U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: PARTS 91, 121, 125, AND 135 FLIGHTCREW PROCEDURES DURING TAXI OPERATIONS	Date: 9/26/03	AC No: 120-74A
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1. PURPOSE. This Advisory Circular (AC) provides guidelines for the development and implementation of standard operating procedures (SOP) for conducting safe aircraft operations during taxiing. It is intended for use by persons operating aircraft **with two or more pilots on the flightdeck** under parts 91, 121, 125, and 135 of Title 14 of the Code of Federal Regulations (14 CFR). The Federal Aviation Administration (FAA) recommends that these guidelines become an integral part of all SOPs, flight operations manuals, and formal flight crewmember training programs. The use of flightcrew SOPs should be emphasized and employed during all phases of flight, including ground operations. Appendices 1 through 7 of this AC contain examples of SOPs that are identical or similar to some SOPs currently in use. These appendices are not directive or prescriptive in nature and do not represent a rigid FAA view of best practices. SOPs may vary among fleets and among certificate holders and may change over time. Operators may integrate the information contained in appendices 1 through 7 into their fleet-specific, route-specific, and equipment-specific operations and checklists. They are shown to denote how the SOPs and best practices can be integrated into the context of specific flight operations.

> **NOTE: Pilots operating aircraft single-pilot under 14 CFR part 91 and part 135, should refer to the current version of AC 91-73, Part 91 and Part 135 Single-Pilot Procedures During Taxi Operations.**

A vertical bar in the left margin identifies revised, added, or deleted text from AC 120-74.

2. CANCELLATION. AC 120-74, Part 121, 125, and 135 Flightcrew Procedures During Taxi Operations, dated June 18, 2001, is canceled.

3. FOCUS. This guidance focuses on the activities occurring within the cockpit (e.g., planning, communicating, coordinating) as opposed to the actual control of the aircraft (e.g., steering, maneuvering). Taxi operations present distinct challenges and requirements not found in other phases of flight operations. These distinct challenges are elaborated, when necessary, throughout the guidance. A section is provided concerning operations at airports without operating control towers. Finally, a section is included on the use of exterior aircraft lights during ground operations.

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4. RELATED READING MATERIAL. The current versions of the following documents contain useful information regarding runway safety. FAA ACs can be found online by choosing "Advisory Circulars" on the menu at: http://www.airweb.faa.gov/rgl.

a. Aeronautical Information Manual (AIM).

b. AC 90-42, Traffic Advisory Practices at Airports Without Operating Control Towers.

c. AC 90-66, Recommended Standard Traffic Patterns and Practices for Aeronautical Operations at Airports Without Operating Control Towers.

d. AC 120-57, Surface Movement Guidance and Control System.

e. AC 120-71, Standard Operating Procedures for Flightdeck Crewmembers.

5. BACKGROUND. The process of getting to and from a runway has become increasingly complex. This is mainly due to the increase in number of aircraft, takeoff times being held more closely to a set schedule, and all the varied combinations of weather, time of day, aircraft type, and language usage, to name a few. While flightcrew experience is gained during actual ground operations, a more defined and determined approach to training flightcrews is seen as beneficial to both the safety and efficiency regarding operations to and from the runway. Training procedures for airport surface operations should be seen as an integral part of an operator's overall ground and flight training programs. This AC develops practical guidance toward the goal of increasing safety and efficiency of aircraft movement on the airport surface.

a. Increased traffic and expansion at many airports create complex runway and taxiway layouts. This additional complexity has made airport surface operations more difficult and potentially more hazardous than they were in the past. To increase safety and efficiency, it is necessary to lessen the exposure to hazards and risks by holding the flightcrew's workload to a minimum during taxi operations. This can be accomplished through SOPs that direct the attention of the flightcrew to essential tasks while the aircraft is in motion. The development and formalized training of safe operating procedures during taxi operations should be implemented by each operator.

b. In developing these SOPs, it is important to consider flightcrew workload prior to takeoff and before landing. Considerations should be given to tasks that make up the normal workload of flightcrews, such as accomplishing checklists, configuring the aircraft for takeoff and landing, programming Flight Management Systems (FMS), and managing communications with the carrier and Air Traffic Control (ATC). The more complex the activities within the flightdeck work environment, the greater the need for explicit, yet simple, and clear SOPs. The overall goal is for operators to develop standardized flightcrew procedures that will increase the flightcrew's awareness but will not increase their workload while the aircraft is taxiing.

6. FLIGHTCREW PROCEDURES.

a. General. The potential for runway incidents and accidents can be reduced through adequate planning, coordination, and communication. The following guidelines are intended to help flightcrews cope more effectively with current airport conditions during taxi operations. All flight crewmembers, regardless of whether they are designated as the pilot in command (PIC), second in command (SIC), or the flight engineer (FE), will benefit from this guidance. The guidelines are grouped into six major categories: Planning, Situational Awareness, Use of Written Taxi Instructions, Intra-Flightdeck/Cockpit Verbal Coordination, ATC/Flightcrew Communication, and Taxiing.

b. Planning.

(1) Thorough planning for taxi operations is essential for a safe operation. Flightcrews should plan for the airport surface movement portion of the flight just as they plan for the other phases of flight. Planning for taxi operations should be an integral part of the flightcrew's flight planning process and should be completed in two main phases:

(a) First, flightcrews should anticipate airport surface movements by conducting pre-taxi or pre-landing planning based on information on the automatic terminal information service (ATIS), previous experience at that airport, and review of the airport diagram.

(b) Second, once taxi instructions are received, the pre-taxi plans should be reviewed and updated as necessary. It is essential that the updated plan be understood by all flight crewmembers.

> **CAUTION: A potential pitfall of pre-taxi and pre-landing planning is setting expectations and then receiving different instructions from ATC. Flightcrews need to follow the clearance or instructions that are actually received, and not the ones the flightcrew expected to receive.**

(2) The following guidance should be used to conduct a briefing of all flight crewmembers.

(a) How familiar are the flight crewmembers with the airport? Has anyone flown out of or into the airport recently? Have there been changes made at the airport recently? Flightcrews should remember to review the latest Notices to Airmen (NOTAM) for both the departure and arrival airports for information concerning construction and/or taxiway/runway closures.

(b) Flightcrews should:

1 Take some time and study the airport layout. An airport diagram should be readily available for use by the pilots (see following NOTE on Use of Airport Diagrams). Pre-taxi plans should focus on the departure airport, and pre-landing plans should focus on the arrival airport.

2 Check the expected taxi route against the airport diagram or taxi chart.

3 Pay special attention to any unique or complex intersections along the taxi route.

4 Identify critical times and locations on the taxi route (transitioning through complex intersections, crossing intervening runways, entering and lining up on the runway for takeoff, and approaching and lining up on the runway for landing) where verbal coordination between the PIC and the SIC will be important for correct aircraft navigation and crew orientation.

NOTE: Use of Airport Diagrams

Under parts 121, 125, and 135, there are explicit requirements for either the use or availability of "Aeronautical Charts." A type of "Aeronautical Chart" as defined in the AIM is an "Airport Diagram." Parts 125 and 135 [§§ 125.215 and 135.83] require "pertinent aeronautical charts" to be accessible to the pilot at the pilot station, and to be used by the pilots. Part 121, §121.549 requires "Aeronautical Charts" to be available on the aircraft; however, many operators require "Airport Diagrams" to be available for use by flightcrews.

While there may be many views regarding the use of "Airport Diagrams" during taxi operations, the FAA believes that following the aircraft's progress on the airport diagram to be sure that the instructions received from ATC are being followed is one of the key procedures in reducing runway incursions. This procedure is of particular importance at a time when it is easy to allow oneself to be distracted by outside events. Finally, from a safety argument, the use of "Airport Diagrams" during taxi operations makes perfect sense and should be the SOP for all flightcrews.

