IBAC
Preventing Runway Incursions
"Best Practices on the Flight Deck"

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Appendix B

BEST PRACTICES ON THE FLIGHT DECK

(Based on material provided by IATA and IFALPA)

1. AIM OF THIS APPENDIX

1.1   The aim of this appendix is to highlight some of the causal or contributory factors that have resulted in runway incursions, and which were identified during a runway safety survey conducted by EUROCONTROL.

1.2   Aircraft operators are invited to review the materials put forward in this document, and where necessary, amend their Standards Operating Procedures with regard to ground operations.

2. CRITICAL PHASE OF FLIGHT

2.1   The number of ground movements on aerodromes has increased significantly during the last decades. To provide the needed capacity on the ground, it is necessary to continuously review the layout of the taxiway infrastructure leading to increasingly complex taxiway systems at major aerodromes.

2.2   With the evolutionary process of enhancement and change accelerating in recent times, it remains imperative that pilots remain aware of the signage and markings being applied. Every opportunity to familiarise oneself should be taken, and where possible, information critical to safe aerodrome operations, should be shared.

2.3   The current generation of aircraft have highly automated and complex systems that have allowed the preparation and programming of the total flight on the ground. This has resulted in flight deck workload peaks shifting to the ground phase of aircraft operations. These evolutions are irreversible and appropriate mitigating measures should be undertaken to prevent runway incursions. Consequently the taxi phase should be treated as a "critical phase of flight".

3. PLANNING FOR TAXI OPERATIONS

3.1   A key-point in the prevention of runway incursions, is to apply preventative measures during the taxi-phase. Prioritisation of administrative and commercial tasks, such as weight and balance calculations, certain checklist items, Captain's welcome speeches, etc. prior to leaving the ramp will assist in reducing workload during the taxi phase and result in increased attention and improved situational awareness. This can be further enhanced by assigning one crew member to progressively monitor the progress of the flight against the aerodrome chart.

4. **AERODROME FAMILIARIZATION**

4.1   Preparations for departure and arrival at an aerodrome can be accomplished well in advance. Familiarization for taxi operation is essential and should be completed at the gate or prior to starting descent:

a)   prepare the necessary charts for taxi and have them available for use during taxi;

b)   take some time to study the aerodrome layout. Very often some system can be identified for the naming of taxiways;

c)   remember to review the latest NOTAM for both the departure and arrival aerodrome for information concerning construction or taxiway/runway closures. Visualise this information on the charts;

d)   standard taxi routes are used more often at busy aerodromes. Review the routes you expect to use. If you are not cleared for expected taxi route, you should take adequate time to familiarize yourselves with the new routing even if it requires stopping to do so;

e)   pay special attention to the location of hot spots. These are locations on the aerodrome movement area where there is an increased risk of collisions. Know what runways you will encounter between where you are and where you are going;

f)   plan timing and execution of check-lists, so that no distractions occur when approaching and/or crossing runways; i.e. all eyes outside during this phase; and

g)   conduct detailed briefings for all flight crew members, especially during night and low visibility operations i.e. include "extra eyes" where available.

5. **BRIEFINGS**

5.1   The "before take-off" briefing should be simplified as much as possible. Go through pre-departure check-lists when the aircraft is stationary. Several taxi items can be addressed during the "before start" briefing at the gate. The briefings during taxi can be limited to a summary of the highlights and the items which have been altered since the before start briefing. This should also be done during the "descent" briefing.

5.2   The "before start" and descent briefing should also contain a complete review of the expected taxi routes with special attention to the hot spots. Pay special attention to temporary situations such as work in progress, other unusual activity and recent changes in aerodrome layout. During this part of the briefing, refer to the aerodrome charts and visualise all available information.

5.3   Memory is "constructive". That is: we have the tendency to fill in the blanks. Ensure that you follow the clearance or instruction that you actually received and not the one you expected to receive.

5.4   Be aware that the expectations established during the pre-taxi or pre-landing planning can be significantly altered with a different and unexpected clearance.

5.5   The following additional check list may assist with briefing preparations:

    a) conduct a briefing for all flight crewmembers;

    b) become familiar with the aerodrome;

    c) plan timing and execution of checklists;

    d) review NOTAM's;

    e) flight crew should fully understand all departure briefing items;

    f) assigned taxi route should be briefed as thoroughly as an instrument approach; and

    g) the aerodrome diagram should be readily available to all flight crew members.

