU channels.

VOR APPROACH IN (TRK / FPA) SELECTED MODE

Radar Vectors:

- On Final Intercept Heading:

- TRK/FPA
- Rose VOR (PF), NAV (PM)
- Flaps 1

Note: Make the "V" for VOR

- On Final Inbound Leg before FDP:

- 5 NM from FDP – Flaps 2
- 4 NM from FDP – L/G Down
- 3 NM from FDP – Flaps 3
- 2 NM from FDP – Flaps Full
- 1 NM from FDP – FPA Set
- 0.3 NM from FDP – FPA Engage + GA Altitude Set (below GA altitude)

- On Final Inbound Leg after FDP:

- Flight Parameters – Monitor (distance vs altitude and raw data)
- Position / Flightpath – Adjust

- At Minimums (if landing):

- AP – OFF
- FD – OFF
- RWY TRK – Check Set



Overhead VOR:

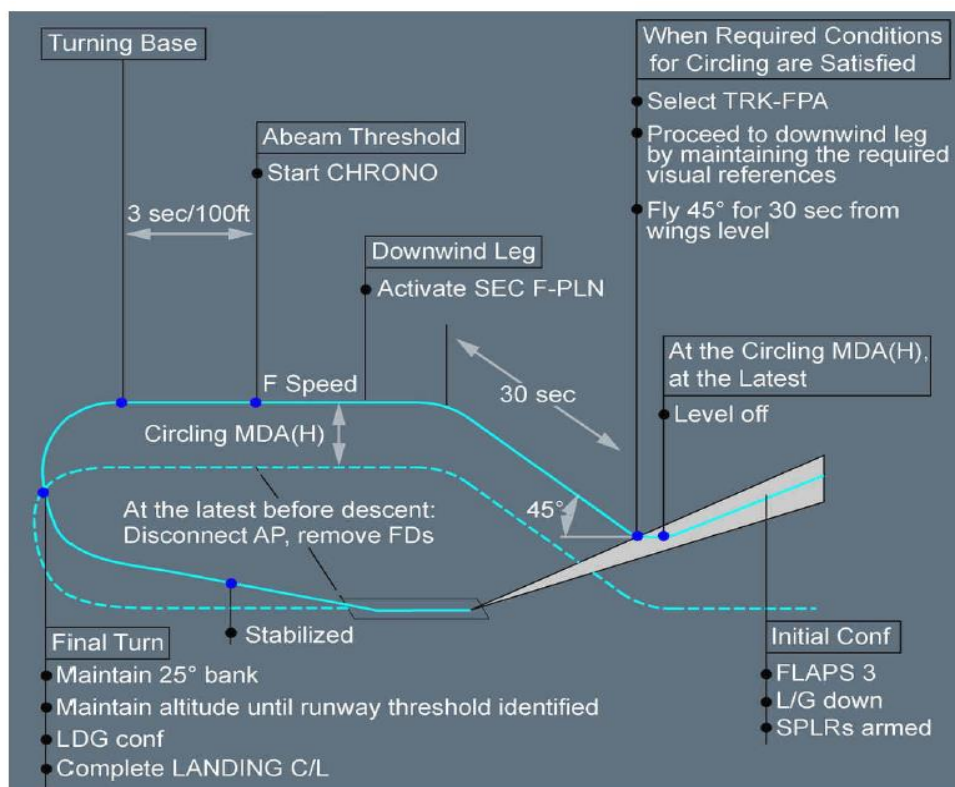
- Activate approach phase.
- 3nm short of overhead position – Select flaps 1 and make the "V" for VOR as mentioned above.
- Fly the outbound leg and approximately 1nm before the end of the outbound leg, set inbound course on RAD NAV page for both pilots.
- At the start of procedure turn, maintain procedure turn altitude until established on inbound course (half the full-scale deflection for VOR and $\pm 5^\circ$ for NDB).
- On inbound track – 5nm from FDP – Carry out the same steps mentioned above.

