



Agenda Item 3 Review of Deficiencies and Air Navigation subjects in the AGA Field
3.4 Runway Safety

RUNWAY SAFETY

(Presented by the Secretariat)

SUMMARY

It is recognized that runway safety is a collective responsibility. This responsibility extends to organizations (aerodrome operators, the air navigation service provider, and the aircraft operator) as well as to individuals (e.g. controller, pilot, vehicle operator).

While there are several incidents due to runway incursions and excursions that may have catastrophic consequences, these events continue to happen and airport authorities need to maintain their efforts to reduce the incidence.

A wide range of factors contribute to runway incursions, including less-than-perfect aerodrome design, technology, procedures, training, regulations and human error.

This WP addresses the best practices for airfield safety and several factors to consider in the progress in managing runway safety as on-going effort from everyone in the aviation industry.

References:

- Doc 9830 (A-SMGCS), Manual of Advanced surface movement guidance and control systems
- Doc 9870, Manual on the Prevention of runway incursions
- Known “Best Practices” for Airfield Safety – Airport Personnel – FAA
- Known “Best Practices” for Airfield Safety – Air Traffic Controllers – FAA
- Aviation Safety Letter, Transport Canada, Issue 3/2009
- EUROCONTROL, Airport safety, preventing runway incursions
- European Action Plan for the prevention of runway incursions

**Strategic
Objectives**

This working paper is related to Strategic Objectives A and D.

1. Introduction

1.1 The issue of runway incursions has been identified as a serious threat to aviation safety and several initiatives from States mainly Europe include the implementation of Action Plans for the prevention of runway incursions, to enhance runway safety. These Action Plans contain a number of recommendations designed to reduce runway accidents and incidents and improve safety. In addition, United States and Canada have advanced programmes for runway incursion prevention.

1.2 The adoption of a standard definition for a runway incursion, has been facilitated the efforts to tackle this problem, as it is applicable to all data collection and analysis and made it practical to collect and share data on a global basis and subsequently analyze and understand why these incidents are taking place. As defined by ICAO, a runway incursion is “any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.”

1.3 In recent years there have been a number of fatal runway accidents and serious incidents worldwide. The reasons for these occurrences are frequently a complex mixture of differing contributory factors.

1.4 An air traffic controller typically has between 4 and 40 seconds to identify a potential runway incursion and take action to prevent it. The pilot and driver have even less time to react. On the way to prevent runway accidents and incursions is to be proactive about reducing the risk of occurrence of safety critical events.

1.5 Of the most common contributory and causal factors, those relating to communications form the biggest group. Non ICAO phraseology, complex instructions, ambiguity and failure to provide or check read-backs, resulted in a runway incursion; and those incidents where pilots or vehicle drivers inadvertently stray onto a runway, because they had lost awareness of where they were.

1.6 The prime contributing factor is in fact, a breakdown in communication between ATC and the pilot or vehicle driver.

1.7 There are several types of runway incursions and these may include:

- Air traffic services deviations: situations that occur where air traffic services (ATS) are being provided, and where a preliminary investigation indicates that safety may have been jeopardized, less than minimum separation may have existed, or both.
- Pilot deviations: situation that occur where the actions of a pilot result in non-compliance with an ATC instruction/clearance, or violation of National or international Regulations.
- Vehicle or pedestrian deviations: situations that occur where a vehicle operator, a non-pilot operator of an aircraft, or pedestrian proceeds without authorization onto protected area of a surface designated for landing or taking off.

2 Discussion

2.1 A number of recommendations are directed at aerodrome operators, air navigation service providers, aircraft operators and regulators among others. The best practices for preventing runway incursions are:

- Aircrew requires the consistency and predictability that the harmonized application of ICAO provisions can provide.
- At the aerodrome level, runway safety can only truly be enhanced by local joint action because local differences in the layout of the infrastructure and the mixture of traffic, etc. must be taken into account.
- Airport operators should provide comprehensive radiotelephony training to vehicle drivers.

- To have a policy preventing aircraft from crossing illuminated red stop bars.
- Current efforts are focused on two main areas, specifically devices that provide positional awareness to pilots and systems that provide air traffic controllers with a warning whenever a runway incursion is under way.
- Implement an Action Plan for the Prevention of Runway Incursions.
- Implement Advanced Surface Movement Guidance and Control System (A-SMGCS). The implementation of A-SMGCS Level 1 gives an accurate surveillance picture of the traffic on and adjacent to the runway, including the position and identity of all known traffic. It will also indicate unknown traffic (or intruders).