(c) The flightcrew should plan the timing and execution of aircraft checklists and company communications at the appropriate times and locations so the pilot who is not taxiing the aircraft can be available to participate in verbal coordination with the pilot who is taxiing the aircraft. This action is needed to confirm compliance with ATC taxi instructions at the appropriate times and locations. When planning these tasks, flightcrews should also consider the anticipated duration of the taxi operation, the locations of complex intersections and runway crossings, and the visibility along the taxi route. If possible during low visibility operations, flightcrews should conduct pre-departure checklists only when the aircraft is stopped or while taxiing straight ahead on a taxiway without complex intersections.

c. Situational Awareness.

(1) When conducting taxi operations, flightcrews need to be aware of their situation as it relates to other aircraft operations going on around them as well as to other vehicles moving on the airport. The flightcrew should know the aircraft's precise location on the airport. Sometimes

this is a challenge, especially when flightcrews are at an unfamiliar airport, the airport layout and taxi routes are complex, or the visibility is poor. It is important for the flightcrew to:

(a) Understand and follow ATC instructions and clearances;

(b) Have an airport diagram available for use; and

(c) Know and use all of the visual aids available at the airport, such as the signs, markings, and lighting.

(2) Flightcrews should use a "continuous loop" process for actively monitoring and updating their progress and location during taxi. This includes knowing the aircraft's present location and mentally calculating the next location on the route that will require increased attention (e.g., a turn onto another taxiway, an intersecting runway, or any other transition points). **Use all resources available (heading indicators, airport diagrams, airport signs, markings, lighting, and air traffic control – ground and/or tower) to keep the aircraft on its assigned taxi route.** As the "continuous loop" is updated, flight crewmembers should verbally share relevant information with each other.

(a) Situational awareness is enhanced by monitoring ATC instructions or clearances issued to other aircraft. Flightcrews should be especially vigilant if another aircraft is on frequency that has a similar call sign. Care should be taken to not inadvertently execute a clearance or instruction for another aircraft.

(b) Prior to entering or crossing any runway, flight crewmembers should scan the full length of the runway and scan for aircraft on final approach or landing roll out. They should verbally confirm scan results with each other. Aircraft movement should be stopped if there is any difference or confusion on the part of any flight crewmember about the scan results.

CAUTION: Do not stop on a runway. If possible, taxi off the runway and then initiate communications with ATC to regain orientation.

(c) Flightcrews should be especially vigilant when instructed to taxi into "position and hold," particularly at night or during periods of reduced visibility. They should scan the full length of the runway and scan for aircraft on final approach or landing roll out when taxiing onto a runway either at the end of the runway or at an intersection. **ATC should be contacted anytime there is a concern about a potential conflict.**

1 In instances where flightcrews have been instructed to taxi into "position and hold" and have been advised of a reason/condition (wake turbulence, traffic on an intersecting runway, etc.) or the reason/condition is clearly visible (another aircraft that has landed on or is taking off on the same runway), and the reason/condition is satisfied, they should expect an imminent takeoff clearance, unless advised of a delay.

2 If landing traffic is a factor, the tower is required to inform flightcrews when clearing them to taxi into "position and hold" of the closest traffic that is cleared to land, touch-

and-go, stop-and-go, or unrestricted low approach on the same runway. Flightcrews should take care to note the position of that traffic and be especially aware of the elapsed time from the "position and hold" clearance while waiting for the takeoff clearance.

3 ATC should advise flightcrews of any delay in receiving their takeoff clearance (e.g., "expect delay for wake turbulence") while holding in position. If a takeoff clearance is not received within a reasonable time after clearance to "position and hold," ATC should be contacted. Suggested phraseology: (*call sign*) *holding in position* (*runway designator or intersection*). Example, **"*American 234 holding in position runway 24L,*"** or **"*American 234 holding in position runway 24L at Bravo.*"**

NOTE: FAA analysis of accidents and incidents involving aircraft holding in position indicate that TWO MINUTES or more elapsed between the time the instruction was issued to "position and hold" and the resulting event (e.g., landover or go-around). Pilots should consider the length of time that they have been holding in position whenever they HAVE NOT been advised of any expected delay to determine when it is appropriate to query the controller.

(d) If any flight crewmember is uncertain about any ATC instruction or clearance, query ATC immediately.

(e) If anyone suspects radio problems and weather conditions permit, attempt to observe the tower for light gun signals.

(f) Extra caution should be used when directed to taxi on a runway during reduced visibility conditions.

(g) Flightcrews should use the utmost caution after landing on a runway that intersects another runway, or on a runway where the exit taxiway will shortly intersect another runway. All flight crewmembers must have a common understanding of ATC's instructions and expectations regarding where the aircraft is to stop and must be able to identify the appropriate hold points. ATC should be advised immediately if there is any uncertainty about the ability to comply with any of their instructions.

CAUTIONS:

1. After landing, when on a taxiway that is between parallel runways, taxi the aircraft clear of the landing runway unless you are constrained by a hold-short line associated with the adjacent parallel runway.

2. Unless otherwise instructed by ATC, taxi clear of the landing runway even if that requires you to cross or enter a taxiway/ramp area.

3. At an airport with an operating air traffic control tower, never enter a runway without specific authorization. When in doubt, contact ATC.

4. At a non-towered airport or at an airport where the control tower is closed, listen on the appropriate frequency (Common Traffic Advisory Frequency (CTAF)) for inbound aircraft information and scan the full length of the runway, including the final approach and departure paths, before entering or crossing the runway. Remember that not all aircraft are radio-equipped.

NOTE: For more information about operations at non-towered airports, refer to the current versions of AC 90-42 and AC 90-66.

(h) After landing and exiting the runway, nonessential communications and nonessential flightcrew actions should not be initiated until clear (on the inbound [terminal] side) of all runways in accordance with sterile cockpit procedures.

d. Use of Written Taxi Instructions. At many airports, taxi instructions can be very complex, involving numerous turns and transitions, as well as runway crossing and hold short instructions. During complex airport surface operations, pilots are very busy with a variety of cockpit duties and responsibilities that compete for their attention. Misunderstanding or forgetting any part of the taxi instructions can lead to an embarrassing or unsafe situation. Writing down taxi instructions, especially complex instructions, can reduce a pilot's vulnerability to forgetting part of a complex instruction and can be used to support airport surface operations as follows:

(1) For use as a reference for reading back the instructions to ATC.

(2) For crewmember coordination on the assigned runway and taxi route.

(3) For a short pre-taxi or pre-landing briefing on the pending airport surface operation.

(4) As a means of reconfirming the taxi route and any restrictions at any time during the airport surface operation.

NOTE: While written taxi instructions are a good operating technique, common sense and flexibility should be used in determining the crew's need for them at a specific airport. For example, if the departure runway is very near the aircraft parking location, or if the crew has used the same taxi route numerous times in the previous days, it may only be necessary to record the basic elements of the taxi clearance. However, when the taxi instructions are complex or the crew is unfamiliar with the airport layout, a detailed transcription of all instructions is desirable. Additionally, individual pilots may choose to develop a set of symbols and shorthand notations that allow them to clearly record and later recall key items in the taxi instructions.

e. Intra-Flightdeck/Cockpit Verbal Coordination. It is essential that the flightcrew correctly understand and agree on all ATC ground movement instructions. Any

misunderstanding or disagreement should be resolved to the satisfaction of all flight crewmembers before taxiing the aircraft. It is the verbal aspect of this coordination that is most significant. It is not enough to assume that all flight crewmembers have heard and understood instructions correctly. A common understanding can be enhanced by one flight crewmember repeating the instructions verbally and getting agreement on the content and intent from the other flight crewmember(s). Any persistent disagreement or uncertainty among crewmembers should be resolved by contacting ATC for clarification. When flight crewmembers verbally confirm their understanding of the instructions, they then have a chance to discover and correct any misunderstandings and thus prevent hazardous situations from developing. This verbal coordination/agreement should be accomplished at the following times:

(1) When ATC issues taxi instructions for a departure, the flightcrew should refer to the airport diagram, coordinate verbally, and agree on the assigned runway and taxi route, including any instructions to hold short of or cross an intersecting runway.

(2) When ATC issues landing instructions, the flightcrew should coordinate verbally and agree on the runway assigned by ATC, as well as any restrictions, such as hold short points of an intersecting runway after landing.

