# FINAL INVESTIGATION REPORT


## SERIOUS INCIDENT
## TCAS-RA

## FLYDUBAI FLIGHT FDB325 BOEING B737-800 AIRCRAFT REG. NO. A6-FGB (SECTOR OMDB TO OPMT) AND MILITARY AIRCRAFT ON 12-07-2018

# SCOPE

At Bureau of Aircraft Safety Investigation Pakistan (BASIP) investigations are conducted in accordance with Pakistan Aircraft Safety Investigation (PASI) Act, 2023 and International Civil Aviation Organization (ICAO) Annex-13.

The sole objective of the investigation and its final report as per above stated regulations is to prevent future accidents / serious incidents / incidents of similar nature without apportion blame or liability. Accordingly, it is inappropriate to use BASIP investigation reports to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for Judiciary and administrative purpose.

This report contains facts, which are based on information which came to the knowledge of BASIP during the investigation up to the time of publication. Such information is published to inform the aviation industry and the public about the general circumstances of civil aviation accidents and serious incidents.

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# ABBREVIATIONS

| | |
|---|---|
| **AAIB** | Aircraft Accident Investigation Board |
| **BASIP** | Bureau of Aircraft Safety Investigation Pakistan |
| **AHQ** | Air Headquarters |
| **ATC** | Air Traffic Control |
| **ATS** | Air Traffic Services |
| **CARs** | Civil Aviation Rules |
| **CIVIL-ATCO** | Civil Controller at Multan Tower |
| **CTR** | Control Zone |
| **ETA** | Estimate Time of Arrival |
| **FDB** | Fly Dubai |
| **FL** | Flight Level |
| **ft** | Feet |
| **h** | Hour(s) |
| **hPa** | Hectopascal |
| **ICAO** | International Civil Aviation Organization |
| **IOU** | Incident Occurrence and Unserviceability Report |
| **Kg** | Kilogram(s) |
| **kts** | Knots |
| **MAC** | Mid Air Collision |
| **MET** | Metrological |
| **min** | Minute(s) |
| **MWO** | Meteorological Watch Office |
| **NM** | Nautical Miles |
| **OMDB** | Dubai International Airport |
| **OPMT** | Multan International Airport |
| **PAF** | Pakistan Air Force |
| **PCAA** | Pakistan Civil Aviation Authority |
| **MILITARY-ATCO** | Military controller at Multan Tower |
| **RA** | Resolution Advisory |
| **RAPCON** | Military Radar Controller at OPRQ |
| **RWY** | Runway |
| **TA** | Traffic Advisory |
| **TCAS** | Traffic alert and Collision Avoidance System |
| **TWR** | Tower |
| **UAE** | United Arab Emirates |
| **UTC** | Universal Time Coordinated |
| **UHF** | Ultra-high Frequency |
| **VHF** | Very-high frequency |

# INTRODUCTION

The serious incident was reported to Bureau of Aircraft Safety Investigation Pakistan (BASIP) by Pakistan Airports Authority (PAA) vide Incident Occurrence and Unserviceability Report (IOU) [1] . ***The TCAS-RA investigations were being conducted, however, previously not being notified by Aircraft Accident Investigation Board (AAIB), Pakistan (now BASIP). After ICAO USOAP Audit 2021 objections, all outstanding TCAS-RA cases are being conducted after establishment of BASIP as per ICAO Protocols. In this regard, final report of FDB325 TCAS-RA case has been prepared and is being forwarded as per Annex-13 to National Transportation Safety Board (NTSB), General Civil Aviation Authority (GCAA), Pakistan Air Force (PAF) and Pakistan Airports Authority (PAA)***. All corresponding timings are mentioned in Universal Time Coordinated (UTC).

[1] PAA IOU Report dated 12th July, 2018

# SYNOPSIS

On 12 July 2018, Fly Dubai flight FDB325, a Boeing 737-800 aircraft, Registration No. A6-FGB, operating as a schedule passenger flight from Dubai International Airport (OMDB), Dubai, United Arab Emirates (UAE) to Multan International Airport (OPMT), Multan, Pakistan, experienced TCAS- RA (Traffic Alert and Collision Avoidance System – Resolution Advisory) during descent. The incident occurred within controlled airspace during a conflict with military aircraft recovering from the training area.

