



*International Civil Aviation Organization*

**The Twenty-First Meeting of the Regional Airspace Safety Monitoring  
Advisory Group (RASMAG/21)**

Bangkok, Thailand, 14-17 June 2016

---

**Agenda Item 4: Airspace Safety Monitoring Documentation and Regional Guidance Material**

**LHD MATERIAL PACKAGE 2016**

(Presented by the Monitoring Agency for Asia Region)

**SUMMARY**

This paper presents consolidated LHD material as a package to capture the current set of material that helps promote the understanding of LHD reporting. This package includes LHD frequently asked questions (FAQ), LHD taxonomy, LHD reporting form, cross-boundary LHD reporting flow, and LHD point of contacts (POC).

**1. INTRODUCTION**

1.1 ICAO Doc 9574 RVSM Implementation Manual section 6.4 specifies that ATC authorities are responsible for reporting Large Height Deviations (LHDs) to the responsible Regional Monitoring Agency (RMA). LHD reports are essential information needed for accurate RVSM risk assessment since LHDs are the main driver of operational risk.

1.2 Throughout RVSM monitoring activities in the Asia Pacific region, RMAs have put efforts into refining and clarifying the definition of LHD and the reporting process in order to encourage more reporting. The purpose of this paper is to collect LHD related materials as a consolidated package, which will be made available for States for future reference.

**2. DISCUSSION**

2.1 The consolidated LHD material package includes an LHD FAQ page, LHD taxonomy, LHD reporting form, cross-boundary LHD reporting flow, and LHD point of contacts (POC).

2.2 **LHD FAQ:** Upon receiving many queries regarding LHD reporting from States/ATC authorities, the MAAR sought out clarification from the 3rd RASMAG Monitoring Agency Working Group (MAWG/3) in December 2015 and feedback from LHD POC. The MAAR then developed an LHD FAQ page (**Attachment A**) with the intent to promote a common understanding of LHDs, and also planned to publish on MAAR's website.

2.3 **LHD Taxonomy:** In addition to the basic definition of LHD and frequently asked scenarios information on the FAQ page, the LHD taxonomy (**Attachment B**) provides a comprehensive list of generic LHD classification with examples. It was agreed by RASMAG/15 and endorsed by RMACG/6 both in 2011. More work is still ongoing to group together operational and technical errors to help readers understand different natures of LHD occurrences.

2.4 **LHD reporting form:** The new LHD reporting form (**Attachment C**) was recently developed by the MAAR and was reconfigured with answer hints to the reporters and restructured to capture more detailed information especially about operational errors, which occurred most frequently

---

in the region. The form was presented in the RASMAG MAWG/3 and has been revised based on feedback from MAAR States and APAC RMAs.

2.5 **Cross-boundary LHD reporting flow:** Most LHDs in the Asia Pacific region were the result of coordination errors in the ATC-to-ATC transfer-of-control responsibility due to human factors issues (Category E). Some ATC Authorities already have LHD coordination/handling procedures to uncover causes of coordination breakdown while some do not. For ATC Authorities without such procedures, specifically those in the BOBASIO region, the MAAR proposed a reporting workflow (**Attachment D**) to be adopted as part of their safety management systems. The diagram of the flow is included in this LHD package as a general guidance.

2.6 **LHD point of contact:** To facilitate LHD coordination/handling procedures highlighted in 2.5, the MAAR compiled a list of current LHD point of contacts (**Attachment E**), containing ATS units both within and adjacent to the area of responsibility of the MAAR.

2.7 The MAAR will continue to update this LHD material package whenever there is any change or new development.

### 3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper and all appendices;
- b) review and comment the content of the package; and
- c) consider having a uniform package for the Asia Pacific region.

.....

## LHD FAQs

### Large Height Deviation Frequently-Asked-Questions

#### General

***Q: What is an LHD?***

A: An RVSM Large Height Deviation (LHD) is defined as any vertical deviation of 300 feet (90 m.) or more from the flight level expected to be occupied by the flight. The deviation may be the result of any operational error or technical condition affecting the flight and includes any operational error that causes the aircraft to be at a location (position and/or time) that is unexpected by the controller.

In other words, an LHD occurs when a controller expects an aircraft to be at one location, but the aircraft is actually at another location.