(3) After landing and exiting the runway, the flightcrew should coordinate verbally and agree on the ATC taxi instructions to the aircraft's parking area, including any instructions to hold short of or cross an intersecting runway.

(4) At complex intersections, the flightcrew should verbally coordinate to be sure that the intersection is correctly identified and that the aircraft is transitioning through the intersection to the correct taxiway.

(5) When approaching an intersecting runway, the flightcrew should verbally coordinate in order to identify the runway. They should also verbally review the ATC instructions as to whether they are to hold short of or cross the runway.

(6) Before crossing any runway or entering a runway for takeoff or for landing, the flightcrew should visually scan to the left and to the right, including the full length of the runway and its approach paths, and coordinate verbally that the scan area is or is not clear.

(7) Before entering a runway for takeoff, the flightcrew should verbally coordinate to ensure correct identification of the runway and receipt of the proper ATC clearance to use it. Similar verification should be performed during approach to landing.

(8) When it becomes necessary for a flight crewmember to stop monitoring any ATC frequency, he or she should tell the other flight crewmember(s) when stopping and resuming the monitoring of the ATC frequency. Any instructions or information received or transmitted during that flight crewmember's absence from the ATC frequency should be briefed and reviewed upon his or her return.

(9) When the pilot not taxiing the aircraft focuses his or her attention on instruments in the cockpit, such as entering data into the aircraft's FMS, and, consequently, is not able to visually monitor the aircraft's progress, he or she should verbally notify the pilot taxiing the aircraft. Likewise, notification should be made when that flight crewmember has completed his or her task and is again able to visually monitor the taxi operation.

f. ATC/Flightcrew Communication. The primary way the flightcrew and ATC communicate is by voice. The safety and efficiency of taxi operations at airports with operating control towers depend on this "communication loop." Controllers use standard phraseology and require readbacks and other responses from the flightcrew in order to ensure that clearances and instructions are understood. In order to complete the "communication loop," the controllers must also clearly understand the flightcrew's readback and other responses. The flightcrew can help enhance the controller's understanding by responding appropriately and using standard phraseology. The AIM, approved flight crewmember training programs, and operational manuals provide information for flightcrews on standard ATC phraseology and communications requirements. Some of the most important guidelines that contribute to clear and accurate communications are included here. Flightcrews should:

(1) Maintain a "sterile" cockpit. Flight crewmembers must be able to focus on their duties without being distracted by non-flight related matters, such as eating meals, engaging in non-essential conversation, or reading material not related to the safe and proper operation of the aircraft. When operating an aircraft that does not have a door between the flightdeck and the passenger compartment, the pilot may need to ask passengers to refrain from unnecessary conversation from the time the pre-flight preparations begin until the time the aircraft is clear of the terminal area and at cruising altitude. The same procedure should be followed on arrival, from the time landing preparations begin until the aircraft is safely stopped at the terminal.

(2) State their position whenever making initial contact with any tower or ground controller, regardless of whether their position was previously stated to a different controller.

(3) Use standard ATC phraseology at all times in order to facilitate clear and concise ATC/flightcrew communications.

(4) Focus on what ATC is instructing. Flight crewmembers should not perform any non-essential tasks while communicating with ATC.

(5) Read back all clearances/instructions to enter a specific runway, hold short of a runway, and taxi into "position and hold," including the runway designator.

(a) Pilots should not merely acknowledge the ATC instructions or clearances to enter a specific runway, hold short of a runway, and taxi into "position and hold" by using their call sign and saying "Roger" or "Wilco." Instead, they should read back the entire instruction or clearance including the runway designator.

(b) Air traffic controllers are required to obtain from the pilot a readback of all runway hold short instructions.

(6) Actively monitor the assigned tower frequency or CTAF for potential conflicts involving their runway when holding in position for takeoff and when on final approach.

(7) Read back all takeoff and landing clearances, including the runway designator.

(8) Clarify any misunderstanding or confusion concerning ATC instructions or clearances to the satisfaction of all flight crewmembers.

g. Taxiing. This paragraph does not discuss speed management, steering, or maneuvering the aircraft, but suggests some good practices regarding other cockpit activities during taxi.

(1) Prior to taxiing, a copy of the airport diagram should be available for use by the flightcrew.

NOTE: A flight crewmember—other than the pilot taxiing the aircraft—should follow the aircraft's progress on the airport diagram to verify that the pilot taxiing the aircraft is following the instructions received from ATC.

(2) The aircraft's compass or heading display is an excellent tool, as a supplement to visual orientation, for confirming correct taxiway or runway alignment. It should be referred to as frequently as necessary, but especially at complex intersections and where the takeoff ends of two runways are close to one another.

(3) When approaching an entrance to an active runway, both flight crewmembers should verify compliance with hold short or crossing clearance before continuing with non-monitoring tasks (e.g., FMS programming, Airborne Communications Addressing and Reporting System (ACARS), company radio calls, etc.).

(4) Low visibility conditions increase the challenge of safely moving the aircraft on the airport surface. Although visibility is technically designated as "low" when the runway visual range (RVR) falls below 1,200 feet, visibility along the taxi route may be considerably less than the runway visibility. All resources available should be used, including heading indicators, airport signs, markings and lighting, and airport diagrams to the fullest extent possible in order to keep the aircraft on its assigned taxi route. Only one flight crewmember should perform heads-down tasks (e.g., programming the FMS, calculating takeoff data) while the aircraft is taxiing. If there are complex taxi instructions or intersections, heads-down activity should only be accomplished by one flight crewmember while taxiing straight ahead on a taxiway without complex intersections or while stopped.

(5) Anytime the flightcrew becomes uncertain as to the aircraft's location on the airport movement area, they should stop the aircraft and immediately advise ATC. If necessary, they should request progressive taxi instructions. The flightcrew should give ATC any information available about their position, such as signs, markings, and landmarks.

CAUTION: Do not stop on a runway. If possible, taxi off the runway and then initiate communications with ATC to regain orientation.

(6) When cleared to takeoff, or to cross a runway, or when exiting a runway, flightcrews should do so in a timely manner. ATC should be informed of any anticipated delay.

(7) Some cockpit displays of traffic information (CDTI) (such as some implementations of the Traffic Alert and Collision Avoidance System (TCAS)) have the capability and sufficient resolution to enable the display of traffic behind an aircraft. When flightcrews are holding in position, they should consider displaying traffic landing behind them to increase their awareness of the traffic situation.

(8) When holding in position at night, pilots should consider lining up slightly to the left or right of centerline (approximately 3 feet) to better enable a landing aircraft to visually differentiate the holding aircraft from runway lights.

(9) Last-minute turnoff instructions from the tower should not be accepted unless the flightcrew clearly understands the instructions and are certain that they can comply.

(10) After landing, flightcrews should not exit onto another runway without ATC authorization.

7. POLICIES AND PROCEDURES FOR TAXI OPERATIONS AT NON-TOWERED AIRPORTS AND AIRPORTS WHERE THE CONTROL TOWER IS CLOSED.

NOTE: For more information about operations at non-towered airports, refer to the current versions of AC 90-42 and AC 90-66.

a. General. The absence of an operating airport traffic control tower creates a need for increased vigilance on the part of the flightcrew operating at those airports. There are also specific communications procedures that differ from those used at airports with control towers. Planning, clear communications, and enhanced situational awareness during airport surface operations will reduce the potential for surface incidents at airports without an operating control tower. This section focuses on those aspects of taxi operations that are unique to airports without an operating control tower and will not be repeated in such detail as the information covered in other sections of this AC.

b. Planning.

(1) Planning taxi operations at an airport without an operating control tower is similar to planning taxi operations at an airport with an operating tower. However, flightcrews must remember that some airports have part-time operational control towers. When planning to fly into or out of such an airport, flightcrews must be absolutely certain of the tower's operational status before conducting any operations. If in doubt, they should attempt contact on the tower's frequency.