Although the civil and military flights were pre-coordinated between RAPCON (Military Radar Control at OPRQ) and OPMT Tower. However, discrepancies in coordination and descent clearances between controlling units resulted in a convergence of traffic paths. Furthermore, the TCAS-RA resulted due to descend below the assigned altitude FL070 by FDB325 to FL064 overhead Multan and military traffic at FL060. In response FDB325 climbed back to FL070 to avoid the conflict and later landed safely at OPMT, without any injuries or damage.

The minimum vertical separation fell below the prescribed threshold, resulting in a loss of separation; therefore, the event has been classified as a serious incident. All corresponding timings are mentioned in Universal Time Coordinated (UTC).

# SECTION 1 - FACTUAL INFORMATION

## 1.1. History of the Flight

1.1.1. On 12 July, 2018, Fly Dubai flight FDB325, a Boeing 737-800, Reg. No. A6-FGB, departed from OMDB, UAE for OPMT, Pakistan. The aircraft entered Pakistan airspace via ATS Route ASVIB G665 PG G214 SK J119 to KASBI and landed at OPMT.

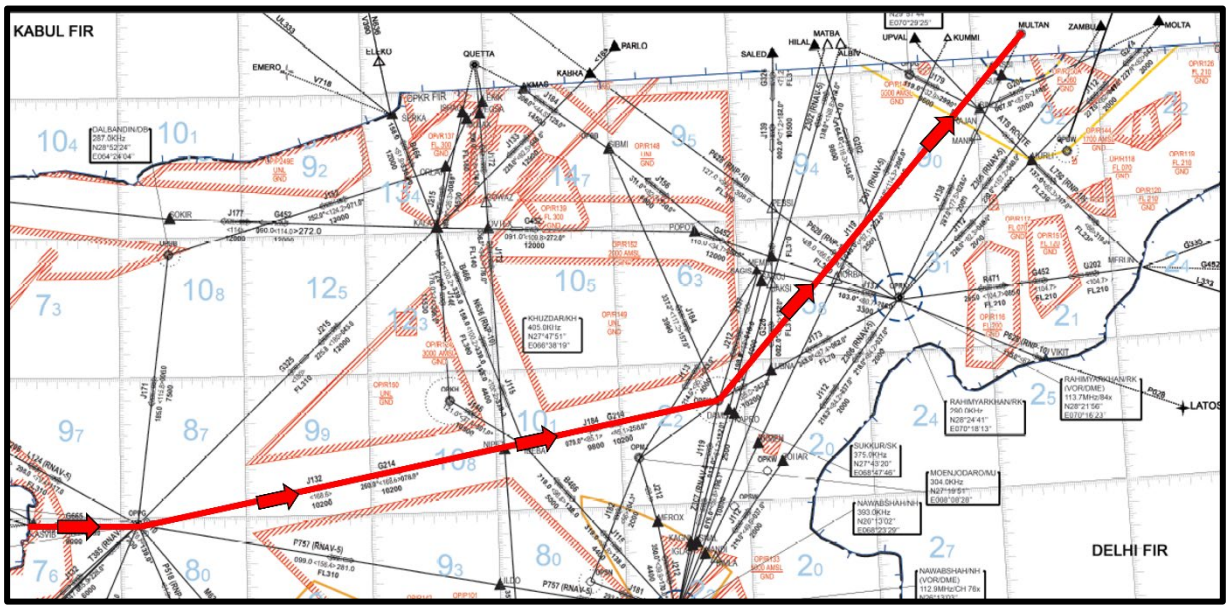


Figure 1 FDB325 ATS route chart

1.1.2. Multan International Airport (OPMT) is a joint user airfield being used by Pakistan Airports Authority (PAA), Pakistan Army (PA) and Pakistan Air Force (PAF).