2.1.1 Level 2 will further enhance Level 1 by giving the controller warnings of potentially hazardous situations associated with runway incursions.

2.1.2 Specific uses of A-SMGCS include:

- Detection of intruders
- Monitoring compliance with ATC instructions
- Detection of hazardous situations on the runways
- To emphasize the protection of active runways, and to enhance the prevention of runway incursions, pilots are asked to acknowledge taxi authorizations that contain the instructions “hold” or “hold short” by providing a complete read back or repeating the hold point. With the increased simultaneous use of more than one runway, instructions to enter, cross, backtrack or line up on any runway should also be acknowledged by a read back.
- Install Airport surface detection equipment. This equipment enables controllers to detect potential runway conflicts by providing the controller with a radar picture of movement on runways and taxiways.

2.2 It is highly recommended the establishment of runway incursions and excursions prevention programmes according to Doc. 9870, Chapter 3, and conforming runway safety teams by States. ICAO has produced several years ago a Runway Safety Toolkit which is available on the website as specified in Appendix J of Doc 9870. Please refer to the **Appendix** to this WP.

3. Conclusion

3.1 The Meeting is invited to:

- a) discuss this WP;
- b) analyze new alternatives that the AGA/AOP/SG/7 should consider for preventing runway incursions and hence runway safety; and
- c) inform to ICAO Regional Offices the best practices for preventing runway incursions implemented at your airports no later than 30 March 2010.

APPENDIX / APÉNDICE
(Available only in English / Disponible en inglés únicamente)

Doc 9870
AN/463



Manual on the Prevention of Runway Incursions

Approved by the Secretary General
and published under his authority

First Edition — 2007

International Civil Aviation Organization

Chapter 3

ESTABLISHING A RUNWAY INCURSION PREVENTION PROGRAMME

3.1 RUNWAY SAFETY TEAMS

3.1.1 A runway incursion prevention programme should start with the establishment of runway safety teams at individual aerodromes. The primary role of a local runway safety team, which may be coordinated by a central authority, should be to develop an action plan for runway safety, advise management as appropriate on potential runway incursion issues and recommend strategies for hazard removal and mitigation of the residual risk. These strategies may be developed based on local occurrences or combined with information collected elsewhere.

3.1.2 The team should comprise representatives from aerodrome operations, air traffic service providers, airlines or aircraft operators, pilot and air traffic controller associations and any other groups with a direct involvement in runway operations. The team should meet on a regular basis. Frequency of meetings should be determined by the individual groups. At some aerodromes, other groups may already exist that could carry out the functions of a runway safety team.

3.2 OBJECTIVES

Once the overall number, type and severity of runway incursions have been determined, the team should establish goals that will improve the safety of runway operations. Examples of possible goals are:

- a) to improve runway safety data collection, analysis and dissemination;
- b) to check that signage and markings are ICAO-compliant and visible to pilots and drivers;
- c) to develop initiatives for improving the standard of communications;
- d) to identify potential new technologies that may reduce the possibility of a runway incursion;
- e) to ensure that procedures are compliant with ICAO Standards and Recommended Practices (SARPs); and
- f) to initiate local awareness by developing and distributing runway safety education and training material to controllers, pilots and personnel driving vehicles on the aerodrome.

3.3 GENERIC TERMS OF REFERENCE

Suggested generic terms of reference for a runway safety team are to assist in enhancing runway safety by:

- a) determining the number, type and, if available, the severity of runway incursions;
- b) considering the outcome of investigation reports in order to establish local hot spots or problem areas at the aerodrome;
- c) working as a cohesive team to better understand the operating difficulties of personnel working in other areas and recommending areas for improvement;
- d) ensuring that the recommendations contained in the *Manual on the Prevention of Runway Incursions* (Doc 9870) are implemented;
- e) identifying any local problem areas and suggesting improvements;
- f) conducting a runway safety awareness campaign that focuses on local issues, for example, producing and distributing local hot spot maps or other guidance material as considered necessary; and
- g) regularly reviewing the airfield to ensure its adequacy and compliance with ICAO SARPs.

3.4 HOT SPOTS

3.4.1 The ICAO definition of a hot spot is:

“A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.”