6. TAXI PROCEDURES

6.1   Clearance

6.1.1   The receipt of any clearance and the taxi clearance itself requires the complete attention of all flight crew on the flight deck. If necessary, write down taxi-instructions, especially at complex or unfamiliar aerodromes, and cross-check the instructions against the aerodrome chart. Clarify any uncertainties about your clearance or your position on the aerodrome before the start of taxi or after vacating the runway. When not sure of taxi instructions, stop, request clarification from ATC and only continue taxiing when the required taxi routing has been confirmed. In case of doubt: ask.

6.1.2   All flight crew members should monitor the clearance for taxi, take-off and landing, and must be "in the loop" at all times when runway operations are in progress.

6.2   Public address announcements

6.2.1   Public address welcome announcements by flight deck should be transferred from the taxi phase to a moment before engine start-up or push back. Safety reports show that public address announcements to passengers or commercial announcements are a direct source of error in many events. Also, operational calls on the company frequency cause the other pilot to be isolated in the flight deck. These calls and announcements should, if possible, be avoided while taxiing and especially when approaching the active runway.

6.2.2   If it is necessary to leave the ATC frequency, notify other flight crew members. Afterwards, be briefed by the other crew member of what may have been missed.

6.3   Taxi best practices

6.3.1   Only one pilot can control the aircraft during taxi and his/her primary task is to safely taxi the aircraft. The pilot not flying should assist the pilot flying to the best of his/her ability by providing guidance based upon the cleared taxi routing and the aerodrome layout map.

6.3.2   Cancel check list activity when crossing and entering runways. One flight crew member should maintain full concentration on the runway traffic situation.

6.3.3   Never cross red stop bars when lining upon or crossing a runway, unless, in exceptional cases, where the stop bars, lights or controls are reported to be unserviceable, and contingency measures, such as using follow me vehicles, are in force. In these circumstances, whenever possible, alternative routes should be used.

6.3.4   When entering any runway, check for traffic (left and right) using all available surveillance means e.g. all eyes to be used.

6.3.5   When cleared to line up and/or when crossing any runway, position the aircraft in a right angle with the runway where possible, in order to better observe other traffic, both arriving and departing.

6.3.6   Do not rush. The higher the ground speed, the less time available to react, manoeuvre the aircraft and avoid obstacles. High speed also results in greater distance and time required to bring the aircraft to a complete stop. Time can be an ally and an enemy; use it wisely. Taxi defensively, and be prepared for others mistakes.

6.3.7   When a clearance to taxi to a point beyond a runway is received, it must include the authorization to cross that runway. A runway should never be crossed unless an explicit ATC clearance has been received.

6.3.8   Adopt the "sterile flight deck" concept while taxiing. During movement of the aircraft the flight crew must be able to focus on their duties without being distracted by non-flight related matters. Ensure cabin crew are aware of this requirement if it is not a Standard Operating Procedure. The following definition of a 'Sterile Flight Deck' is offered as a reference.

6.3.9   **Sterile flight deck definition:** Any period of time when the flight crew should not be disturbed, except for matters critical to the safe operation of the aircraft.

6.3.10   **Explanation:** Disturbances may include, but not be limited to, calls received from non-operational areas (e.g. company), entry onto the flight deck by cabin crew and extraneous conversations not related to the current phase of flight. It is generally accepted that the need for a sterile cockpit commences:

    a) departure: when the aircraft starts engine(s) and ceases when the aircraft reaches 10 000 feet above the departure aerodrome elevation;

    b) arrival: when the aircraft reaches 10 000 feet above the arrival aerodrome elevation until the engine(s) are shut down after landing; and

    c) any other times determined and announced by the flight crew. (e.g. in flight emergency, security alert etc.).

6.3.11   Use all aircraft lights to help controllers and other pilots to see the aircraft. Fixed navigation lights and taxi light should be on whenever the aircraft is moving. Landing lights should be turned on when cleared for take-off (note – standard procedures to be inserted).

6.3.12   Check audio box and volume adjustment whenever a frequency change is made.

6.3.13   Ensure all flight crew are on the appropriate frequency until all runways have been vacated after landing.

6.3.14   After landing, vacate the runway as soon as possible, but not by turning onto another runway, unless specifically instructed to do so.

6.3.15   When the aircraft has vacated the active runway, be prepared to stop to resolve any questions about the ATC clearance or about the aircraft position.

6.3.16   Anytime there is uncertainty about the location of the aircraft position on the movement/manoeuvring area, STOP the aircraft, advise ATC, and ask for clarification. Take the question out of the flight deck.