1.1.3. PAF Base Rafiqui (OPRQ), is a Pakistan Air Force base located within the outskirts of Shorkot city in the Jhang District of Pakistan's Punjab province and North-East of Multan by 55 NM.


Figure 2 Distance between OPMT and OPRQ

1.1.4. At the time of the occurrence, two controllers were operating concurrently at OPMT Tower: a **Military-ATCO** is responsible for military traffic on Ultra High Frequency (UHF), and a civil controller (CIVIL-ATCO) managing aircraft arrivals and departures on Very High Frequency (VHF). Coordination between the two was conducted through informal over-the-shoulder communication and was therefore not recorded or logged**.**

1.1.5. The factual data presented in this report is based on **VHF communication recordings between the CIVIL-ATCO and FDB325**, as well as coordination exchanges between the **RAPCON (Military Radar Controller at OPRQ) and OPMT Tower (CIVIL-ATCO and Military-ATCO)**, conducted via **DEFCOM link and Hotline between OPRQ and OPMT**. As no radar data was provided by AHQs for analysis purposes, except Occurrence Report.

1.1.6. 044806. RAPCON informed Military – ATCO at OPMT TWR that the 02 military aircraft, were airborne from OPRQ. The aircraft intended to operate in OPRQ Training Area Delta (North of Multan) and thereafter would proceed to OPMT for landing.