CIRCLING APPROACH

Prerequisites	- Higher of the following: - Published minima on charts. - MDH 600 ft AGL, Visibility 2400 meters. - F-PLN – Approach & Missed Approach Procedure - SEC F-PLN – Copy Active F-PLN & Revise Runway ¹
Approach	- Speed – F Speed (also insert it as a constraint at FDP) - Configuration – L/G Down, CONF 3 & Spoilers Armed
Circling	- MDA - Level off and set G/A altitude - Select TRK FPA and proceed to downwind (45° for 30s) - Downwind – Activate SEC F-PLN - Abeam Threshold – Check time 3 sec/100 feet - Before Descending to Runway – AP/FD OFF - Landing Configuration – As appropriate (ensuring early stabilization) - Landing Checklist – Complete

1. When SEC F-PLN is activated, the G/A procedure in the FMS is associated with landing runway and not with instrument approach, therefore if visual references are lost, initiate a go around using selected guidance, following the missed approach of the initial instrument approach (unless otherwise specified). The transition from the visual (circling) maneuver to the missed approach should be initiated by a climbing turn, within the circling area, towards the landing runway, to return to the circling altitude or higher, immediately followed by interception and execution of the missed approach procedure.

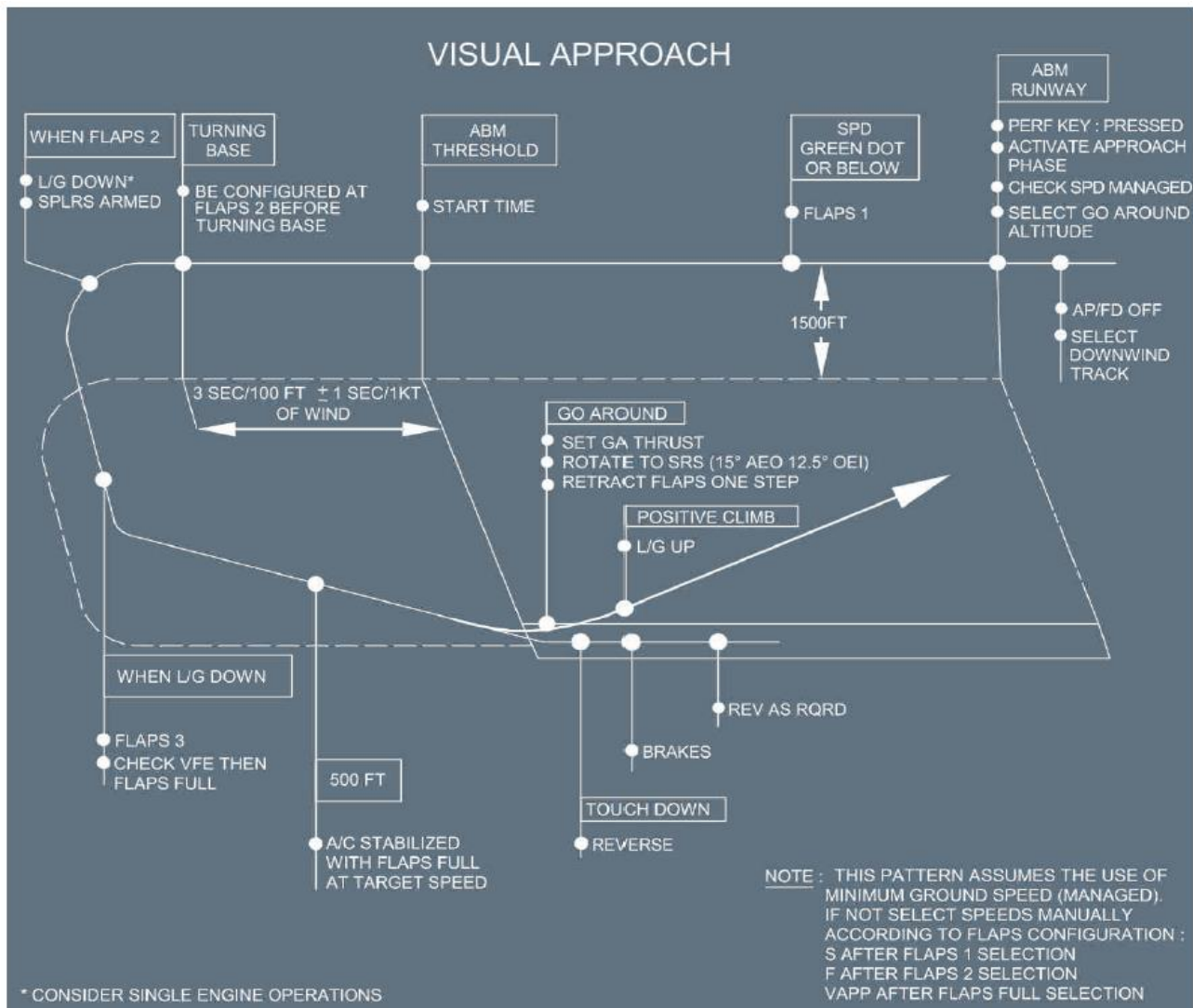
Note: For a planned circling approach at destination, company planning minima for destination's alternate will be circling minima.