(2) Flightcrews should listen to the automated surface observation system (ASOS) or the automated weather observing system (AWOS) when available and write down the information

for correctness in relaying the information to the other crewmember(s) and for later reference during takeoff planning and taxiing.

(3) When planning for taxi at an airport without an operating control tower, flightcrews should consider the following guidance:

(a) How familiar are you with the airport? Have you flown out of or into that airport recently? Might there have been changes made at the airport since your last flight? Remember to review the latest NOTAMs for both departure and arrival airports for information concerning construction and/or taxiway/runway closures.

(b) Flightcrews should:

1 Take some time to study the airport layout. Use an airport diagram to plan their taxi and pay special attention to any tricky or complex intersections along the route. While planning for departure, they should be sure to consider the likely inbound taxi route at their arrival airport as well.

2 Familiarize themselves with the local traffic pattern. They should remember that not all airports use a standard traffic pattern and to check the pattern altitude.

CAUTION: During calm or nearly calm wind conditions, be aware that flight operations may occur at more than one runway at the airport. Also, aircraft may be using an instrument approach procedure to runways other than the runway in use for visual flight rules (VFR) operations. The instrument approach runway may intersect the VFR runway. It is also possible that an instrument arrival may be made to the opposite end of the runway from which a takeoff is being made.

3 Familiarize themselves with the local CTAF or Unicom frequency.

4 Brief their taxi plans and be sure all flight crewmembers have a common understanding of the plan.

c. Situational Awareness. While maintaining situational awareness is important in all circumstances, it is particularly important when operating at an airport without an operating control tower. To achieve situational awareness, the flightcrew should be fully aware of their intended taxi route and be able to follow the planned route correctly. Without ATC to verbally assist or tell the flightcrew where and when to stop, the flightcrew must rely on visual cues to maintain situational awareness and maintain the planned taxi route. These visual cues include airport signs, markings, and lighting, together with the airport diagram. These particular cues are especially useful during periods of poor visibility and at night. Other things to consider that can help flightcrews maintain situational awareness while operating at an airport without a working control tower include:

(1) Monitor the appropriate frequency. Flightcrews should listen to what the pilots of other aircraft on the frequency are saying on the radio.

(2) If possible, flightcrews should monitor the approach control frequency to alert them to instrument flight rules (IFR) traffic inbound to the airport.

(3) Prior to entering or crossing any runway, flight crewmembers should scan the full length of the runway, including approach areas. Do not engage in any other flightdeck/cockpit duties while crossing a runway. Full attention must be given to crossing and clearing the runway.

(4) Flightcrews should use exterior lighting to make their aircraft more conspicuous to other pilots. Use of exterior lighting is discussed further in paragraph 8 below.

d. Communication and Aeronautical Data. Communication rules and guidelines and aeronautical data for operations at airports without an operating control tower differ from those applicable at towered airports. Various regulations, the AIM, approved flightcrew-training programs, and operational procedure manuals provide information to the flightcrew on standard phraseology, communication, and data requirements.

(1) Before Taxi. Flightcrews should verify that:

(a) Current aeronautical data for the airport is obtained, including the operating hours and status of the control tower.

(b) Airport communication facilities or aids are monitored by a flight crewmember, i.e., CTAF, flight service station (FSS), or Unicom frequency.

(2) Taxi for Departure. Flightcrews should:

(a) Monitor the CTAF, FSS, or Unicom frequency.

NOTE: Flightcrews of departing aircraft should monitor/communicate on the appropriate frequency from engine start, during taxi, and until 10 miles from the airport unless appropriate regulations, local procedures, or operations specifications require otherwise.

(b) Self-announce all ground movement operations on the CTAF, FSS, or Unicom frequency.

(3) Taking the Runway. Flightcrews should:

(a) Announce their intention to takeoff on the CTAF, FSS, or Unicom frequency.

(b) Not line up on the departure runway and hold any longer than absolutely necessary.

(c) Always state the name of the airport at the beginning and end of the radio transmission.

CAUTION: Some aircraft operating at airports without operating control towers may not be equipped with a radio. Flightcrews must remain alert for them.

8. USE OF EXTERIOR AIRCRAFT LIGHTS TO MAKE AIRCRAFT MORE CONSPICUOUS.

a. General.

(1) Exterior aircraft lights may be used to make an aircraft operating on the airport surface more conspicuous. Pilots may use various combinations of exterior lights to convey their location and intent to other pilots, air traffic control, and ground personnel. Certain exterior lights may also be used in various combinations to signal whether the aircraft is on a taxiway or on a runway, in position on the runway but holding for takeoff clearance, crossing an active runway, or moving down the runway for takeoff.

(2) Because adherence to the guidelines in this AC are voluntary and aircraft equipment varies, flightcrews are cautioned not to rely solely on the status of an aircraft's lights to determine the intentions of the flightcrew of the other aircraft. Additionally, flightcrews must remember to comply with operating limitations on the aircraft's lighting systems.

b. Exterior Lights. To the extent possible and consistent with aircraft equipage, operating limitations, and flightcrew procedures, pilots should illuminate exterior lights as follows:

(1) Engines Running. Turn on the **rotating beacon** whenever an engine is running.

(2) Taxiing. Prior to commencing taxi, turn on **navigation, position, anti-collision, and logo lights, if available.** To signal intent to other pilots, consider turning on the taxi light when the aircraft is moving or intending to move on the ground, and turning it off when stopped, yielding, or as a consideration to other pilots or ground personnel. Strobe lights should not be illuminated during taxi if they will adversely affect the vision of other pilots or ground personnel.

(3) Crossing a Runway. All exterior lights should be illuminated when crossing a runway.

CAUTION: Flightcrews should consider any adverse effects to safety that illuminating the forward facing lights will have on the vision of other pilots or ground personnel during runway crossings.

(4) Entering the departure runway for takeoff or "position and hold." When entering a runway either for takeoff, or when taxiing into "position and hold," flightcrews should make their aircraft more conspicuous to aircraft on final behind them and to ATC by turning on lights (except for landing lights) that highlight the aircraft's silhouette. Strobe lights should not be illuminated if they will adversely affect the vision of other pilots.

(5) Takeoff. Turn on **landing lights** when takeoff clearance is received, or when commencing takeoff roll at an airport without an operating control tower.

NOTE: The SOP of turning on landing lights when takeoff clearance is received is a signal to other pilots, ATC, and ground personnel that the aircraft is moving down the runway for takeoff.

9. SUMMARY.

a. Taxi operations require constant vigilance on the part of the entire flightcrew. Each flight crewmember needs to be continually aware of the movement and location of other aircraft and ground vehicles. Taxi operations require the same planning, coordination, and proper execution as other phases of flight operations. Sterile cockpit discipline is always appropriate while taxiing, even under normal weather conditions.

b. During low-visibility taxi operations, additional vigilance is absolutely essential. Flightcrews must pay particularly close attention to instructions from ATC and must insist on correct readback and hearback. Additionally, flightcrews should pay close attention to readback and hearback between ATC and other aircraft. Any ambiguity or uncertainty should be promptly resolved by clarification with ATC. When clear of an active runway, flightcrews should be prepared to stop in position to resolve any questions about position on the airport or clearance from ATC.

c. Safe aircraft operations can be accomplished and incidents eliminated if flightcrews are properly trained and correctly accomplish standard taxi operating procedures and practices.

/s/ John M. Allen, for
James J. Ballough
Director, Flight Standards Service

NOTES ON THE USE OF APPENDICES

Appendices 1 through 7 contain examples of standard operating procedures (SOP) that are identical or similar to some SOPs currently in use. These examples are not directive or prescriptive in nature and do not represent a rigid FAA view of best practices. SOPs may vary among fleets and among certificate holders and may change over time. Operators can use this information to integrate these basic tenets into fleet-specific, route-specific, and equipment-specific operations and checklists. They are shown to denote how the SOPs and best practices can be integrated into the context of specific flight operations.

