



TSB Recommendation A09-01

Bounced landing training

The Transportation Safety Board of Canada recommends that the Department of Transport require air carriers to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training.

Air transportation safety investigation report	A08O0189
Date the recommendation was issued	09 September 2009
Date of the latest response	November 2015
Date of the latest assessment	March 2026
Rating of the latest response	Satisfactory in Part
File status	Closed

Summary of the occurrence

On 22 July 2008, a Kelowna Flightcraft Air Charter Ltd. Boeing 727-227 (registration C-GLKF, serial number 21118), with three crew members on board, was being operated as KFA281 on a cargo flight from Moncton, New Brunswick, to Hamilton, Ontario. The aircraft was vectored for an approach to Runway 06 at Hamilton Airport. At 2216 eastern daylight time, the aircraft touched down hard and bounced before touching down hard a second time. Immediately after the second touchdown, a go-around was initiated. During rotation, the tailskid made contact with the runway. The thrust reverser actuator fairing and the number 2 engine tailpipe made contact with the ground off the departure end of the runway. The aircraft climbed away and then returned for a normal landing on Runway 12. There were no injuries; the aircraft sustained minor damage.

The Board concluded its investigation and released report A08O0189 on 09 September 2009.

Rationale for the recommendation

The Commercial Air Service Standards require that crews practice the rejected landing procedure and the normal go-around procedure. These procedures are all initiated before main wheel touchdown.

In this occurrence, the crew had to react to a bounced landing. While the manufacturer's manual contains guidance on how to respond to such an event, crews do not receive training for these manoeuvres. While the crew was able to conduct a go-around and return for a safe landing, the aircraft sustained some damage.

Accident data show that other crews throughout the aviation industry have also experienced problems when manoeuvring following a bounced landing.

Action has been taken in the United States to mitigate the risks associated with bounced landings through crew training. Canadian operators, however, are not required to train their crews for bounced landings. Without training to improve crew skills and awareness of the risks associated with this manoeuvre, there continues to be an unacceptable level of risk to crews and the travelling public.

Therefore, the Board recommended that

The Department of Transport require air carriers to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training.

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Previous responses and assessments

December 2009: response from Transport Canada

To address the issue of bounced landing training, Transport Canada (TC) will prepare an Advisory Circular (AC) to air carriers that will raise awareness of the hazards and means of reducing the risks through a Safety Management System (SMS) approach. TC will seek voluntary compliance in addressing the identified operational hazard similar to the approach taken by the Federal Aviation Administration (FAA). TC will review the voluntary implementation of any identified mitigation and, one year after the release of the AC, TC will assess the approach taken by the operators. The results shall be made public in accordance with the *Canadian Transportation Accident Investigation and Safety Board Act*, section 24(6) (b), which states in part, "... the Minister shall make that reply available to the public."

On 01 January 2010, TC issued AC 705-007, titled Bounced Landing Training for 705 Air Operators. The AC stated in part:

The purpose of this document is to encourage Canadian Subpart 705 air operators to institute bounced landing recovery training into their flight crew training syllabus, and to provide bounced landing information in their company operations manual (COM).

This document is applicable to all Transport Canada Civil Aviation (TCCA) employees, to individuals and organizations when they are exercising privileges granted to them under an External Ministerial Delegation of Authority. This information is also available to the aviation industry for information purposes.

March 2010: TSB assessment of the response (Satisfactory in Part)

Recommendation A09-01 proposed that the Department of Transport require air carriers to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training. However, in AC 705-007, TC indicated that it will not make this a mandatory requirement; instead it will seek voluntary compliance in addressing the identified operational hazard. Furthermore, AC 705-007 is only directed at Canadian Subpart 705 air operators, rather than being directed at all air carriers.

AC 705-007 promotes flight crew member awareness of the factors contributing to bounced landings and the proper use of bounced landing recovery techniques. However, only Canadian Subpart 705 air operators that choose to institute this training into their flight crew training syllabus will benefit. Without training being required for all air carriers, to improve crew skills and awareness of the risks associated with this manoeuvre, there continues to be a substantial level of risk to crews and the travelling public.

The response is assessed as **Satisfactory in Part**.

January 2011: response from Transport Canada

In its response, TC only indicates that it will review the approach taken by operators in the third quarter of 2011.