***Q: Why States are required to submit LHD report?***

A: ICAO Doc9574 RVSM Implementation Manual section 6.4 specifies that ATC authorities are responsible to report LHD for any reason to their responsible RMA for collision risk assessment.

***Q: How does an LHD contribute to mid-air collision risk?***

A: An aircraft occupies space unexpected by a controller. Not knowing that the space is occupied, the controller may clear another aircraft to that location, which may cause a mid-air collision.

***Q: What is the benefit of LHD reporting while it may be perceived as additional workload by some units?***

A: Reporting an LHD is part of safety management system, enabling an organization to identify corrective and preventive actions. In case of LHD events occurring in a high collision risk area, remedial actions requiring inter-state collaboration may be initiated with the help of ICAO regional office and the RMA.

#### To report to the RMA or not

***Q: Some states impose flow restrictions by issuing NOTAMs or AFTN service message. If the incoming traffic violates the flow restriction but complies with separation agreed in the LOA, should this incident be reported as an LHD?***

A: No. This operational error may be reported internally, but does not need to be reported as an LHD to the RMA.

***Q: A controller does not receive a transfer or the appropriate revision of the transfer of an aircraft from the transferring unit, but surveillance system enables the accepting controller to determine the location of the incoming aircraft well before the Transfer-of-Control (TOC) point, allowing the accepting controller to call the transferring controller back to confirm the aircraft's intent. Should this incident be reported?***

A: No. The call-back procedure can be considered a method to circumvent the coordination problem by the accepting unit, so it does not need to be reported as an LHD to the respective RMA. However, ANSPs can report the occurrence internally as evidence for further inter-unit collaboration to prevent such occurrences in the future.

***Q: The transferred SSR code does not match the incoming traffic. The controller sees the incoming traffic, but cannot identify it. Should this be reported?***

A: Yes. The RMA will analyze this type of occurrence case by case.

***Q: The traffic doesn't arrive at the transferred time. The controller calls the transferring unit to get an updated transferred time. Should this occurrence be reported?***

A: Yes.

## LHD Taxonomy

Agreed by RASMAG/15, and endorsed by RMACG/6

| Code                      | LHD Cause   |
|---------------------------|---|
| <b>Operational Errors</b> |   |
| A                         | <p>Flight crew failing to climb/descend the aircraft as cleared</p> <p>Example: Aircraft A was at FL300 and assigned FL360. A CLAM alert was seen as the aircraft passed FL364. The Mode C level reached FL365 before descending back to FL360.</p>   |
| B                         | <p>Flight crew climbing/descending without ATC Clearance</p> <p>Example: At 0648, Aircraft A reported leaving cruise level FL340. The last level clearance was coincident with STAR issue at 0623, when the flight was instructed to maintain FL340. ATC was applying vertical separation between Aircraft A and two other flights. The timing of the descent was such that Aircraft A had become clear of the first conflicting aircraft and there was sufficient time to apply positive separation with the other.</p>  |
| C                         | <p>Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc)</p> <p>Example: The aircraft was maintaining a flight level below the assigned altitude. The altimeters had not been reset at transition. The FL assigned was 350. The aircraft was maintaining FL346 for in excess of 4 minutes.</p>  |
| D                         | <p>ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message.<br/>Includes situations where ATC delivery of operational information, including as the result of hear back and/or read back errors, is absent, delayed, incorrect or incomplete, and may result in a loss of separation.)</p> <p>Example: All communications between ATC and aircraft are by HF third party voice relay. Aircraft 1 was maintaining FL360 and requested FL380. A clearance to FL370 was issued, with an expectation for higher levels at a later point. A clearance was then issued to Aircraft 2 to climb to FL390, this was correctly read back by the HF operator, but was issued to Aircraft 1. The error was detected when Aircraft 1 reported maintaining FL390.</p> |
| E                         | <p>Coordination errors in the ATC to ATC transfer or control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)</p> <p>Example 1: Sector A coordinated Aircraft 1 to Sector B at FL380. The aircraft was actually at FL400.</p> <p>Example 2: The Sector A controller received coordination on Aircraft 1 for Waypoint X at FL370 from Sector B. At 0504 Aircraft 1 was at Waypoint X at FL350 requesting FL370.</p>   |
| F                         | <p>Coordination errors in the ATC to ATC transfer or control responsibility as a result of equipment outage or technical issues</p> <p>Example: Controller in FIR A attempts to send AIDC message to coordinate transfer of aircraft at FL320. Messaging unsuccessful and attempts to contact adjacent FIR by telephone fail. Aircraft contacts adjacent FIR without coordination being completed.</p>  |