VISUAL APPROACH

A visual approach shall ONLY be accepted if following criteria is met:

- Visibility is more than 5 km.
- Positive contact with the ground.
- Vertical distance from cloud base at least 2000ft.
- Any other proceeding traffic is in sight.
- During day only.



VISUAL APPROACH (TAKEOFF AND LANDING)

- Select ND mode selector to Rose NAV & RANGE 10 NM.
- Landing runway should be selected on MCDU, however visual references must be used for flying.
- After Airborne – LG UP & Pull Heading
- Climb to 1500 feet circuit height.
- Select Flaps 1 & Activate Approach.
- FDs OFF – Bird ON – Set Downwind Track.
- Consider wind vector (top left corner of ND) for bank angle selection. In headwind bank less (about 15°) and for tailwind bank more (about 25°) so that the downwind is at about 2.5 – 3 nm (margin of inner range circle).
- Approach Checklist.
- Abeam threshold check time for 45 secs (3 sec/100 feet, ±1 sec for wind).
- Approaching end of downwind – Flaps 2
- End of downwind turning for base – Gears down and then Flaps 3
- On base leg descend at about 300-400 fpm and Flaps Full
- Landing checklist
- Stabilize by 500 feet.

LANDING ¹

	PF	PM
Approx. 30 Feet	Flare – Perform ² Thrust – Idle ³	Attitude – Monitor ⁴
Touchdown ⁵	De-Rotation – Initiate Reverse – Idle or Max	Spoilers – Check / Announce: “SPOILERS / NO SPOILERS” ⁶ Reversers – Check Announce: “REVERSE GREEN / NO REVERSE”
Brakes	As Required ⁷	Deceleration – Check / Announce: “DECEL / NO DECEL”
70 Knots	Thrust Levers – Reverse Idle	“70 KNOTS” – Announce ⁸
Taxi Speed	Reversers – Stow ⁹	
Before 20 Knots	Autobrake – Disengage	

1. Line Captain to perform landing if (1) crosswind > 15 knots (2) contaminated or slippery runway (3) any abnormality (4) cloud base less than 1000 ft above runway threshold for a non-precision approach and less than 500 ft for a precision approach.

2. Typical pitch increment in the flare is approximately 4°, which leads to -1° flight path angle associated with a 10 knots speed decay. Do not allow the aeroplane to float.

3. In manual landing “Retard” call out is triggered at 20 feet as a reminder to retard thrust levers to idle. At the latest, thrust levers shall be at IDLE detent upon touchdown. Ground spoilers are inhibited if this is not done.

4. Pitch <10° and Bank <7°. PM to call “PITCH, PITCH” if pitch reaches 10°. Tailstrike occurs if pitch >13.5 (11.5 with gears compressed). PM to call “BANK, BANK” if bank angle reaches 7°. Wingtip or engine scrape occurs if roll >20 (16 with gears compressed).

5. A landing should not be attempted immediately after high bounce, as thrust may be required to soften the second touchdown and the remaining runway length may not be sufficient to stop the aircraft.

6. If no spoilers: Verify both levers at idle or reverse detent. Set both levers to max reverse and fully press brake pedals. If spoilers not armed: Reverse thrust selection will extend them.