Note 1.— The criteria used to establish and chart a hot spot are contained in the PANS-ATM (Chapter 7) and Annex 4 — Aeronautical Charts (Chapters 13, 14 and 15).

Note 2.— Hazards associated with hot spots should be mitigated as soon as possible and so far as is reasonably practicable.

Examples of how hot spots are shown on charts are provided in Figures 3-1, 3-2 and 3-3.

3.4.2 Aerodrome charts showing hot spots should be produced locally, checked regularly for accuracy, revised as needed, distributed locally, and published in the Aeronautical Information Publication (AIP).

3.4.3 Once hot spots have been identified, suitable strategies should be implemented to remove the hazard and, when this is not immediately possible, to manage and mitigate the risk. These strategies may include:

- a) awareness campaigns;
- b) additional visual aids (signs, markings and lighting);
- c) use of alternative routings;
- d) construction of new taxiways; and
- e) the mitigation of blind spots in the aerodrome control tower.

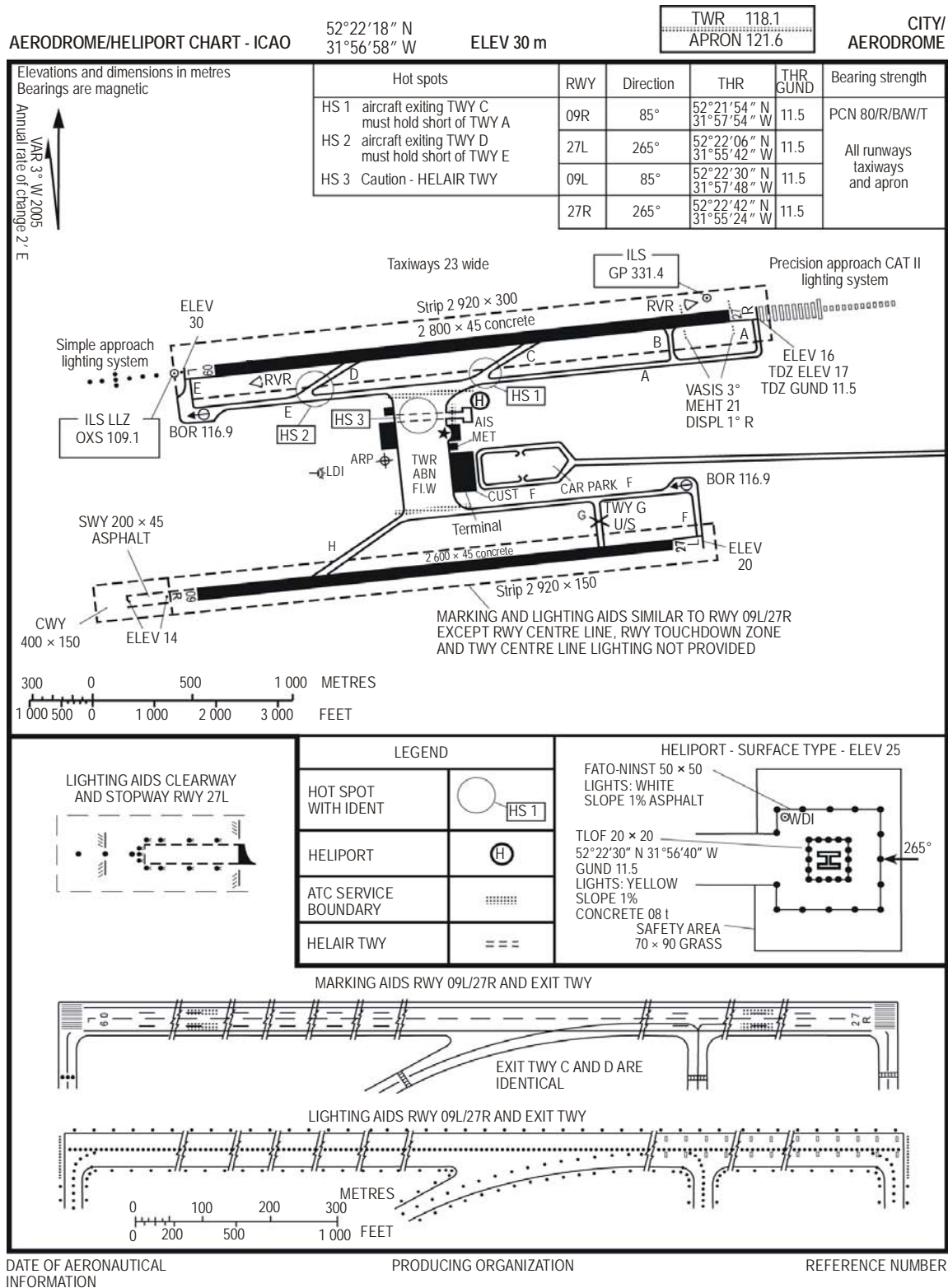


Figure 3-1. Sample Aerodrome/Heliport Chart — ICAO showing ICAO charting method for depiction of hot spots