March 2011: TSB assessment of the response (Satisfactory in Part)

The Board remains concerned that, without training being required for all air carriers to improve crew skills and awareness of the risks associated with the bounced landing manoeuvre, there continues to be a risk to crews and the travelling public.

The assessment remains **Satisfactory in Part**.

May 2011: response from Transport Canada

Transport Canada is in the process of gathering the data required to determine the efficiency of our approach and expects to produce a report in third quarter of 2011.

September 2011: updated response from Transport Canada

No change.

March 2012: TSB assessment of the response (Satisfactory in Part)

No new information has been made available since TC's response, dated 21 January 2011. Therefore, the assessment remains unchanged. Because the action taken will reduce but not substantially reduce or eliminate the deficiency the Board remains concerned that, without training being required for all air carriers to improve crew skills and awareness of the risks associated with the bounced landing manoeuvre, there continues to be a risk to crews and the travelling public.

The response is considered **Satisfactory in Part**.

December 2012: response from Transport Canada

Transport Canada is currently gathering data to measure the effectiveness of Advisory Circular (AC) No. 705-007. TCCA will advise the TSB when an update is available.

March 2013: TSB assessment of the response (Satisfactory in Part)

No new information has been made available since TC's response, dated 21 January 2011. Therefore, the assessment remains unchanged. Because the action taken will reduce but not substantially reduce or eliminate the deficiency, the Board remains concerned that, without training being required for all air carriers to improve crew skills and awareness of the risks associated with the bounced landing manoeuvre, there continues to be a risk to crews and the travelling public.

The response is considered **Satisfactory in Part**.

November 2013: response from Transport Canada

Transport Canada completed the data gathering in early fall 2013 and the analysis is expected to be completed by the end of fiscal year 2013/2014.

April 2014: TSB assessment of the response (Satisfactory in Part)

No new information has been made available since TC's response, dated 04 December 2012. Because the action taken will reduce but not substantially reduce or eliminate the deficiency, the Board remains concerned that, without training being required for all air carriers to improve crew skills and awareness of the risks associated with the bounced landing manoeuvre, there continues to be a risk to crews and the travelling public. In order to determine to what extent the actions taken have mitigated the risks associated with bounced landings additional information will be required.

Therefore, the assessment remains unchanged and is considered **Satisfactory in Part**.

January 2015: response from Transport Canada

Transport Canada agrees with the intent of the recommendation.

Advisory Circular (AC) 705-007 – Bounced Landing Training for 705 Air Operators was intended to raise awareness of the various hazards associated with bounced landings, provide guidance on conducting bounced landing avoidance and recovery training as a recommended risk mitigation strategy and a means to encourage voluntary implementation of a formalized training program on that topic within the Subpart 705 air operator's community.

Eighteen months after the publication of AC 705-007, Transport Canada utilized a questionnaire as an initial assessment of the level of awareness of the bounced landing hazard and to measure

the level of implementation of the recommended risk mitigation methodologies within the Subpart 705 Canadian operator population.

As a result of the data gathering and analysis of this initial assessment, AC 705-007 was found to be a highly effective tool at raising awareness of the hazards associated with bounced landings by improving operators' understanding of the hazards and means to mitigate the associated risks of bounced landings. The AC was not as effective at encouraging operators to formalize training in bounced landing avoidance and recovery. However, air operators have other programs such as Stabilized Constant Descent Angle (SCDA), training with and use of Enhanced Ground Proximity Warning System (EGPWS) equipment, highlighting stabilized approach criteria, and introducing bounced landings into Crew Resource Management (CRM) training scenarios to address this issue and further reduce such incidents.

In addition to issuing AC 705-007, Transport Canada will continue to assess the effectiveness of the various measures undertaken by airlines in terms of preventing, and recovering where necessary, from bounced landings, including how airlines track, analyze and implement corrective measures related to bounced landings within the context of normal surveillance activities.

Through the actions described above, Transport Canada has implemented the intent of TSB Recommendation A09-01, and no further updates will be provided.

March 2015: TSB assessment of the response (Satisfactory in Part)

Recommendation A09-01 proposed that the Department of Transport require air carriers to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training. However, in AC 705-007, which is only directed at Canadian Subpart 705 air operators, rather than being directed at all air carriers, TC indicated that it will not make this a mandatory requirement; instead it will seek voluntary compliance in addressing the identified operational hazard.