7. Autobrake is not activated if ground spoilers are not activated.

8. If FO is PF, he will transfer control to Captain and will assume PM duties.

9. On snow-covered grounds stow at 25 kts and for autoland stow reversers at the end of rollout along with disengaging the autopilot. Do not move thrust levers beyond FWD IDLE position.



AFTER LANDING

	PF	PM
Ground Spoilers	Disarm	Cue to start the procedure
	Exterior Lights – Set ¹	• Radar – OFF • PWS – OFF • Engine Mode Selector – Norm • Flaps – Retract ² • TCAS – Standby • ATC – AS required • APU – Start ³ • Anti-ice – As required ⁴ • Brake Temperature – Check ⁵
Checklist ⁶	AFTER LANDING RADAR & PRED W/S.....OFF	

1. Strobe AUTO after vacating runway, Landing lights retract, Others as required.

2. a) Cold Weather Check: Set flaps 0 except if approach was in icing conditions or runway is contaminated. Ground crew will have to check for obstructing ice before retraction.

b) Hot Weather Check: On ground, hot weather may cause overheating to be detected around the bleed ducts in the wings, resulting in "AIR L (R) WING LEAK" warnings. This can be avoided by keeping the slats in Configuration 1 when the OAT is above 30°C. In case of terminating flights where securing aircraft C/L is to be completed, flaps should be retracted to position 0.

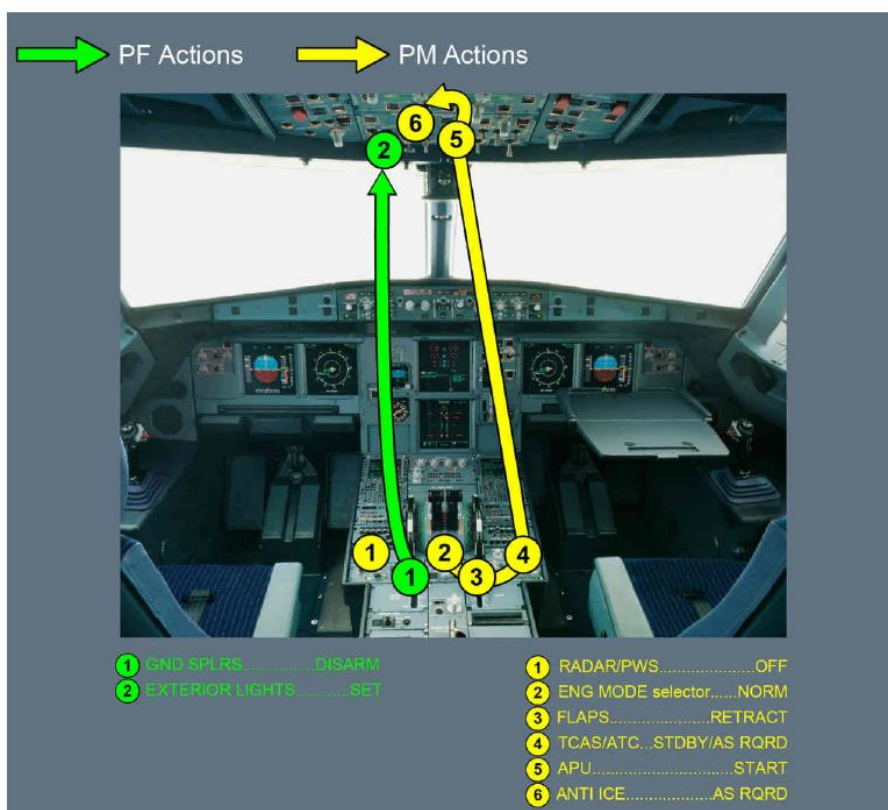
3. Delay as long as possible. Use 1 Pack if possible and change packs between flights to avoid wear on 1 pack.

4. Engine ice shedding procedure if required is available in PRO-NOR-SUP-ADVWXR.

5. Delay brake fans for at least 5 min after landing or before stopping at the gate (whichever occurs first). If turnaround time is short or brake temperature is likely to exceed 500°C, use brake fans disregarding the above restriction. Maintenance action is due if (1) One brake temp exceeds 900°C. (2) Temperature difference between two brakes of a gear is more than 150°C with one brake equal to or more than 600°C OR equal to or below 60°C. (3) Average temperature difference of left and right gear brakes is equal to or above 200°C.