(Associated provisions in Annex 4 and the PANS-ATM will become applicable on 22 November 2007)

4. Aircraft northwest on Taxiway F from the FBO or cargo ramp to Runway 12L use diligence to not miss the left turn onto Taxiway S. If the left turn at Taxiway S is missed, do not cross the hold marking for Runway 6-24 without ATC authorization.

Note.— Not for navigation.

1. Aircraft southeast on Taxiway F from the FBO or cargo ramp use caution when making the right turn onto Taxiway J. Do not cross the hold marking for Runway 30R-12L without ATC authorization.

3. Aircraft taxiing to Runway 12L on either Taxiway C or D are often instructed to turn right onto Runway 6 and to hold short of Runway 12R-30L. Use caution when making the right turn onto Runway 6 and watch for the red surface painted 12R-30L marking and hold short lines. Do not cross the hold marking for Runway 12R-30L without ATC authorization.

Note.— During times when the sun is at low angles, i.e. early morning and late evening, hold position markings on east-west taxiways can be difficult to see due to glare.

2. Outbound traffic from the airline ramp can mistake Runway 12R-30L as Taxiway D especially at the wide intersection near Taxiway L. Use caution when approaching the intersection of Taxiways D and L and do not cross the hold marking for Runway 12R-30L without ATC authorization.

