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RASMAG

SAFETY BULLETIN

Regional Airspace Safety Monitoring Advisory Group (RASMAG)

RASMAG was formed by ICAO Asia Pacific Regional Office to centralize the assistance to States and advise the regional airspace safety and monitoring activities involving flight operations and the air traffic services. The primary task of the group is to review the monitoring and safety assessment activities carried out by the regional monitoring agencies established by APANPIRG for implementation and operation of reduced separation minima.

Enhancing Team Resource Management (TRM) to Prevent Large Height Deviations (LHDs)

INTRODUCTION

A Large Height Deviation (LHD) refers to any vertical deviation of 300 feet or more from an assigned, coordinated, or planned flight level within Reduced Vertical Separation Minimum (RVSM) airspace. Such deviations may result from human factor issues that arise among either air traffic controllers (ATCOs) or flight crews, equipment malfunctions, or environmental factors such as turbulence. LHDs may also be reported when aircraft remain at the same level, but flight crews are not notified of requirements to change level due to coordination issues between neighboring FIRs.

In the Asia Pacific Region, most LHDs are attributed to human factors, particularly coordination issues during the transfer of control between Area Control Centers (ACCs) or communication breakdowns between ATCOs and flight crews. These issues commonly arise from miscommunication, procedural lapses, or coordination breakdowns.

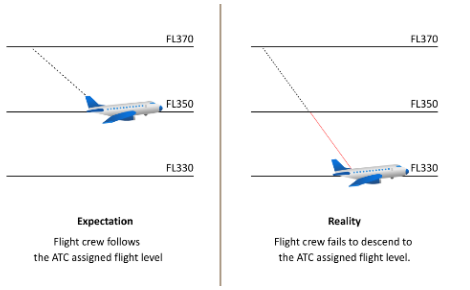
To mitigate these issues, Team Resource Management (TRM) provides an effective framework to strengthen teamwork, enhance communication, and support more efficient coordination and decision-making. TRM concepts can be applied to both ATCOs and flight crews to promote shared situational awareness and reduce the likelihood of human error.

This bulletin outlines human factor issues that lead to LHDs and presents TRM-integrated practices designed to enhance communication, minimize the likelihood for mistakes, and prevent LHDs.

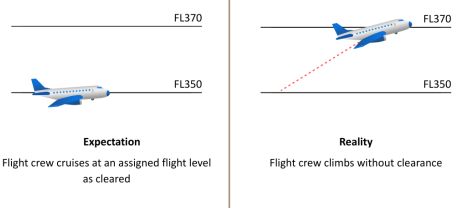
Human factor issues leading to LHDs

Issues in the communication between ATCOs and flight crews

- Flight crew fails to climb or descend to the ATC assigned flight level.
  - Misunderstanding of assigned flight level
  - Failure to comply with flight level restrictions

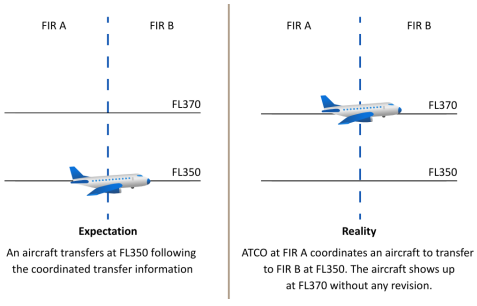


- Flight crew climb or descend without clearance.
  - Misunderstanding of a clearance
  - Callsign confusion resulting in an aircraft mistakenly acting on a clearance intended for another aircraft



Issues during transfer of control between ACCs

- ATCO fails to coordinate the transfer of information.
- ATCO does not revise transfer information, after the transferred information has been revised.



Causes of Human Factor Issues Leading to LHDs

Human factor issues refer to unintentional failure in human performance, including slips, lapses, and mistakes. Even in well-managed operations, research indicates that a person may commit an error approximately once every 1,000 routine actions. Although human error cannot be completely eliminated, understanding its underlying causes is essential to prevent LHDs.