6. PF checks on the pedestal that weather radar and predictive windshear are OFF and then announces "OFF".

AFTER LANDING FLOW PATTERN



ONE ENG TAXI AT ARRIVAL ¹

	PF	PM
Cooling Time Elapsed		Announce ²
Taxi	Taxi in a Straight Line	
Eng 2 Shut Down	Order	
APU Start		Check AVAIL
Eng 2 Anti Ice		OFF
Eng 2 Master Lever		OFF ³
Eng 2 Parameters		Check
Yellow Electric Pump		ON ⁴

1. No less than 3 min after high thrust operations. Routine cooling periods that last less than the recommended time, can result in engine degradation.

2. If the flight crew used idle reverse thrust for landing and normal thrust to maneuver during taxi after landing, the cooling period starts when the flight crew retards the thrust lever during the flare. If the flight crew used maximum reverse thrust for landing, the cooling period starts when the flight crew sets the thrust lever to idle reverse during the landing rollout.

3. If JP4 fuel is used at ambient temperatures higher than 10°C, dry motor the ENG 2 for 2 min after ENG 2 shutdown. This dry motor period should start approximately 90s after the ENG 2 MASTER lever is selected OFF.

4. This avoids running the PTU.



PARKING ¹

	PF	PM
Parked at Gate ²	ACCU Pressure – Check ³ Parking Brakes – ON ⁴ Brake Pressure Indicator – Check	Anti-Ice – OFF APU: ○ Available – APU Bleed ON ⁵ ○ Not Available – EXT PWR ON
Yellow Electric Pump	OFF (before Eng 1 shutdown)	
Engines	Engine Master Switch – Both OFF ⁶	Engine Parameters – Monitor
Misc. Do Items	Wing & Beacon – OFF ⁷ Other EXT Lights – As Req.	Cabin Crew – Advise on PA ⁸
	Slides – Check Disarmed	
	Seat Belts – OFF	Fuel Pumps / CTR XFR Valves – OFF ATC – Standby Brake Fan – As Required
Ground Contact	Confirm – Chocks in Place Parking Brake – As Required ⁹	
Checklist	PARKING PARK BRK OR CHOCKS.....SET ENGINES.....OFF WING LIGHTS.....OFF YELLOW ELEC PUMP.....OFF	
Performance Monitoring	I	IRS – Check Performance ¹⁰
	F	Fuel Quantity – Check ¹¹
	E	ECAM – Check Status
Display Units	Dim	
Report ¹²	Severe Icing Conditions	
EFB	As Req	
1. Prior to performing this, consider “Ground Operations in Heavy Rain” (PRO-NOR-SUP-ADVWXR). In heavy rain, water may enter the avionics ventilation system via the skin air inlet valve. EXTRACT Pb to OVRD will close the inlet valve but will cause reduction in cooling. So, packs should be on for air-conditioning to compensate the cooling reduction. 2. On entering the apron, taxi speed should not exceed 5 knots & taxi lights OFF on final turn to parking stand. 3. In case of low pressure, chocks are required before engine 1 shutdown. 4. If one brake temperature is >500°C (or 350 with fans on), avoid parking brakes unless necessary. 5. Just before engine shutdown to avoid exhaust fumes. 6. No less than 3 minutes after high thrust operation. Check engine parameters decreasing. 7. After confirming that all engines have spooled down. 8. "Cabin Crew Prepare for Arrival, Disarm Door Slides and Cross Check". In case of U/S APU and if there is any delay in connecting the GPU, carry out disarming announcement before engine shutdown. 9. Release parking brakes after chocks are on if one brake temp > 300°C (150 with fans on). This prevents critical structures from being exposed to high temp. If necessary (slippery tarmac), keep parking brakes on. Do not press brake pedals before releasing parking brake in order to avoid activation of the “Zero Torque Pressure Function”, which makes the alternate brake pistons to remain in close proximity with the carbon discs, even after parking brake is released. However, press brakes after parking brake release, if req. With a flat nose gear tire, keep parking brake on, to avoid aircraft yawing at brake release. 10. NAV TIME is the cumulated block time since the latest IRS alignment (fast or complete). On MCDU POSITION MONITOR page, read the deviation of each IRS position from the FMGC position and check that the value does not exceed the limits mentioned in FCOM PRO-NOR-SOP-22, Parking Procedures (graph shown on the next page). 11. FOB + FU = Departure Fuel. If not (unusual discrepancy) then maintenance action is due. On terminating flights, mention arrival fuel in tech log & time of this entry (min 5 minutes after engine shutdown for fuel quantity on gauges to settle down) for fuel control monitoring (Circular Ref: FLTOPS/SI/10/FriApr192019). 12. Report severe icing conditions in logbook, requiring inspections of “engines fan acoustic panels” during walkaround.		