| <b>Aircraft Contingency Events</b>               |  |
|--|--|
| G  | <p>Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure)</p> <p>Example: Aircraft 1 descended from F400 to F300 with a pressurization issue.</p>   |
| H  | <p>Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level</p> <p>Example: Aircraft 1 cruising at FL380. ATC receives alert indicating aircraft climbing through FL383. Flight crew advises attempting to regain cleared level with autopilot and navigation system failure</p>  |
| <b>Deviation due to Meteorological Condition</b> |  |
| I  | <p>Deviation due to turbulence or other weather related cause</p> <p>Example: During the cruise at F400, the aircraft encountered severe turbulence, resulting the aircraft descending 1,000 ft without a clearance.</p>   |
| <b>Deviation due to TCAS RA</b>                  |  |
| J  | <p>Deviation due to TCAS resolution advisory, flight crew correctly following the resolution advisory</p> <p>Example: Aircraft 1 was cruising at FL350. Flight crew received "Traffic Alert" from TCAS and almost immediately after an "RA Climb" instruction. Flight crew responded and climbed Aircraft 1 to approx FL353 to comply with TCAS instruction. TCAS display indicated that opposite direction Aircraft 2 descended to approx FL345 and passed below Aircraft 1.</p>  |
| K  | <p>Deviation due to TCAS resolution advisory, flight crew incorrectly following the resolution advisory.</p>   |
| <b>Other</b>                                     |  |
| L  | <p>An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan)</p> <p>Example 1: Original flight plan details submitted by FIR A for outbound leg showed Aircraft 1 as negative RVSM. Subsequent flight plan submitted by FIR B showed Aircraft 1 as RVSM approved. FIR A controller checked with aircraft shortly after entering FIR A and pilot confirmed negative RVSM.</p> <p>Example 2: Aircraft 2 cruising FL310 was handed off to the Sector X controller who noticed the label of Aircraft 2 indicated RVSM approval. The Sector X controller had controlled the aircraft the day before. It was then a non-RVSM aircraft. The controller queried the status of Aircraft 2 with the pilot who advised the aircraft was negative RVSM.</p> |
| M  | <p>Other – this includes situations where:</p> <p>i) There has been a failure to establish or maintain a separation standard between aircraft; or<br/> ii) Where flights are operating (including climbing/descending) in airspace where flight crews are unable to establish normal air-ground communications with the responsible ATS unit.</p> <p>Example: Aircraft 1 cruising at FL350. At time xxxx Aircraft 1 advised “Negative RVSM” due equipment failure. At that time Aircraft 2 on converging reciprocal track FL360 less than 10 minutes prior to time of passing.</p>   |

# RVSM Large Height Deviation (LHD) Report

Occurrence 1 of 1

A RVSM Large Height Deviation (LHD) is defined as any vertical deviation of 300 feet (90 m.) or more from the flight level expected to be occupied by the flight. The deviation may be the result of any operational error or technical condition affecting the flight and includes any operational errors that cause the aircraft to be at a location (position and/or time) that is unexpected by the controller.

Name of FIR: 2T

Date of Occurrence (UTC Date): 2T

Call Sign: 2T

Departure Aerodrome: 2T                      Destination Aerodrome: 2T

Aircraft Type: 2T

Location of Occurrence (Point): 2T    FLOS Transition Area?:

Location of Occurrence (Route): 2T    Route Type: 2T

Flight Level Expected by the Controller: 2T

Actual Flight Level: 2T    Detected via:

Duration at the Incorrect FL: 2T

Other Traffic (if any): 2T

*If this occurrence is a breakdown in ATC-to-ATC coordination (Category E or F), please fill in the following additional information:*

**Reporter's Role:**    **The Other ATS Unit:** 2T

**Was there any collaboration between the watch supervisors of both ATS units to uncover the cause of the error?**

**Check all that describe the nature of the occurrence:**

- Late/non-existent coordination       Miscommunicated transfer conditions
- Late/non-existent FL/time/route information       Aircraft did not transfer at the coordinated FL
- Other (please, describe below)