APPENDIX 1

Standard Operating Procedures (SOP) Template for Ground Operations and the Prevention of Runway Incursions

A manual or section of a manual that serves as the flightcrew's guide to SOPs may double as a training guide. The contents should be clear and comprehensive. This template includes topics that industry and the Federal Aviation Administration (FAA) have selected as useful for developing effective SOPs for operations on the ground and on approach with an emphasis in the prevention of runway incursions. It does not include every topic that might apply, such as those that apply to special operating authority or new technology (such as Extended Range Operations with Two-Engine Airplanes (ETOPS), Precision Runway Monitor (PRM), Surface Movement Guidance System (SMGS), and required navigation performance (RNP)).

- Captain's authority

- Use of automation
  - The operator's automation philosophy
  - Specific guidance in selection of appropriate levels of automation
  - Autopilot/flight director mode control inputs
  - Monitoring of automated systems and Flight Mode Annunciator (FMA)
  - Flight Management System (FMS) inputs

- Checklist philosophy
  - Policies and procedures (who calls for, who reads, who does)
  - Format and terminology
  - Type of checklist
    - Challenge-Do-Verify
    - Do-Verify
  - Walk-around

- Checklists
  - Safety check – power on
  - Originating/receiving
  - Before start
  - After start
  - Before takeoff
  - Preliminary landing
  - Landing
  - After landing
  - Parking and securing
  - Emergency procedures
  - Non-normal/abnormal procedures

- Communications
  - Who handles radios
  - Primary language used
  - Air Traffic Control (ATC)
  - On the flightdeck
  - Keeping both pilots in the loop
  - Company radio procedures
  - Flightdeck to cabin signals
  - Passenger briefing
  - Cabin to flightdeck signals
  - Procedure to review/crosscheck clearances
    - Cross or hold short of a runway
    - Taxi into position and hold
    - Takeoff
    - Land

- Briefings
  - Controlled Flight Into Terrain (CFIT) risk consideration
  - Special airport qualifications
  - Special security considerations
  - Temperature considerations
  - Before taxi
  - Before takeoff
  - Descent/approach/missed approach (approach briefing generally done prior to beginning of descent)

- Flightdeck access
  - Onground/in-flight
  - Jumpseat
  - Access signals, keys

- Flightdeck discipline
  - Sterile cockpit – in-flight and on the ground
  - Monitoring/crosschecking
  - Maintaining outside vigilance
  - Transfer of control
  - Additional duties
  - Flight kits
  - Special security equipment
  - Headsets/speakers
  - Boom mikes/handsets
  - Maps/approach charts
  - Meals

- Boarding passengers/cargo
  - Special security considerations

- Carry-on baggage
- Exit row seating
- Hazardous materials
- Prisoners/escorted persons
- Guns onboard
- Count/load

- Pushback/powerback

- Taxiing
  - Single engine
  - All engines
  - Contaminated Runways
    - Ice
    - Snow
    - Water
    - Slush
  - Prevention of runway incursions
    - Use of airport diagram
    - Crew confirmation of taxi clearance
    - Visually clear final approach path and the runway before crossing or taking any active runway
    - Complex intersections, airfield construction, and “hot spots”

- Crew Resource Management (CRM)
  - Crew briefings
    - Flight attendants
    - Flightcrew

- Weight and balance/cargo loading
  - Who is responsible for loading cargo, and securing cargo
  - Who prepares the weight and balance data form; who checks it
    - Copy to crew

- Flightdeck/cabin crew coordination
  - Boarding
  - Ready to taxi
  - Cabin emergency
  - Prior to takeoff/landing

- Approach philosophy
  - Monitoring during approach
  - Precision approaches preferred
  - Stabilized approaches standard
  - Use of navigation aids
  - FMS/autopilot
  - Use, and when to discontinue use

- Approach gates
- Limits for stabilized approaches
- Use of radio altimeter
- Briefing for expected runway prior to beginning approach
- Go-arounds:
  - Plan to go around
  - Change plan to land when visual, if stabilized

- Individual approach type
  - All types, including engine-out

- For each approach
  - Profile
  - Flap/gear extension
  - Callouts
  - Procedures

- Go-around/missed approach
  - When stabilized approach gates are missed
  - Procedure
  - Callouts
  - Clean-up profile

- Landing
  - Actions and callouts
  - Configuration for conditions
    - Visual approach
    - Low visibility
    - Contaminated runway
  - Close-in turns
  - Crosswind
  - Rejected
  - Transfer of control after first officer landing
  - Anticipated landing runway and taxiway exit designation & direction of turn to the first hold short point

APPENDIX 2

Runway Incursion Prevention
Introduction

The Philosophy of Using Standard Operating Procedures (SOP) for Runway Incursion Prevention

SOPs provide a structure that helps to decrease the probability of human error and capture errors before they result in a runway incursion. By applying SOPs to surface operations, pilots can reduce the probability of a runway incursion by increasing and maintaining situational awareness. Situational awareness is a continuous process of attentiveness and surveillance.

Situational awareness includes knowing:

- The location of the aircraft
- Weather
- Traffic
- The clearance from Air Traffic Control (ATC)
- All other factors that affect the safety of the flight

The SOPs contained in this document are designed to help pilots use all available resources to detect and correct errors – both their own, and those of their crewmembers, pilots of other aircraft, and air traffic controllers – before they result in a runway incursion. Implementation of these SOPs is a low-cost action with a potential for a high return in a reduction of incidents.

Standard Operating Procedures

1. Captains will give a pre-taxi/departure briefing that includes the expected taxi route and restrictions.

2. Both pilots will monitor the frequency when initial taxi clearance is called for to ensure that both pilots hear the taxi clearance.

3. After taxi clearance has been received, the crew will agree on the runway assigned, any restrictions, and the taxi route. If not in agreement, the flightcrew will seek clarification from ATC.

4. Flightcrews will observe “sterile cockpit,” especially while taxiing.

5. Both pilots should have the airport diagram out, available, and in use. Crosscheck the heading situation indicator (HSI), airport diagram, and airport signage to confirm aircraft position while taxiing.

6. Fixed navigation lights (red, green, and white) must be on whenever the airplane is in motion.

7. Both pilots will monitor the appropriate tower frequency when anticipating a clearance to cross or taxi onto an active runway.

8. When approaching an entrance to an active runway, both pilots will ensure compliance with hold short or crossing clearance by discontinuing non-monitoring tasks (e.g., Flight Management System (FMS) programming, Airborne Communications Addressing and Reporting System (ACARS), company radio calls, etc.).

9. Prior to crossing or taxiing onto any runway, verbally confirm ATC clearance with other crewmember(s) and visually scan the runway and approach area.

10. Read back all clearances/instructions to enter a specific runway, hold short of a runway, and taxi into "position and hold," including the runway designator.

NOTE: Do not merely acknowledge the foregoing instructions/clearances by using your call sign and saying "Roger" or "Wilco." Instead, read back the entire instruction/clearance including the runway designator.

11. When entering a runway after being cleared for takeoff, or when taxiing into "position and hold," make your aircraft more conspicuous to aircraft on final behind you and to ATC by turning on lights (except landing lights) that highlight your aircraft's silhouette.