6.3.17   If necessary request progressive taxi instructions.

6.3.18   Never stop on a runway unless specifically instructed to do so.

6.3.19   The following check list may assist with best practice preparations:

      a)   if necessary write down taxi route;

      b)   assign a crew member to progressively follow aircraft position on chart;

      c)   follow company SOP's in regard to exterior lighting when taxiing and cleared for take-off – where possible, maximum illumination;

      d)   sterile flight deck during taxi;

      e)   be aware that the visibility required for taxiing may be less than the runway visual range (RVR);

      f)   be alert for mandatory signs/markings/stop bars and runway guard lights;

      g)   look for visual aids such as taxiway location information and destination signs;

      h)   designate a crew member to look for and report signs / markings and keep track of location against the aerodrome chart;

      i)   conduct pre-departure checklists when the aircraft is stationary;

      j)   use STANDARD radio phraseology;

      k)   receive explicit clearance before crossing any runway;

      l)   READ-BACK all runway crossing or hold short clearances using correct phraseology;

      m) DO NOT be rushed by any party (ATC or company);

      n)   LISTEN to clearances issued to other aircraft;

o) NEVER cross red stop bars when entering or crossing a runway unless contingency measures are in force, e.g. to cover cases where the stop bars or controls are unserviceable;

p) before entering or crossing any runway, CHECK FOR TRAFFIC!!

q) no checklist activity crossing any runway;

r) ensure correct understanding of the ICAO phraseology "Taxi to holding point"; and

s) a common phraseology problem is the fundamental difference between the phraseology "position and hold" (which has the same meaning as the ICAO standard phrase "line up [and wait]") and the standard ICAO phraseology "taxi to holding point" (which means taxi to, and hold at the runway holding point. Listen carefully to the instruction. If unsure – ASK.

6.4 **Language**

6.4.1   While the use of the language normally used by the station on the ground or the English language[*] is allowed, the use of standard aviation English at international aerodromes enhances situational awareness of all those listening on the frequency.

6.5 **Proficiency**

6.5.1   Conducting and comprehending radiotelephony communications requires competence with standard phraseology as well as general proficiency in the language used for communications.

6.5.2   Use standard phraseology at all times. Strict adherence to standard phraseology avoids miscommunications. See Appendix A. Communications Best Practices for further information.

6.5.3   Speaking slowly is essential when operating in foreign regions. When the speech note is slowed, the response may be slower and clearer.

6.6 **Read-Backs**

6.6.1   Any clearance requires a read-back. The following Standard is included in ICAO Annex 11: The flight crew shall read back to the air traffic controller safety-related parts of ATC clearances and instructions which are transmitted by voice. The following items shall always be read back:

a) ATC route clearances;

b) clearances and instructions to enter, land on, take off from, hold short of, cross and backtrack on any runway; and

c) runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed instructions and, whether issued by the controller or contained in ATIS broadcasts, transition levels.

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[*] ICAO air-ground radiotelephony communications language requirements are shown in Annex 10 — *Aeronautical Telecommunications*, Volume II, Chapter 5 and Annex 1 — *Personnel Licensing*, Chapter 1 and its appendix.

6.6.2   Any read-back requires a hear-back. In order to complete this "communication loop", the read-back must be complete and clear. Read-back the full clearance, including call sign and runway designator. "Roger" is not a read-back.

6.7   **Listen**

6.7.1   Listen on the frequency at all times. Try to visualise the other traffic in the vicinity. Know what runways will encountered between where you are and where you are going. Be particularly attentive to all clearances and instructions issued to traffic involving those runways.

7. OTHER COMMUNICATION BEST PRACTICES

7.1   Be extra attentive when other aircraft with similar call signs are on the frequency.

7.2   When instructed to follow other traffic, this does not automatically include the clearance to enter or cross a runway. Each aircraft requires a specific clearance to enter or cross any runway. If in doubt, seek clarification.

7.3   If you are cleared to "line up and wait", then only a short delay on the runway should be anticipated. If you find yourself in this position for an extended period, advise about your position and seek clarification.

7.4   Both the pilot flying and the pilot not flying should monitor the frequency and agree upon the acceptance of a clearance to taxi, cross a runway, take-off and land on a runway. Any misunderstanding or disagreement should be cleared up immediately by contacting ATC for clarification.