Type of human factor issues and their contributing causes:

Human Factor Issues	Causes
Errors in communication between ATCOs and flight crews	• Use of similar callsigns on the same frequency • ATCO and/or flight crew high workloads • Assumptions being made without clarification • Misunderstandings due to insufficient listening comprehension • Failure to confirm information • Failure to repair communication breakdowns or clarify misunderstandings • Poor pronunciation or lack of familiarity with an accent • Distractions or loss of focus caused by fatigue • Use of incorrect phraseology
Errors during transfer of control between ACCs	• Lack of reminders • Lack of/Insufficient coordination tools • Not adhering to transfer of control procedures • High workload • Distractions or loss of focus caused by fatigue

How TRM Mitigate Human Factor Issues and Prevent LHDs

The EUROCONTROL Guidelines for TRM Good Practices refers to TRM as

"The application of strategies by ANSPs to make the most effective use of all available resources, including information, equipment, and personnel, in order to enhance the safety and efficiency of Air Traffic Services."

TRM emphasizes effective teamwork through the sharing of information, maintaining situational awareness, supporting colleagues, and communicating clearly to solve problems and make effective decisions under all circumstances. When applied to both ATCOs and flight crews, TRM practices can enhance the effectiveness of communication, reduce human error, and prevent LHDs. The following practices demonstrate how TRM concepts can be integrated into ATCO and flight crew operations.

TRM Practice 1: Sharing and Studying LHD cases Among ANSPs

Expected Outcomes:

- ATCOs develop a greater awareness of the causes of human errors and LHDs.
- ATCOs pay greater attention to the importance of effective voice communication.
- ATCOs recognize the importance of actively correcting readback/hearback errors and conducting confirmation checks within their teams.

TRM Practice 2: Joint Meetings between ATCOs and Flight Crews

Expected Outcomes:

- ATCOs and flight crews gain opportunities to review potential threats and risks within the communication loop.
- ATCOs and flight crews develop mutual understanding of aircraft performance, ATC procedures, and cockpit workload.
- ATCOs and flight crews establish harmonized expectations for readback/hearback process and correction procedure.

TRM Practice 3: Bilateral Meeting between ACCs

Expected Outcome:

- ACCs recognize operational issues affecting the transfer of control and implement mitigation measures.
- Communication and coordination between ACCs are strengthened, supporting safer and more efficient transfer of control.

How TRM Mitigates Human Factors Issues and Prevents LHDs

How effective TRM Practices reduce LHDs:

Effective TRM practices including the **sharing and studying of LHD cases, conducting joint meetings between ATCOs and flight crews, and organizing bilateral meetings between ACCs** to enhance situational awareness and reinforce the readback-hearback process. They also promote a shared understanding of aircraft performance, ATC procedures and communication expectations. In addition, these practices help identify operational issues during the transfer of control and support the development of appropriate mitigation measures. These improvements strengthen communication, coordination, enable timely correction of misunderstandings, and minimize errors and therefore the likelihood of LHDs.

The following examples demonstrate how timely correction during readback-hearback processes can minimize errors and prevent LHDs.

Hearback error:

ATCO	**ABC123**, descend to and maintain **FL310**	
Flight Crew	Roger, descend to and maintain **FL210**, ABC123	
ATCO	--- (Hearback error) ---	Negative, descend to and maintain **FL310**
Result	Leading to the LHD	Preventing the LHD

Callsign confusion and hearback error:

ATCO	**ABC123**, descend to and maintain FL310	
Flight Crew (ABD123)	Roger, descend to and maintain FL310, **ABD123**	
ATCO	--- (Hearback error) ---	Negative, we call **ABC123**
Flight Crew (ABD123)	--- (No confirmation) ---	Confirm callsign **ABC123 or ABD12.**
Result	Leading to the LHD	Preventing the LHD