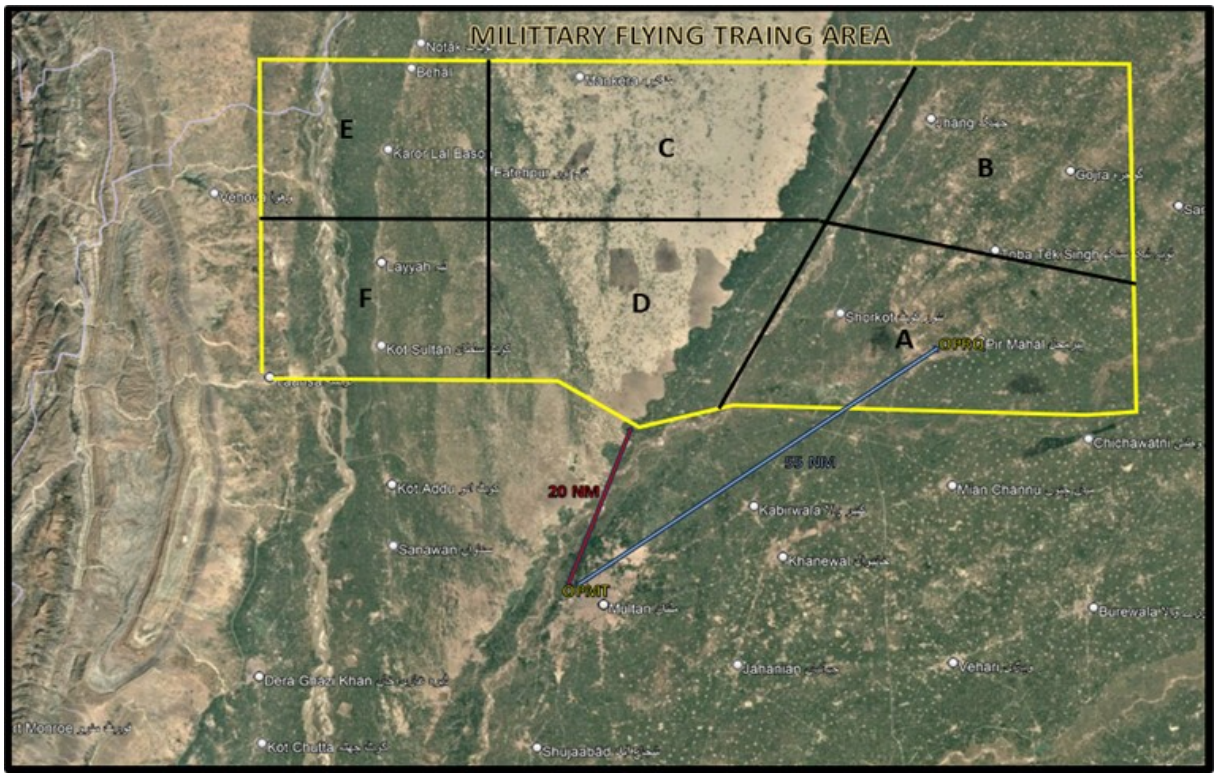


Figure 3 Military Training Area

1.1.7. 044916. RAPCON was advised by CIVIL-ATCO to inform when the military traffic set course for OPMT, along with their Flight level (FL) and Estimated Time of Arrival (ETA).

1.1.8. 045243. CIVIL-ATCO reiterated RAPCON to positively notify OPMT TWR before clearing military traffic to set course for OPMT, as **the RWY 18 circuit (downwind leg) was active**, and timely information was necessary to ensure that it could be vacated in advance.

1.1.9. In response, RAPCON informed CIVIL-ATCO that the military traffic had just entered training area and were expected to set course in approximately 20 minutes and would take an estimated 7 to 8 minutes to arrive at OPMT.

1.1.10. 045923. CIVIL-ATCO informed RAPCON that a civil aircraft, FDB325 was expected to land at approximately **052500** (coinciding with the anticipated arrival of military traffic recovering from training area for OPMT).

1.1.11. 050043. RAPCON requested Squawk code of FDB325 and upon observing the aircraft on radar, assessed that it would be overhead OPMT in approximately 14 minutes. Consequently, RAPCON cleared FDB325 for an unrestricted descent to 4,000 ft overhead OPMT, establishing it as number one in the landing sequence, and advised CIVIL-ATCO that further descent below 3,000 ft should only be coordinated once the aircraft was established on the ILS for RWY 18.

1.1.12. 050900. FDB325 contacted OPMT TWR after release by Karachi Control, while descending out of FL200 for FL150 and was re-cleared by CIVIL-ATCO to continue descend 4,000 ft on QNH 995 hPa. The aircraft was advised to report overhead OPMT for RNAV Approach RWY 18, with restriction to cross overhead OPMT at 4,000 ft.