**Time aircraft expected to arrive at the TOC Point (UTC):** 2T

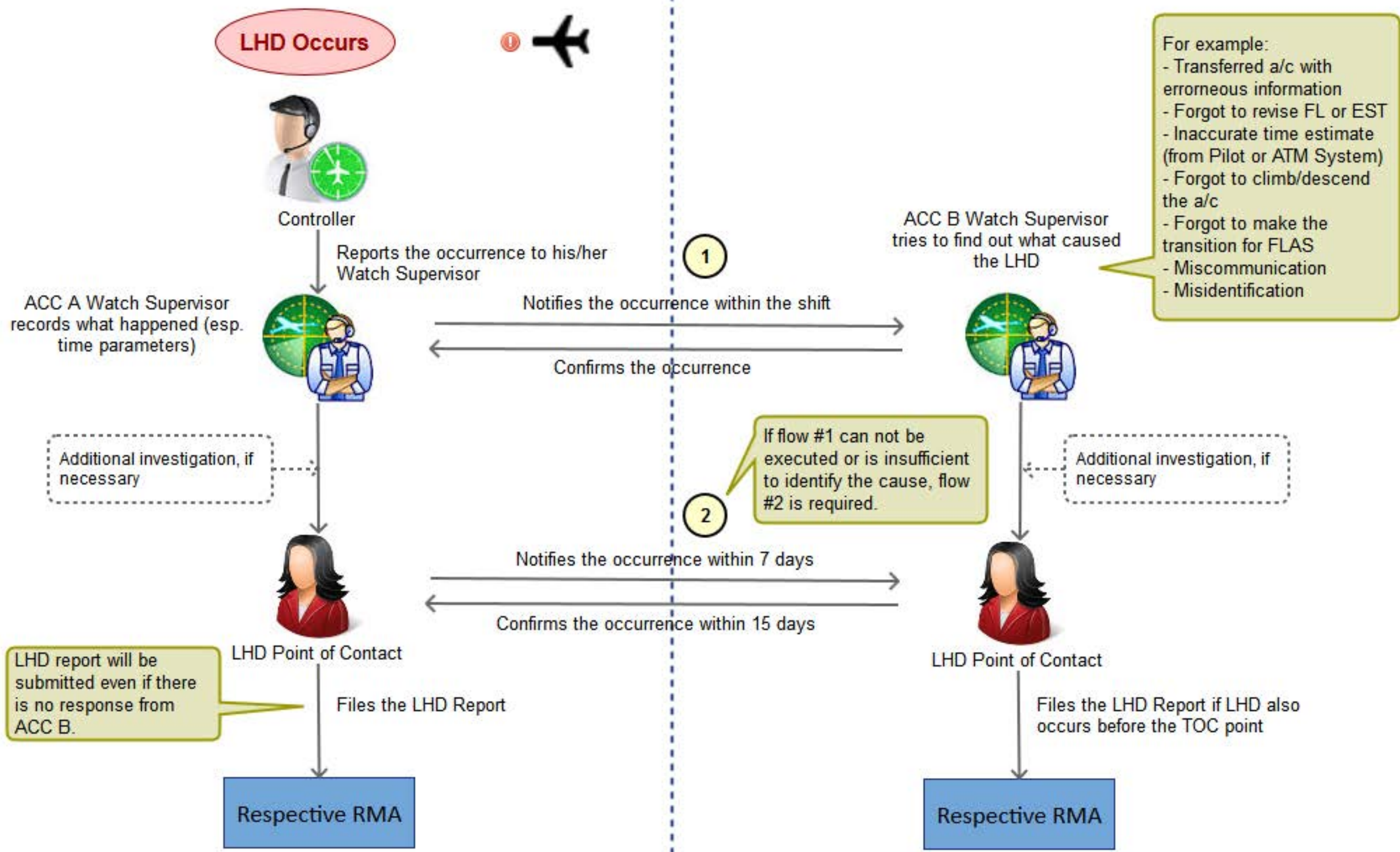
**Actual time aircraft arrived at the TOC point (UTC):** 2T