12. Be especially vigilant when instructed to taxi into "position and hold," particularly at night or during periods of reduced visibility. Scan the full length of the runway and scan for aircraft on final approach when taxiing onto a runway either at the end of the runway or at an intersection. Contact ATC anytime you have a concern about a potential conflict.

a. In instances where you have been instructed to taxi into "position and hold" and have been advised of a reason/condition (wake turbulence, traffic on an intersecting runway, etc.) or the reason/condition is clearly visible (another aircraft that has landed on or is taking off on the same runway), and the reason/condition is satisfied, you should expect an imminent takeoff clearance, unless advised of a delay.

b. If landing traffic is a factor, the tower is required to inform you of the closest traffic that is cleared to land, touch-and-go, stop-and-go, or unrestricted low approach on the same runway when clearing you to taxi into "position and hold." Take care to note the position of that traffic and be especially aware of the elapsed time from the "position and hold" clearance while waiting for the takeoff clearance.

c. ATC should advise you of any delay in receiving your takeoff clearance (e.g., "expect delay for wake turbulence") while holding in position. If a takeoff clearance is not received within a reasonable time after clearance to "position and hold," contact ATC. Suggested phraseology: (*call sign*) *holding in position* (*runway designator or intersection*). For example,

"*American 234 holding in position runway 24L,*" or **"*American 234 holding in position runway 24L at Bravo.*"**

> **NOTE: FAA analysis of accidents and incidents involving aircraft holding in position indicate that TWO MINUTES or more elapsed between the time the instruction was issued to "position and hold" and the resulting event (e.g., landover or go-around). Pilots should consider the length of time that they have been holding in position whenever they HAVE NOT been advised of any expected delay to determine when it's appropriate to query the controller.**

13. To signal intent to aircraft downfield **turn on landing lights when cleared for takeoff.**

14. As part of the approach briefing, review the airport diagram and anticipated taxi route.

> **CAUTION**
> **A potential pitfall of pre-taxi and pre-landing planning is setting expectations and then receiving different instructions from ATC. Flightcrews need to follow the clearance or instructions that are actually received, and not the ones the flightcrew expected to receive.**

Recommended Practices and Techniques

1. State your position whenever making initial contact with any tower or ground controller, regardless of whether you have previously stated your position to a different controller.

2. Write down non-standard or complex taxi instructions.

3. To signal intent to other pilots, consider turning on the taxi light when the aircraft is moving or intending to move on the ground, and turning it off when stopped, yielding, or as a consideration to other pilots or ground personnel.

4. At night, use edge lights to distinguish between taxiways (blue) and runways (white).

5. Flightcrews should minimize "heads-down" activities, such as entering data into the FMS, while the aircraft is moving. Advise the pilot taxiing whenever heads-down activity is required.

6. When visually scanning the runway and approach area, flight crewmembers should verbally confirm scan results with each other (e.g., "clear right," "clear left").

7. When holding in position for takeoff, actively monitor the assigned tower frequency or the Common Traffic Advisory Frequency (CTAF) for potential conflicts involving your runway.

8. If unsure of position and on a runway, immediately clear the runway and notify ATC. Always notify ATC if you are unsure of your position; consider requesting "progressive taxi."

9. When taxi visibility is low, crews should perform heads down tasks (e.g., programming the FMS, calculating takeoff data) while the aircraft is stopped or while taxiing straight ahead on a taxiway without complex intersections.

10. To confirm proper runway or taxiway selection, verify that the compass heading approximately matches the runway heading and taxiway orientation.

11. Some cockpit displays of traffic information (such as some implementations of the Traffic Alert and Collision Avoidance System (TCAS)) have the capability and sufficient resolution to enable the display of traffic behind you. When holding in position, consider displaying traffic landing behind you to increase your awareness of the traffic situation.

12. When holding in position at night, consider lining up slightly to the left or right of centerline (approximately 3 feet) to better enable a landing aircraft to visually differentiate the holding aircraft from runway lights.

13. When on final approach, actively monitor the assigned tower frequency (or CTAF) for potential conflicts involving your runway.

14. Do not accept last minute turnoff instructions from the tower unless you clearly understand the instructions and are certain that you can comply.

APPENDIX 3

Pre-Departure Briefing

There is a strong correlation between crews who use effective briefings and those who perform with fewer errors. The purpose of a pre-departure briefing is to make sure that all flight crewmembers are mentally "on the same page" and to highlight items that may be unique about the planned operation. Pay special attention to those items that are different or are potential problem areas, such as low visibility, runway incursion "hot spots," and short taxi distance. If it is anticipated that active runways will be crossed, attention should be devoted to discussing that as well. The following list contains several items that should be covered during a pre-departure briefing.

NOTE: Those areas that are generic to pre-departure briefings are shaded and those topics that are specific to airport surface operations are unshaded. The reason that the airport operations information is shown integrated with a generic aircraft is to show airport operations-specific information in the context of a normal flight operation.

❶ Fuel
❷ Air Traffic Control (ATC) Clearance
❸ Expected Taxi Route
❹ Standard Instrument Departure (SID) or Instrument Flight Rules (IFR) Departure Procedure
❺ Any Applicable Special Considerations, such as:
- Unique airport advisory information
- Unique noise abatement procedures
- Unique engine failure procedures
- Significant terrain or obstacles in the terminal area relative to departure routing
- Significant weather considerations
- Any other known risks and intentions

❶ **Fuel.** Discuss the fuel onboard and ensure it is adequate for the flight including delays, alternates, weather en route, etc.

❷ **ATC Clearance.** Discuss the ATC clearance and make sure that it matches the Flight Release and what is loaded into the Flight Management System (FMS).

❸ **Expected Taxi Route.** Discuss where you are (gate location) and which runway you anticipate for departure. Then discuss how you plan to get from the gate to the runway. At a minimum, brief any planned crossings of active runways, complex taxi intersections, known or anticipated runway incursion "hot spots," airport construction that may affect taxi or takeoff, and anything out of the norm.

CAUTION

A potential pitfall of pre-taxi and pre-landing planning is setting expectations and then receiving different instructions from ATC. Flightcrews need to follow the clearance or instructions that are actually received, and not the ones the flightcrew expected to receive.

❹ **SID or IFR Departure Procedure.** Brief the normal takeoff, in terms of anticipated flap and thrust settings. Brief departure clearance, and verify Mode Control Panel and FMS are properly set up for normal departure.

❺ **Any Applicable Special Considerations.** Focus on those things that are non-normal for this takeoff, or any special procedures. These may include elements such as unique airport advisory information, unique noise abatement procedures, unique engine failure procedures, significant terrain or obstacles in the terminal area relative to departure routing, significant weather considerations, and any other known risks and intentions.

CAUTION

After taxi clearance has been received, the crew will agree on the runway assigned, any restrictions, and the taxi route. If not in agreement, seek clarification from ATC.

Example Pre-Departure Briefing:
Accomplish the pre-departure briefing once you receive the ATC clearance and your aircraft is fueled (fuel slip onboard if applicable). Ideally, the briefing should be conducted about ten minutes prior to gate departure. When discussing the taxi portion, both pilots should reference the airport diagram. Below is an example of how these items can be briefed:

❶ *The required fuel for the flight is onboard. We don't need a takeoff alternate but because CLT has a forecast of 800 broken and 2 miles visibility we have a destination alternate of RIC. The weather in RIC is 2,000 broken and 5 miles.*

❷ *Our ATC clearance has been crosschecked with the Flight Release and what is in the FMS.*

❸ *We are at Gate B28 and we are planning a departure on Runway 28L at the Papa intersection. To get to that runway, we can expect to first hold short of Runway 28C, probably on taxiway Victor. With the light rain and 7 degree temperature, we will plan engine anti-ice on for taxi and takeoff.*

❹ *Let's plan Flaps 1 and Flex thrust. Our clearance is via the Pittsburgh Five Departure, which says "climb runway heading to 1,700 ft. before turning on course. Maintain 5,000." I see that runway heading is set on the mode control panel and so is 5,000 ft. Let's beware that the SID requires a climb gradient of 1,133 fpm to 1,700 msl if the weather falls below 300-1. Our first fix is BURGS intersections, and that is in the FMS.*

❺ *As far as special conditions are concerned, there are no unique procedures for this airport. However, if we lose an engine, the engine-out procedure says 'turn to heading of 200 degrees using 15 degree of bank, and climb to 3,000.' Also, instead of using a clean-up height of 1,000 ft, if we lose an engine we will clean-up at 1,200 ft agl, which is 2,400 msl. Is there anything that you would like to discuss further, or do you have any questions?*

APPENDIX 4

Airport Surface Operations Procedures/Departure

The following dialogue boxes illustrate airport surface operations procedures integrated into the context of a normal airport departure.

NOTE: Those areas that are related to specific aircraft operations are shaded and those that are specific to airport surface operations are unshaded.