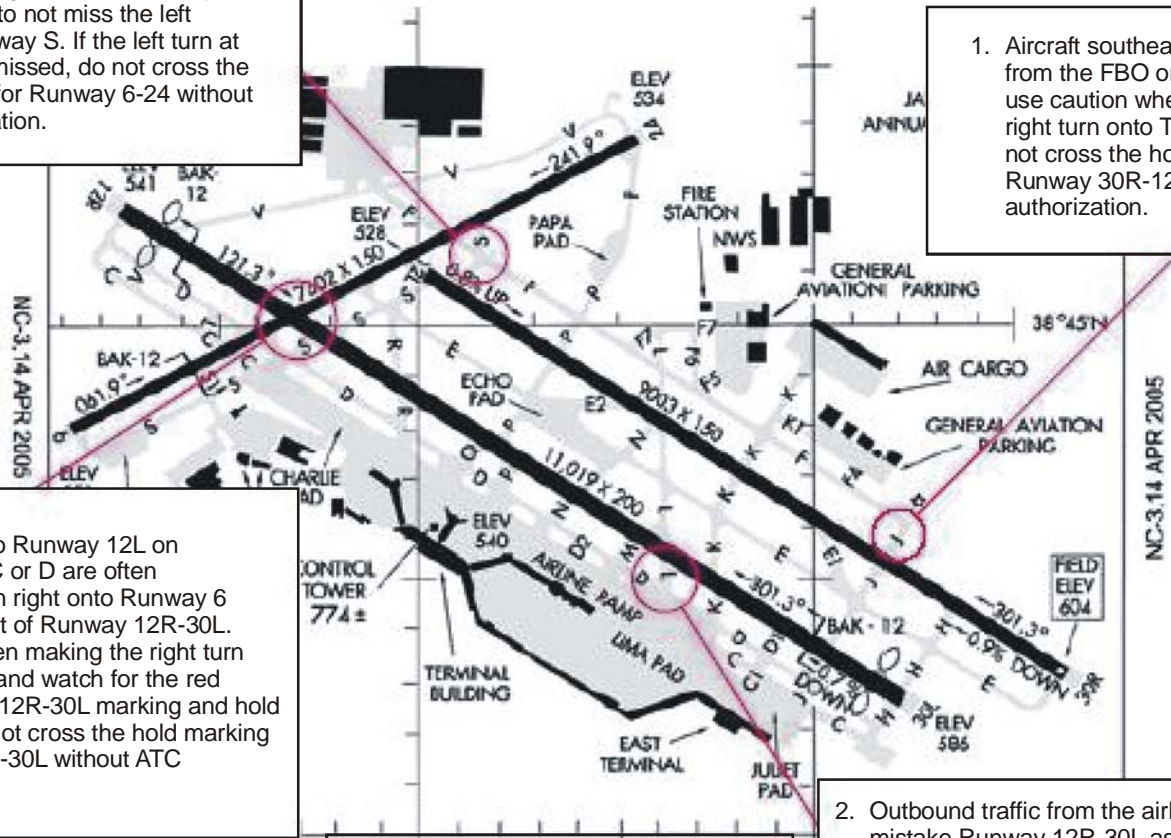


Figure 3-2. Example of hot spot information

3.5 ACTION ITEMS

A plan containing action items for mitigating runway safety deficiencies should be developed. Action items should be aerodrome specific and linked to a runway safety concern, issue or problem at that aerodrome. Action items may include suggested changes to the physical features of, or facilities at, the aerodrome; air traffic control procedures; airfield access requirements; pilot and vehicle operator awareness; and production of hot spot maps.

3.6 RESPONSIBILITY FOR TASKS ASSOCIATED WITH ACTION ITEMS

Each action item should have a designated person or organization which is responsible for completing the relevant tasks. There may be more than one person or organization affected by an action item; however, one person or organization should take the lead and be responsible for the completion of all the tasks associated with the action item. A realistic time frame to accomplish the work should also be associated with each action item.

3.7 EFFECTIVENESS OF COMPLETED ACTION ITEMS

Periodically the effectiveness of implemented and/or completed action items should be assessed. This can be accomplished by comparing the results of the initial analysis and the current runway incursion status. For example, if an action item was to provide training for controllers, pilots or vehicle drivers, the effectiveness of such training should be evaluated by the team. If the analysis shows little or no improvement in the number, type or severity of runway incursions, the team should re-evaluate the implementation of that action item.

3.8 EDUCATION AND AWARENESS

3.8.1 Education and awareness material such as newsletters, posters, stickers and other educational information are invaluable tools for reducing the risk of runway incursions. The ICAO runway safety toolkit, discussed in Appendix J, provides a wealth of information for educational and awareness programmes.

3.8.2 Other awareness material that may be helpful to local runway safety teams is available from:

Airports Council International (ACI)
www.airports.org

Air Services Australia
www.airservicesaustralia.com

European Organisation for the Safety of Air Navigation (EUROCONTROL)
www.eurocontrol.int/runwaysafety/public/subsite_homepage/homepage.html

Federal Aviation Administration (FAA)
www.faa.gov/runwaysafety

International Air Transport Association (IATA)
www.iata.org

International Civil Aviation Organization (ICAO)
www.icao.int/fsix/res_ans.cfm

International Federation of Airline Pilots' Associations (IFALPA)
www.ifalpa.org

Transport Canada
www.tc.gc.ca/civilaviation/systemsafety/posters/tools.htm

United Kingdom Safety Regulation Group
<http://www.caa.co.uk>

Appendix J

ICAO RUNWAY SAFETY TOOLKIT

1. The ICAO runway safety toolkit on CD-ROM was produced by the International Civil Aviation Organization (ICAO) and Embry Riddle Aeronautical University, Florida, United States, as part of a continuing effort to assist States in the implementation of runway incursion prevention programmes. This interactive toolkit is a compilation of the best educational material available, obtained over a period of several years, and draws on information and knowledge obtained during a series of ICAO seminars on the subject of runway safety held between October 2002 and October 2004. The toolkit is meant to be used with other runway safety tools such as the *Manual on the Prevention of Runway Incursions* (Doc 9870) and to support other runway incursion prevention programme initiatives.
 2. The CD-ROM contains:
 - a) an opening statement by the President of the ICAO Council;
 - b) introduction to all users;
 - c) modules for air traffic control, flight operations, aerodrome and management responsibilities; and
 - d) supplemental material including a glossary of terms related to runway safety, an appendix containing ICAO provisions on runway safety, references and links to runway safety websites, posters, videos, and presentations given during the ICAO runway safety awareness and education campaign.
 3. The CD-ROM can be obtained from the ICAO website at:
www.icao.int/fsix/res_ans.cfm.
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