7.5   The use of headsets increases the readability of communications with ATC and within the flight deck.

7.6   Ensure the correct setting of the audio panel, especially after any temporary switch in audio sources.

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

7.8   Adopt the sterile cockpit rule during taxi phase.

8. SITUATIONAL AWARENESS

8.1   Situational awareness is about knowing where you are and where you want to go, as well as building the picture of the traffic in the vicinity. Even during daylight and in good visibility, people get lost. Even worse is the situation where you think you know your position, but find yourself elsewhere. At times of darkness and low visibility, additional care must be taken to ensure that accuracy in navigation on the ground and the highest degree of situational awareness is undertaken by all members of the flight crew.

8.2   The following check list may assist with maintaining situational awareness:

8.3   Before starting the approach

      a)   obtain all needed information;

      b)   brief planned primary runway exit and taxi route;

      c)   eliminate as much distraction as possible;

      d)   have aerodrome diagram available for instant use;

      e)   maintain situational awareness on final approach at night; and

      f)   listen for clearances to other aircraft.

8.4   **Visual aids**

8.4.1   Charts, signs, markings and lighting are all aids to assist in determining position. A high level of awareness must be maintained to observe and respond to mandatory signs and markings. Correct knowledge of all the symbols and signs is therefore necessary. All the visual information that is available should correlate with the actual situation. Gathering visual information and the constant questioning and cross checking of your position is the task of the entire flight crew. A crew member who is in doubt or does not agree with something must speak-up.

8.4.2   Head down situation during taxi should be limited to the minimum amount of time possible.

8.4.3   When a pilot not taxiing the aircraft focuses on the instruments in the flight deck, he/she is not able to monitor the progress of the aircraft. Before undertaking head-down actions advise the other pilot, so that added emphasis can be placed by the navigating pilot on maintaining navigational accuracy and situational awareness.

8.5   **Other aids**

8.5.1   Use your heading display or compass to confirm the runway or taxiway alignment with the information available from the charts. If available, use the ILS centreline guidance system to confirm the correct runway alignment.

8.5.2   Have a good look out; scan the entire runway and approach in both directions before entering a runway. If in doubt, seek clarification.

9.   CONCLUSION

9.1   **You can help to prevent runway incursions! How?**

      a)   it is essential to adhere strictly to all relevant ICAO Standards and Recommended Practices, Procedures and guidance material, including phraseologies;

b) flight crews need to ensure that they follow the clearance or instructions that are actually received, and not those that the flight crew is expecting to receive;

c) good planning of ground operations can decrease the workload during taxi. The flight and its associated risks starts during the preparation;

d) good situational awareness is the top priority during taxi. All crewmembers should be involved;

e) application of "Crew Resource Management" principles during taxi is as important as during other phases of flight;

f) even the most professional and experienced people make mistakes. By being defensive and letting the built-in safety nets do their work, a single mistake should not lead to a serious incident or accident; and

g) never take anything for granted.

References

The following ICAO standards and recommended practices are provided to assist flight crews in understanding the use and application of stop bars:

Annex 2 — *Rules of the Air*, Chapter 3, paragraph 3.2.2.7.3

"An aircraft taxiing on the manoeuvring area shall stop and hold at all lighted stop bars and may proceed further when the lights are switched off."

Annex 14 — *Aerodromes,* Volume I — *Aerodrome Design and Operations*

Paragraph 5.3.19.9   Selectively switchable stop bars shall be installed in conjunction with at least three taxiway centre line lights (extending for a distance of at least 90 m from the stop bar) in the direction that it is intended for an aircraft to proceed from the stop bar.

Paragraph 5.3.19.13   *Note 1.— A stop bar is switched on to indicate that traffic stop and switched off to indicate that traffic proceed.*

Paragraph 5.4.3.35   A taxiway shall be identified by a designator comprising a letter, letters or a combination of a letter or letters followed by a number.

Paragraph 5.4.3.36   Recommendation. When designating taxiways, the use of the letters I, O or X and the use of words such as inner and outer should be avoided wherever possible to avoid confusion with the numerals 1, 0 and closed marking.

Paragraph 5.4.3.37   The use of numbers alone on the manoeuvring area shall be reserved for the designation of runways.

Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444), Chapter 7, paragraph 7.14.7, Stop bars.

"Stop bars shall be switched on to indicate that all traffic shall stop and switched off to indicate that traffic may proceed.

Note.— Stop bars are located across taxiways at the point where it is desired that traffic stop, and consist of lights, showing red, spaced across the taxiway."

Other References

ICAO. Procedures for Air Navigation Services — *Aircraft Operations* (Doc 8168), Fourth Edition, 1993.

FAA. Federal Aviation Regulations / Airman's Information Manual, 2002.

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FAA/IATA Runway Incursion Prevention Program.

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