The Board is concerned that AC 705-007 was not as effective at encouraging operators to formalize training in bounced landing avoidance and recovery.

Because the action taken will reduce but not substantially reduce or eliminate the deficiency, the Board remains concerned that, without training being required for all air carriers to improve crew skills and awareness of the risks associated with the bounced landing manoeuvre, there continues to be a risk to crews and the travelling public.

Therefore, the assessment remains unchanged and is considered **Satisfactory in Part**.

November 2015: response from Transport Canada

As per the 2014 update, Transport Canada agrees with the intent of the recommendation and believes that the issue has been addressed. TC has no further activities planned on this recommendation.

2014 update:

Advisory Circular (AC) 705-007 - Bounced Landing Training for 705 Air Operators was intended to raise awareness of the various hazards associated with bounced landings, provide guidance on conducting bounced landing avoidance and recovery training as a recommended risk mitigation strategy and a means to encourage voluntary implementation of a formalized training program on that topic within the 705 air operator's community.

Eighteen months after the publication of AC 705-007, Transport Canada utilized a questionnaire as an initial assessment of the level of awareness of the bounced landing hazard and to measure the level of implementation of the recommended risk mitigation methodologies within the Subpart 705 Canadian operator population.

As a result of the data gathering and analysis of this initial assessment, AC 705-007 was found to be a highly effective tool at raising awareness of the hazards associated with bounced landings by improving Operators' understanding of the hazards and means to mitigate the associated risks of bounced landings. The AC was not as effective at encouraging Operators to formalize training in bounced landing avoidance and recovery. However, Air operators have other programs such as Stabilized Constant Descent Angle (SCDA), training with and use of Enhanced Ground Proximity Warning System (EGPWS) equipment, highlighting stabilized approach criteria, and introducing bounced landings into Crew Resource Management (CRM) training scenarios to address this issue and further reduce such incidents.

In addition to issuing AC 705-007, Transport Canada, within the context of normal surveillance activities, will continue to assess the effectiveness of the various measures undertaken by airlines in terms of preventing, and recovering where necessary, from bounced landings, including how airlines track, analyze and implement corrective measures related to bounced landings.

Through the actions described above, Transport Canada has implemented the intent of TSB Recommendation A09-01.

March 2016: TSB assessment of the response (Satisfactory in Part)

Recommendation A09-01 proposed that the Department of Transport require all air carriers to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training. However, in AC 705-007, which is only directed at Canadian Subpart 705 air operators, TC indicated that it will not make this a mandatory requirement; instead it will seek voluntary compliance in addressing the identified operational hazard.

The Board is concerned that although AC 705-007 promotes flight crew awareness of the factors contributing to bounced landings and the proper use of bounced landing recovery techniques in 705 operators, it has not been presented to other commercial operators and is therefore not effective at encouraging all other operators to formalize training and increase awareness in bounced landing avoidance and recovery.

Because the action taken will reduce but not substantially reduce or eliminate the deficiency, the Board remains concerned that, without training being required for all air carriers to improve crew skills and awareness of the risks associated with the bounced landing manoeuvre, there continues to be a risk to crews and the travelling public.

Therefore, the assessment remains unchanged and is considered **Satisfactory in Part**.

Latest response and assessment

March 2026: TSB assessment of the overall response (Satisfactory in Part)

In January 2010, Transport Canada (TC) responded to Recommendation A09-01 by publishing Advisory Circular (AC) 705-007, *Bounced Landing Training for 705 Air Operators*,¹ with the objective of raising awareness of the hazards associated with bounced landings and encouraging operators to implement appropriate avoidance and recovery training. TC subsequently assessed the effectiveness of the AC through questionnaires and surveillance activities, concluding that, while the AC was effective at increasing awareness, the AC was less effective at prompting operators to formalize bounced landing recovery training as a discrete, mandatory element of flight crew training programs. TC also identified that operators address the risk of bounced landings through other safety defences, including stabilized approach criteria, stabilized constant descent angle (SCDA) procedures, the use of enhanced ground proximity warning systems (EGPWS), and the integration of bounced landing scenarios into crew resource management (CRM) training.