**Time the Controller detected the actual position of the aircraft (UTC):** 2T

**Additional Description of the Occurrence (please attach a copy of your internal occurrence report, if available):** 2T

# ACC A Receiving ATS Unit

# ACC B Transferring ATS Unit



## LHD Point of Contacts

| State            | FIR           | Name   | Email   |
|------------------|---------------|--|---|
| Afghanistan      | Kabul         | Mr. Bernard Sims   | bernard.sims1@gmail.com<br>Bernard.d.sims@iapws.com |
| Bangladesh       | Dhaka         | Station Air Traffic Officer (SATO), Hazrat ShahJalal International Airport, Dhaka<br>Tel: +88-02-8901460 | satohsia@caab.gov.bd                                |
|                  |               | Duty Flight Information Officer (FIO), Area Control Center<br>Tel: +88-02-8901462<br>+88-02-8901463      |   |
| Cambodia         | Phnom Penh    | Lorn Thyrith   | Thyrithl@cats.com.kh                                |
| Hong Kong, China | Hong Kong     | Mr. Richard F Egber  | rfegbers@cad.gov.hk                                 |
| India            | Chennai       | Watch Supervisory Officer  | vomm.wso@aai.aero                                   |
|                  |               | ATS In-Charge  | vomm.sqms@aai.aero                                  |
|                  | Delhi         | Watch Supervisory Officer  | vidp.wso@aai.aero                                   |
|                  |               | ATS In-Charge  | atmsqmsigi@gmail.com                                |
|                  | Kolkata       | Watch Supervisory Officer  | vecc.wso@aai.aero                                   |
|                  |               | ATS In-Charge  | vecc.sqms@aai.aero                                  |
|                  | Mumbai        | Watch Supervisory Officer  | vabb.wso@aai.aero                                   |
|                  |               | ATS In-Charge  | mumbaisqms@gmail.com                                |
| Lao PDR          | Vientiane     | Mr. Amdounla Salinthone  | asalinthone@gmail.com                               |
| Malaysia         | Kuala Lumpur  | Mr. Abdul Rali Bin Kassim  | abdulrali@dca.gov.my                                |
|                  | Kota Kinabalu | Ms. Nur Vivianni Gadiman   | vivianni@dca.gov.my                                 |
| Maldives         | Male          | Mr. Fathimath Ramiza   | ramiza@aviainfo.gov.mv<br>fathmath@macl.aero        |
| Mongolia         | Ulaanbaatar   | Mr. Myagmardorj Serdamba   | safety-atc@mcaa.gov.mn                              |
| Myanmar          | Yangon        | Mr. Tike Aung  | utikeaung@gmail.com                                 |
| Nepal            | Kathmandu     | Mr. Bimalesh Lal Karna   | bimalesh_lal@hotmail.com                            |
| Pakistan         | Karachi       | Mr. Muhammad Riazuddin   | RFC.JIAP@caapakistan.com.pk                         |
|                  | Lahore        | Radar Facility Chief   | AIAP@caapakistan.com.pk                             |



| State                      | FIR         | Name                        | Email                           |
|----------------------------|-------------|-----------------------------|---------------------------------|
| Philippines                | Manila      | Ms. Anna Joy C. Papag       | ae_jae0627@yahoo.com            |
| Singapore                  | Singapore   | Mr. Ying Weng Kit           | ying_weng_kit@caas.gov.sg       |
| Sri Lanka                  | Colombo     | Mr. Sugath Nagahawatte      | sugathatc.ans@airport.lk        |
| Thailand                   | Bangkok     | Mr. Aram Lertlum            | aram.le@aerothai.co.th          |
| Vietnam                    | Hanoi       | Mr. Mai Hongquan            | mhongquan@yahoo.com             |
|                            | Ho Chi Minh | Mr. Mai Hongquan            | mhongquan@yahoo.com             |
| <b>Other adjacent FIRs</b> |             |                             |                                 |
| China                      | Sanya       | Fu Yonqiang (ATMB, CAAC)    | hnsfyq@gmail.com                |
| Taiwan, China              | Taipei      | Ms. Tzu-Chi (Kiki) Weng     | tcweng@mail.caa.gov.tw          |
| Seychelles                 | Seychelles  | Lineda Samson               | lsamson@scaa.sc                 |
| Somalia                    | Mogadishu   | Mr. Humphrey Kilei Mwachoki | humphrey.mwachoki@icao.unon.org |
| Oman                       | Muscat      |                             |                                 |
| Yemen                      | Sana        |                             |                                 |
| Iran                       | Tehran      |                             |                                 |