Preflight	
Captain	**First Officer (F/O)**
60 minutes prior to departure obtain Flight Release and weather package.	
Report to aircraft at least 30 minutes (45 minutes for international operations) prior to scheduled departure time.	
• Accomplish Crew Briefing when originating trip	• Participate in Crew Briefing
•• If electrical power is not already on, read and do "Safety & Power On Checklist."	
• Accomplish Captain's Preflight	• Accomplish First Officer's Exterior Preflight or Exterior Intermediate Preflight • Record current ATIS information • Accomplish First Officer's Preflight

Before Start	
Captain	**F/O**
At least 20 minutes prior to departure when fueling is complete:	
• Check fuel slip for accuracy. Verify actual fuel load is within limits of GATE REL fuel and balanced.	• Check ACARS GMT for correct time. Insert flight number, departure and destination airport identifiers, flight plan time, and payroll numbers. • Verify actual fuel load is within limits of GATE REL fuel and balanced. Enter actual FOB into ACARS.
•• Obtain ATC clearance. If done verbally, both pilots should listen to clearance.	
• Verify the proper altitude and transponder code is set	• Set the proper altitude in altitude alerter
• Accomplish "Captain's Before Start Flow (to the line)"	• Accomplish "First Officer's Before Start Flow (to the line)"

•• Review Flight Release, Weather Package, and all pertinent Jeppesen pages •• Set communication frequencies and navigation frequencies and courses for departure •• MCP set for departure •• Verify ATC clearance matches FMC and Flight Release route •• Both pilots must be thoroughly familiar with airport orientation and taxi route •• Have airport diagram out and in view •• PF accomplish Departure Review: – Fuel – ATC Clearance – Expected taxi route – SID or IFR Departure Procedure – Any applicable special considerations, such as: ▪ Unique airport advisory information ▪ Unique noise abatement procedures ▪ Unique engine failure procedures ▪ Significant terrain or obstacles in the terminal area relative to departure routing ▪ Significant weather considerations ▪ Any other known risks and intentions	
"Before Start Checklist"	• Accomplish Before Start Checklist to the line
Initiated by Captain approximately 10 minutes prior to departure:	
• Accomplish Welcome Aboard announcement	
Just prior to pushback – or engine start at gate – after agent provides count and verifies fuel onboard and GSI status:	
• Ensure Cabin Ready Notification is received from flight attendant and relay short taxi, overwater beyond 50 nm, or other pertinent information	
	• Obtain pushback clearance, if required. • Anti-Collision lights ON. LOGO lights (if installed) ON for night operations. • Door Lights & Lock Check.

Pushback	
Captain	**F/O**
•• Accomplish pushback procedures if required	

Engine Start	
Captain	**F/O**
Normal starting procedure is to start Engine 2, then Engine 1 using APU air and electrical supply.	
When cleared to start engines:	
"Below the line"	• L & R Packs & Press – OFF/Checked • Accomplish Before Start Checklist below the line
Accomplish engine start.	

After Start	
Captain	**F/O**
• Give thumbs up signal when ground crew is no longer required	
When ground equipment is clear and "thumbs up" has been received from the ground crew:	
• Accomplish After Start Flow	• Accomplish After Start Flow
"After Start Checklist"	• Accomplish After Start Checklist

Taxi	
Captain	**F/O**
• Monitor Taxi Clearance and restate any hold short instructions • Turn taxi light on when aircraft is moving	• Once Captain is able to monitor ATC communications, request Taxi Clearance • Write down non-standard or complex taxi instructions • Request confirmation if Captain does not restate any hold short instructions • Maintain vigilance outside the aircraft • Inform captain if out of the loop for any reason
•• Crosscheck HSI, airport diagram, and airport signage to confirm aircraft position while taxiing. •• Approaching the entrance to an active runway, ensure compliance with hold short or crossing clearance before continuing with non-monitoring tasks. Visually scan runway and approach areas.	
When clear of congested area and TOW and W & B message received:	
•• Discuss TOW and W&B message.	
	• Enter FMC data (inform captain that you will be out of the loop)

Before Takeoff	
Captain	**F/O**
After a runway assignment has been issued and takeoff data has been received:	
• Accomplish Before Takeoff Flow to the line	• Accomplish Before Takeoff Flow to the line
•• PF accomplish Takeoff Briefing: – Initial heading – Initial altitude – Initial fix or route segment – Summarize applicable special considerations previously briefed and any new considerations	
"Before Takeoff Checklist"	• Accomplish Before Takeoff Checklist to the line
1-3 minutes prior to takeoff:	
	• Flight Attendants – Notify
Cleared onto the active runway:	
•• Verbally confirm ATC clearance onto active runway with other crewmembers and confirm proper runway selection using airport signs and markings and the airport diagram. •• Visually scan runway and approach areas.	
•• Check that FOB is at or above T.O. Min. Fuel Quantity and at or below BRN TO Quantity if applicable.	
• Turn on wing, logo, and runway turn-off and taxi lights ***"Below the line"***	• Transponder – TA/RA • Start Switches – CONT • Complete Before Takeoff Checklist
When the aircraft is at the takeoff end of the runway:	
•• Confirm proper runway selection using HSI.	
• If F/O is PF, transfer aircraft controls	• Ensure correct departure runway is displayed on line 5R • Select 5R and press EXEC
When cleared for takeoff:	
• Turn on all remaining exterior lights	

APPENDIX 5

Arrival Briefing

As in the case of the pre-departure briefing, an effective arrival briefing can increase crew performance by highlighting those potential areas that need special attention and consideration. The arrival briefing should ideally be conducted during low workload periods prior to beginning descent. This is supported by data from Line Operations Safety Audits (LOSA), which indicate that crews who conducted the arrival briefing after beginning descent committed 1.6 times more errors during descent/approach and landing, compared to those crews who briefed prior to top of descent. When the briefing is conducted during lower workload periods (such as cruise flight), greater attention can be provided to the content of the briefing.

To increase awareness of anticipated operations on the airport, attention should be devoted to discussing items that are different, or potential problem areas, such as low visibility, runway incursion "hot spots," airport construction and short taxi distance. If it is anticipated that active runways will be crossed, attention should be devoted to discussing that, as well.

CAUTION

A potential pitfall of pre-taxi and pre-landing planning is setting expectations and then receiving different instructions from Air Traffic Control (ATC). Flightcrews need to follow the clearance or instructions that are actually received, and not the ones the flightcrew expected to receive.

During the arrival briefing, pilots should refer to each of the charts that are applicable to the planned operation. For example, if a Standard Terminal Arrival (STAR) will be flown, refer to that chart, and crosscheck the applicable information. Likewise, refer to the applicable approach chart, as well as the airport diagram chart.

NOTE: The following list contains items that should be covered during an arrival briefing. Those areas that are generic to an arrival briefing are shaded, and those topics that are specific to airport surface operations are unshaded.

❶ *Arrival chart: Use STAR chart, if applicable, to confirm/verify the lateral routing and vertical profile, such as waypoint altitude and speed crossing restrictions if not already accomplished. Crosscheck that these values are properly set into the Flight Management System (FMS), if applicable.*

❷ *Discuss weather at destination and surrounding areas, if weather is a factor.*

❸ *Approach chart: Accomplish a complete approach briefing except when not required in day Visual Meteorological Conditions (VMC). At a minimum in day VMC, discuss any special considerations and discuss and use the most precise navigation and visual approach aids available. A complete approach briefing is accomplished as follows using the approach chart and other relevant radios/instruments:*

- *Approach name and runway*
- *Approach chart date*
- *Primary navaid frequency*
- *Final approach course*
- *Crossing altitude at Final Approach Fix (FAF)*
- *Decision Altitude (height) (DA (H)), Alert Height (AH), or Minimum Descent Altitude/Missed Approach Point (MDA/MAP)*
- *Touchdown Zone Elevation (TDZE)*
- *Highest Minimum Safe Altitude (MSA)*
- *Missed approach*
- *Required visibility*
- *Any applicable special considerations, such as:*
  - *Compliance with stabilized approach conditions*
  - *Unique airport advisory approach information*
  - *Unique noise abatement procedures*
  - *Unique engine failure during missed approach procedure*
  - *Significant terrain or obstacles in the terminal area relative to approach routing*
  - *Significant weather considerations*
  - *Any other known risks and intentions*

❹ *Airport diagram chart: Refer to the airport diagram and discuss approach lighting, usable runway length, anticipated direction of turn off and airport operations. While referring to runway length, this may be a logical time to discuss planned landing flap setting and auto brake usage. If planning to land on a runway that will require crossing another runway during taxi to the terminal, make note of that. It may also be helpful to denote the planned runway exit point.*

❺ *Anything else that may be applicable to increase safety of the operations*.