In previous reassessments, the Board expressed concern that TC's approach relied on voluntary compliance and was limited in scope, as AC 705-007 applied only to *Canadian Aviation Regulations* (CARs) Subpart 705 air operators and did not require all air carriers to incorporate bounced landing recovery techniques into manuals and training.

Since 2015, TC has indicated that it considers the intent of the recommendation to have been addressed and that no further activities are planned. The recommendation has remained dormant for an extended period, with no new initiatives, regulatory proposals, or policy developments forthcoming to expand the scope of bounced landing recovery training requirements beyond those already in place. However, during this time, the Canadian aviation industry has continued to evolve, with broader implementation of safety management systems (SMS), stabilized approach policies, data-driven monitoring programs, and enhanced training standards that collectively address approach and landing risks, including bounced landings, in a more integrated manner.

Additionally, there has been some international progress toward mandating bounced landing recovery training across all classes of commercial air operators. In 2005, the National

¹ Transport Canada, Advisory Circular (AC) 705-007: Bounced Landing Training for 705 Air Operators (Issue 01: 01 January 2010), at <https://tc.canada.ca/en/aviation/reference-centre/advisory-circulars/advisory-circular-ac-no-705-007> (last accessed on 23 April 2026).

Transportation Safety Board (NTSB) issued Safety Recommendation A-05-30 calling on the U.S. Federal Aviation Administration (FAA) to require Part 121 and Part 135 air carriers to incorporate bounced landing recovery techniques in manuals and training.² While the FAA subsequently introduced requirements for bounced landing recovery training within the context of extended envelope training for Part 121 operators, these requirements were implemented as part of broader training reforms and were not extended in a comparable mandatory manner to Part 135 operators. The FAA continues to rely on advisory material and integrated training frameworks rather than discrete regulatory requirements applicable to all commercial air carriers.

Similarly, the European Union Aviation Safety Agency (EASA) has not introduced regulatory requirements mandating bounced landing recovery training. In 2013, EASA issued Safety Information Bulletin (SIB) 2013-20, based in part on TC's AC 705-007, to encourage manufacturers, operators, and training organizations to provide guidance and training on bounced landing recognition and recovery. While the SIB was advisory in nature, promoting the use of SMS and classroom-based instruction, it has since been withdrawn by EASA. The International Air Transport Association (IATA) has likewise addressed bounced landing recovery within the context of extended envelope training and upset prevention and recovery training (UPRT), reflecting a global shift toward integrated, risk-based training models rather than prescriptive manoeuvre-specific requirements.

Despite the measures implemented by TC and the broader evolution of approach-and-landing safety practices, the Board acknowledges that the risk associated with the safety deficiency identified in Recommendation A09-01—namely the absence of a mandatory requirement for all air carriers to incorporate bounced landing recovery techniques into flight manuals and initial and recurrent training—has not been fully eliminated. TC's actions, including the issuance of AC 705-007 and continued reliance on operator surveillance and SMS, have contributed to increased awareness and risk reduction, particularly within CARs Subpart 705 operations. However, these measures remain advisory in nature and are not applied consistently across all commercial air carriers.

While the Board remains of the view that the actions taken reduce, but do not eliminate, the residual risk associated with the safety deficiency identified in Recommendation A09-01, given the passage of time, the lack of international regulatory progress, and the incorporation of bounced landing risk mitigation within broader, integrated training and safety frameworks, continued assessments are unlikely to yield further results.

Therefore, the Board considers the overall response to Recommendation A09-01 to be **Satisfactory in Part**.

² United States National Transportation Safety Board (NTSB) Safety Recommendation A-05-30 (September 26, 2005). Available at: https://www.nts.gov/safety/safety-recs/reletters/A05_30_32.pdf (last accessed on 23 April 2026).

File status

Given the age of the recommendation, the evolution of training practices and safety frameworks, and the lack of international regulatory alignment, the Board considers that the risk associated with safety deficiency identified in Recommendation A09-01 has been partially addressed and that further progress is unlikely. Although the risk associated with bounced landing events has not been eliminated, existing defences reduce its likelihood. Consequently, the residual risk is considered to be low.

This deficiency file is **Closed**.