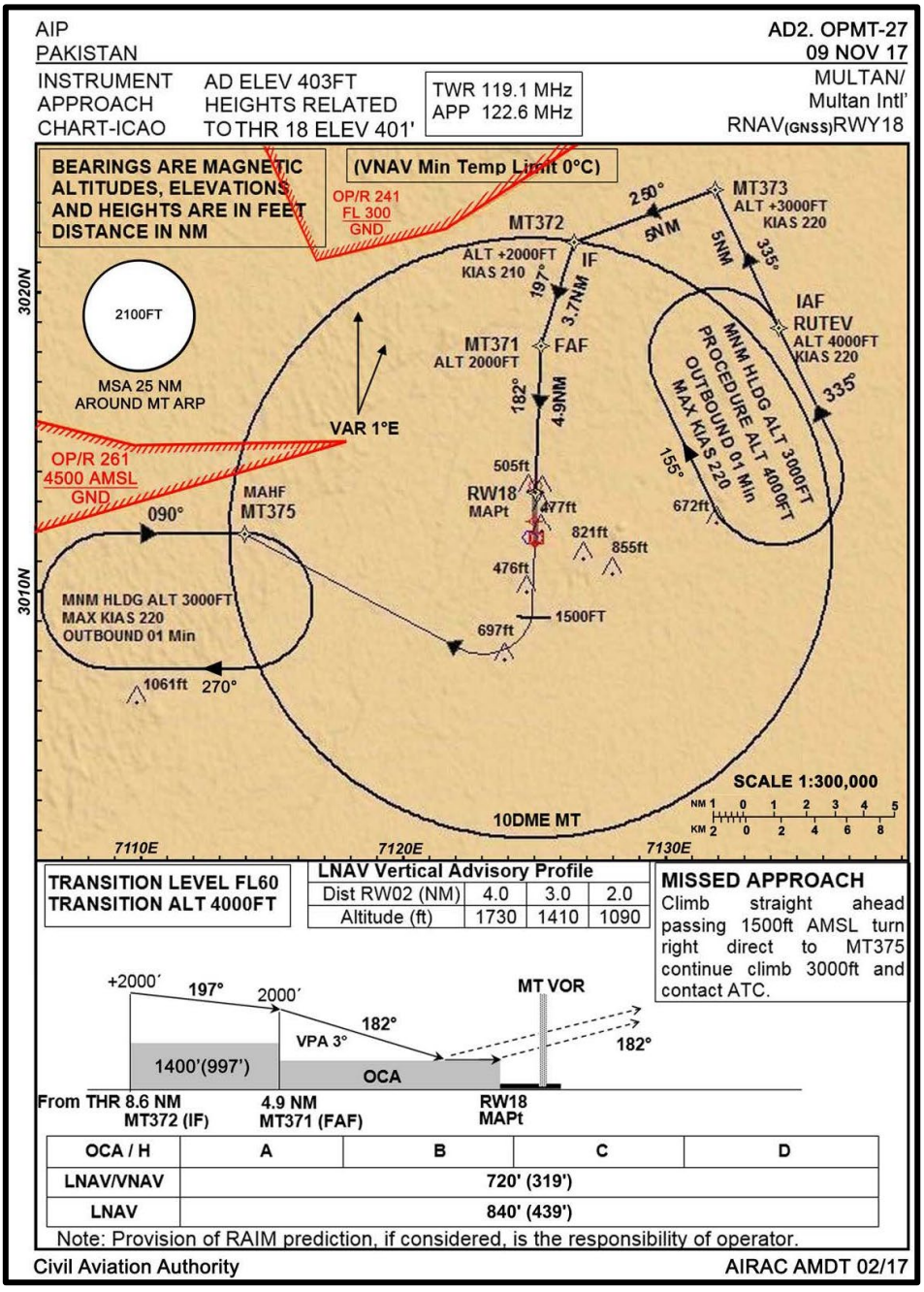


Figure 4 RNAV Approach RWY 18 OPMT

1.1.13. 051100. FDB325 was passing Rajan while Military traffic was exiting Delta training area.

1.1.14. 051145. RAPCON informed CIVIL-ATCO that the military traffic would be overhead OPMT in 3 minutes at FL120. In response, CIVIL-ATCO stated that it has been already coordinated with Military-ATCO and the military traffic were to hold at Area HOTEL due to the arrival of civil traffic (FDB325).

1.1.15. 051156. RAPCON informed CIVIL-ATCO on hotline to hold FDB325 at FL120. CIVIL-ATCO stated that FDB325 has already been given to 4,000 ft as coordinated earlier.

1.1.16. 051212. RAPCON reiterated that to hold FDB at FL120 further descend will be available after 2 min.

1.1.17. 051219 - 051226. FDB325 reported CIVIL-ATCO, passing FL130 for 4,000 ft, 42 NM to Multan, and the same was conveyed to RAPCON, stating that the FDB325 cannot be re-cleared to FL120 since it has already passed FL130.

1.1.18. 051240. Distance between FDB325 & Miltary traffic was 48 NM.

1.1.19. 051257. FDB325 reported passing FL115 for 4,000 ft, 28 NM to OPMT.

1.1.20. 051307. After observing FDB325 descending below FL120, RAPCON requested MILITARY-ATCO to restrict FDB325 to FL100, while military traffic would descend to FL080 for BEACON -2 (NDB letdown) and then to joining point. Distance between FDB325 & Miltary traffic was 30.5 NM. Although the level restriction was acknowledged by MILITARY-ATCO but the instructions were not passed to FDB325 and it continued descend to 4,000 ft.

1.1.21. 051339. The military traffic was handed over to MILITARY-ATCO on UHF Channel.

1.1.22. 051407. CIVIL-ATCO inquired FDB325 about position.

1.1.23. 051409. FDB325 replied position 21 NM to OPMT, passing 9,400 ft for 4,000 ft and proceeding direct to RUTEV after crossing OPMT.