→ PF Actions → PM Actions

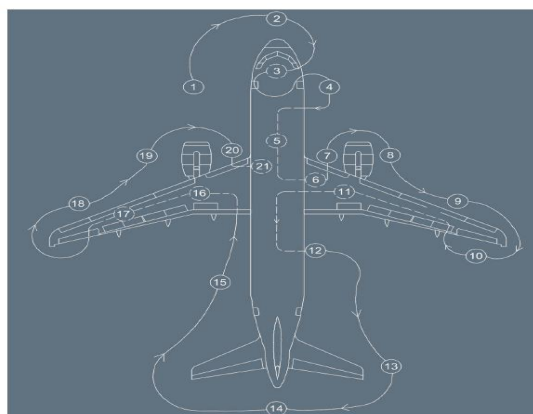
1 ACCU PRESS.....CHECK
 2 PARK BRK handle.....ON
 3 YELLOW ELEC PUMP pb-sw. OFF
 4 ALL ENG MASTER LEVERS. OFF
 5 EXTERIOR LIGHTS.....OFF
 6 SLIDES.....CHECK DISARMED
 7 SEAT BELTS sw.....OFF
 8 ANTI ICE.....OFF
 9 APU BLEED pb-sw.....AS RQRD
 10 FUEL PUMPS.....OFF
 11 ATC.....STBY
 12 IRS PERFORMANCE.....CHECK
 13 FUEL QUANTITY.....CHECK
 14 FUEL QUANTITY.....CHECK



SECURING THE AIRCRAFT ¹

	CM1	CM2
Do Items	Parking Brake – Check ON ² ADIRS – All IR Mode Selectors OFF ³	Oxygen Crew Supply – OFF Exterior Lights – OFF Maintenance Bus – As required ⁴ APU – Bleed and Master switch OFF ⁵ Emergency Exit Lights and Signs – OFF External Power – As Required Battery – 1 & 2 OFF ⁶
Checklist ⁷	SECURING THE AIRCRAFT OXYGEN.....OFF EMER EXIT LT.....OFF BATTERIES.....OFF	
EFB	Application Close and EFB OFF	
1. Prior to this, adverse weather supplementary procedures (PRO-NOR-SUP-ADVWXR) should be taken into account. Apply this procedure when last passenger has left and securing of aircraft is intended (aircraft unattended: i.e. no qualified flight or ground crew in the cockpit to supervise and monitor). 2. Keep it on to reduce the hydraulic leak rate. 3. To avoid damage to Rudder Travel Limit Unit mechanical stop, the SLATS/FLAPS should be retracted before all ADIRS are set to OFF simultaneously. After ADIRS shutdown wait 10s before electrical shutdown, for ADIRS to memorize the most recent data. 4. If ELEC power is required for servicing, set overhead MAINT BUS sw (FWD Cabin) ON, before setting a/c power off. 5. APU to be kept ON for disembarkation but will be shut down after GPU & AC van is connected, regardless of transit time. APU operational costs & environmental impact mandates minimizing its usage so GPU & AC van will be requested on arrival at both domestic & international stations. Local restrictions to APU usage will always have priority. 6. Wait till APU flap is closed (about 2 min after the APU AVAIL light goes out) otherwise it may cause smoke in the cabin during the next flight. With batteries off and APU running, APU fire extinguishing is not available. 7. This checklist is “Read and Do” type.		

POST FLIGHT EXTERIOR INSPECTION



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