CAUTION

A potential pitfall of pre-taxi and pre-landing planning is setting expectations and then receiving different instructions from ATC. Flightcrews need to follow the clearance or instructions that are actually received, and not the ones the flightcrew expected to receive.

Example Arrival Briefing: Accomplish the Arrival Briefing once the Arrival ATIS is received. Ideally, the briefing should be planned so that it is conducted prior to beginning descent. Reference each relevant chart as that information is being discussed. Below is an example of how these items can briefed:

❶ *We are planning the DUPONT FOUR arrival into Philadelphia. The lateral routing has been checked and verified. As far as crossing restrictions, we will expect JAYBO at 15,000 feet, and TERRI at 250 kts and 10,000 feet. Both of those are in the FMS. The STAR also says for landings to the East, at SUMMY intersection, turn left to a heading of 270 degrees. It looks like we will have to make that turn manually through the Heading mode, as it is not programmed into the FMS.*

❷ *The weather is 400 overcast, 1 mile visibility with light rain and mist. There are reports of moderate icing in the area, so let's plan engine anti-ice on. Be on the lookout for any structural icing, and if necessary, we will use wing anti-icing.*

❸ *This will be an ILS to Runway 9R at Philadelphia, PA. Chart date is 19 January, 01. Highest MSA is 2,600. Touchdown zone elevation is 22 feet. Localizer frequency is 109.3; inbound course is 087 degrees. We should cross KELEE at 1,725' and DA is 222'. The missed approach procedure is climb to 1,500', then a climbing right turn to 2,000', direct Woodstown VOR and hold. If we hold at Woodstown, it will be a teardrop entry, and once established in the holding pattern, left hand turns. The missed approach has been verified in the FMS. Required visibility is 1,800 RVR, and we have that right now.*

❹ *Runway 9R is 10,400 feet long, and it has 9,300 feet beyond the glideslope. There is an ALSF-II approach lighting system, but no VASI or PAPI. Let's plan Flaps Full, with no auto brake. We will make a left turn off the runway around the S4 intersection. One thing I want to point out is that our taxi route to the terminal will intersect Runway 9L, so back me up and make sure we don't cross until we have clearance to do so. I see there are runway incursion "hot spots" at intersections Mike and November.*

❺ *As far as special conditions, there are no unique procedures for this airport. Other than the possibility of some icing, there are no special items that require special attention for this approach. Is there anything that you would like to discuss further, or do you have any questions?*

APPENDIX 6

Airport Surface Operations Procedures/Arrival

The following dialogue boxes illustrate airport surface operations procedures integrated into the context of a normal airport arrival.

NOTE: Those areas that are related to specific aircraft operations are shaded and those that are specific to airport surface operations are unshaded.

Landing	
PF	**Pilot Monitoring (PM)**
At Main gear touchdown:	
• Deploy Thrust Reverse	• Verify spoiler extension and REV green on ECAM ***"SPOILERS, TWO REVERSE."***
After Nose wheel touchdown:	
• Apply brakes, if required • Monitor landing roll	• Monitor deceleration
At 80 knots:	
• Select idle reverse	***"80 knots"***
At 60 knots:	
• Verify idle reverse thrust or less	***"60 knots"***
If First Officer (F/O) accomplished landing, when captain is ready to take control of aircraft:	
"I have the aircraft." • Captain assumes control of the aircraft	***"You have the aircraft."*** • FO relinquishes control of aircraft

Taxi	
Captain	**F/O**
When clear of active runway:	
• Monitor Taxi Clearance and restate any hold short instructions	• Request taxi clearance • Write down non-standard or complex taxi instructions • Request confirmation if Captain does not restate any hold short instructions

	• Maintain vigilance outside the aircraft • Inform captain if out of the loop for any reason
•• Crosscheck HSI, airport diagram, and airport signs to confirm aircraft position while taxiing. •• When approaching the entrance to an active runway, ensure compliance with hold short or crossing clearance before continuing with non-monitoring tasks. Visually scan runway and approach areas.	
When clear of landing runway and compliance with any runway hold short clearances can be assured.	
• Accomplish After Landing Flow • Turn taxi light on when aircraft is moving	• Acomplish After Landing Flow
"After Landing Checklist"	• Accomplish After Landing Checklist • If necessary, notify company operations of your arrival and confirm gate assignment and availabliity (inform captain that you will be out of the loop)

APPENDIX 7

Prior to Arrival Considerations

Considerations Prior to Descent

NOTE: The following list contains items that should be covered during an arrival briefing. Those areas that are generic to an arrival briefing are shaded and those topics that are specific to airport surface operations are unshaded.

To optimize situational awareness, the Captain should ensure that significant terrain and obstacles affecting arrival or approach are identified. Review charted MSA, Grid MORA, MEA, contour or spot elevation, EGPWS, and TRR indicated on the flight plan (highest actual terrain height 5 nm left and right of course between route waypoints on the planned route).

All crewmembers should review field conditions and special procedures for the arrival airport, including Ops Advisory pages.

Approach Briefing

Post Landing

Captains should brief the crew on the anticipated taxi to the gate from the primary/secondary landing runway and consider the following:

- The anticipated primary/secondary landing runway
- NOTAMs that reference the anticipated taxi route and runways
- Airport construction of taxiways and runways
- "Hotspots" depicted on the airport diagram or listed in NOTAMs
- Potential runway incursion areas such as unusual placement of hold short lines
- Use of ILS hold short lines when noted on ATIS
- Standard taxi routes

Visual Approaches

The Captain will ensure that airport elevation and landing runway are identified. In addition, brief intentions in the event of a go-around and anticipated post landing taxi routes.

In the event of a runway change in visual conditions, no further briefing is required, but the Captain should consider runway conditions, aircraft weight, LAHSO, and post landing taxi routes, if applicable.

Instrument Approach as Backup In Night VMC or Whenever IMC May Be Encountered During Approach

Flight crews should prepare for an instrument approach as a backup when a visual approach is planned in night VMC, or whenever IMC might be encountered during the approach.

Preparation should include selecting, and having open and readily available for use, the chart for the best available instrument approach. A precision approach, if available, would be the best selection; any approved approach providing precision-like vertical guidance would be the next best selection; any other instrument approach would be the third choice.

The briefing should include at least the following, as applicable:

- Frequency of the approach navaid
- Final approach course
- Glideslope intercept altitude, or FAF/OM crossing altitude
- Applicable MDA, DA, or DH
- Missed approach point and procedure
- Post landing briefing

Preparation should also include applicable instrument approach preparation procedures.

Instrument Approaches

Each crewmember will review the current Jeppesen approach chart, after ensuring all pilots have the same page. The Captain will ensure the items on the Jeppesen Briefing Strip, applicable minima, and IAF crossing altitudes (if applicable) are briefed.

For approaches without a charted briefing strip, the following items are the minimum to be briefed:

- Applicable minima (visibility, RVR, ceiling)
- Approach navaids and Idents
- MSA/Field Elevation
- IAF crossing altitude (if applicable)
- Fined approach course
- FAF/OM crossing altitude
- Applicable MDA, DA, DH, or AH
- Missed approach procedure
- Post landing taxi routes

Instrument Approach Procedures

- Tune and identity approach facility
- Set MDA, DH, AH as applicable

- Use all approach and landing aids available
- Set up EFIS and Flight Mode panels
- Check FMC/Map depicted approach and missed approach vs. Jeppesen chart
- Verify, the Altitude Window is set to the missed approach altitude:
  - Visual approach – when executing a go-around
  - Non-Precision Approach - after intercepting a normal visual glidepath or upon initiating a go-around at MDA
  - ILS approach – after glideslope capture