1.1.24. 051425. RAPCON informed MILITARY-ATCO that FDB325 TCAS would be activated and why it is not maintaining level.

1.1.25. 051431. MILITARY-ATCO confirmed RAPCON that military traffic were operating at FL080 and FDB325 was restricted to FL100.

1.1.26. 051436. However, RAPCON observed on radar that FDB325 was descending through 8,500 ft and inquired again from MILITARY-ATCO why FDB325 was not at FL100.

1.1.27. 051442. RAPCON again informed CIVIL-ATCO that FDB325 was crossing FL080 and military traffic is overhead FL070 and TCAS would be activated. Meanwhile RAPCON informed MILITARY-ATCO to re-clear military traffic for FL060 and restrict the civil traffic at FL080.

1.1.28. 051452. CIVIL-ATCO inquired FDB325 about level passing. FDB325 reported passing 8,400 ft for 4,000 ft. CIVIL-ATCO immediately instructed FDB325 to **STOP CLIMB FL080.** The call was not understood by the FDB325 aircrew, therefore CIVIL-ATCO immediately asked FDB325 to **STOP CLIMB.**

1.1.29. 051520. FDB325 aircrew acknowledged CIVIL-ATCO after received of second call by reading back **STOP DESCEND FL070.**

1.1.30. 051540. CIVIL-ATCO instructed FDB325 to report maintaining FL070. FDB325 acknowledged passing 7,700 ft for 7,000 ft, and CIVIL-ATCO informed FDB325 that **traffic will shortly be on TCAS**, maintaining FL070 for overhead.

1.1.31. 051630. RAPCON inquired MILITARY-ATCO regarding the continued descent of FDB325 below FL070, noting that the aircraft was observed passing FL065 and closing in on military traffic maintaining FL060.

1.1.32. 051642. FDB32 reported **TCAS-RA, TCAS-RA FDB325 turning right…**, **We have TCAS-RA 300 ft climbing it to altitude**.

1.1.33. 051733. FDB325 turned right while maintaining navigation to OPMT.

1.1.34. 051745. FDB325 reported clear of conflict maintain FL070.

1.1.35. 051810. FDB325 reported overhead OPMT maintaining FL070.

1.1.36. 051901. As military traffic were expected to land at OPMT therefore FDB325 was instructed to hold overhead RUTEV at FL070, until further instructions.

1.1.37. 052325. FDB325 reported approaching alternate fuel limit (minimum fuel), therefore, it was given priority for approach by OPMT TWR after coordination with RAPCON and the aircraft landed safely at OPMT at time 053534.

1.1.38. During the incident, the CIVIL-ATCO at OPMT Tower was concurrently handling **six (06) other aircraft and helicopters** in addition to FDB325, while the **military formation remained under the control of the RAPCON and MILITARY-ATCO** stationed at the tower.

## 1.2. Injuries to Person(s)

1.2.1. No injury was reported to any person on board any of the aircraft.

## 1.3. Damage to Aircraft

1.3.1. No damage was reported due to this incident to any of the aircraft.

## 1.4. Other Damage

1.4.1. Not Applicable.

## 1.5. Personnel Information

1.5.1. Not Applicable.

## 1.6. Aircraft Information

| FDB325 | |
|---|---|
| Aircraft Make & Model | Boeing 737-800 |
| Registration Marking | A6-FGB |
| Manufacturer Serial No. | 60955/5950 |
| Operator | Fly Dubai |
| Sector | OPDB – OPMT |

Table 1 FDB325 Aircraft details

## 1.7. Meteorological Information

1.7.1. No significant weather was reported by Meteorological Watch Office (MWO) at the time of the incident.

| METAR |
|---|
| OPMT 0500Z 23010KT 5000 FU FEW 120 33/24 Q0995 NOSIG RH58% 29.41” |

Table 2 METAR details for OPMT

| METAR DESCRIPTION | |
|---|---|
| **OPMT** | Multan International Airport |
| **0500Z** | Observation taken at **0500 UTC** |
| **23008KT** | **230° true at 10 knots** — wind from southwest direction |
| **5000** | **Visibility 5000 metres**— moderate visibility |
| **FU** | Smoke or haze (reduces visibility due to suspended particles |
| **FEW 120** | **Few clouds present at 12,000 feet above ground level** |
| **33/24** | **Temperature 33ºC, Dew point 24ºC** |
| **Q0995** | **QNH 995 hPa** — relatively low pressure |
| **NOSIG** | **No significant change expected within the next two hours** |
| **RH58%** | **Moderately humid conditions** |
| **29.41** | 29.41 inches of mercury |

Table 3 METAR description

1.7.2. At OPMT during 0500 UTC, weather was hot and hazy with moderate visibility (5 km) due to smoke (FU). Winds were light from 230° at 10 knots, and few high clouds were present at 12,000 ft. The temperature was 33°C, dew point 24°C, and QNH 995 hPa, indicating a low-pressure, thermally active environment. No significant changes were forecast (NOSIG).

## 1.8. Aids to Navigation

1.8.1. Navigational Aids for OPMT are provided below: -

**OPMT AD 2.19 RADIO NAVIGATION AND LANDING AIDS**

| TYPE OF AID (CAT of ILS VAR VOR/ILS) | ID | Frequency | Hours of operation | Site of transmitting antenna coordinates | Elevation of DME transmitting antenna | Remarks |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| ILS/LOC CAT I 36 | IMT | 110.3 MHz | H24 | 301322.97N 0712513.62E | - | - |
| NDB | MT | 387.0 kHz | H24 | 301138.70N 0712445.97E | - | - |
| VOR (1/2015) | MT | 116.7 MHz | H24 | 301138.56N 0712458.42E | - | - |
| GP/TDME 36 | DOTS/DASHES | 335.0 MHz CH40X | H24 | 301139.04N 0712511.17E | 140.15M | GP 3° |

Table 4 Navigational Aids for OPMT

## 1.9. Communications

1.9.1. Communications facilities for OPMT are provided below: -

**OPMT AD 2.18 ATS COMMUNICATION FACILITIES**

| Service designation | Call sign | Frequency | Hours of operation | Remarks |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| APP | MULTAN Tower | 119.10 MHZ | H24 | Primary |
| APP | MULTAN Tower | 121.50 MHZ | H24 | Emergency |
| APP | MULTAN Tower | 122.60 MHZ | H24 | Secondary |
| APP | MULTAN Tower | 250.60 MHZ | H24 | UHF |
| Apron | MULTAN Tower | 121.80 MHZ | H24 | GROUND |
| TWR | Multan Tower | 119.10 MHZ | H24 | Primary |
| TWR | Multan Tower | 122.60 MHZ | H24 | Secondary |
| TWR | Multan Tower | 250.60 MHZ | H24 | UHF |

Table 5 Communication Facilities OPMT

## 1.10. Aerodrome Information

1.10.1 Multan International Airport (OPMT) lies within the Multan Control Zone (CTR), which is a circular Class 'C' airspace with a radius of 20 NM, extending vertically from the surface up to FL155. The transition altitude is 4,000 ft AMSL. The aerodrome is served by a single runway 18/36 that supports both instrument and visual approach procedures. The surrounding airspace is designated as non-surveillance (non-radar), and procedural approach services are provided in accordance with ICAO standards.

1.10.2 The Multan Terminal Control Area (TMA) is established to ensure the safe sequencing and protection of controlled arrivals and departures for Multan, D.G. Khan, and Bahawalpur Airports. The TMA encompasses defined lateral limits extending across southern Punjab, with the CTR forming its core 20 NM radius protected airspace. Vertically, the TMA extends from the surface within the CTR, and from FL55 outside the CTR, up to an upper limit of FL155. Airspace classification remains Class C within 20 NM of the aerodrome and transitions to Class E beyond the CTR above FL55. This structured configuration provides standardized containment of traffic and supports the orderly flow of civil and military operations within the region.

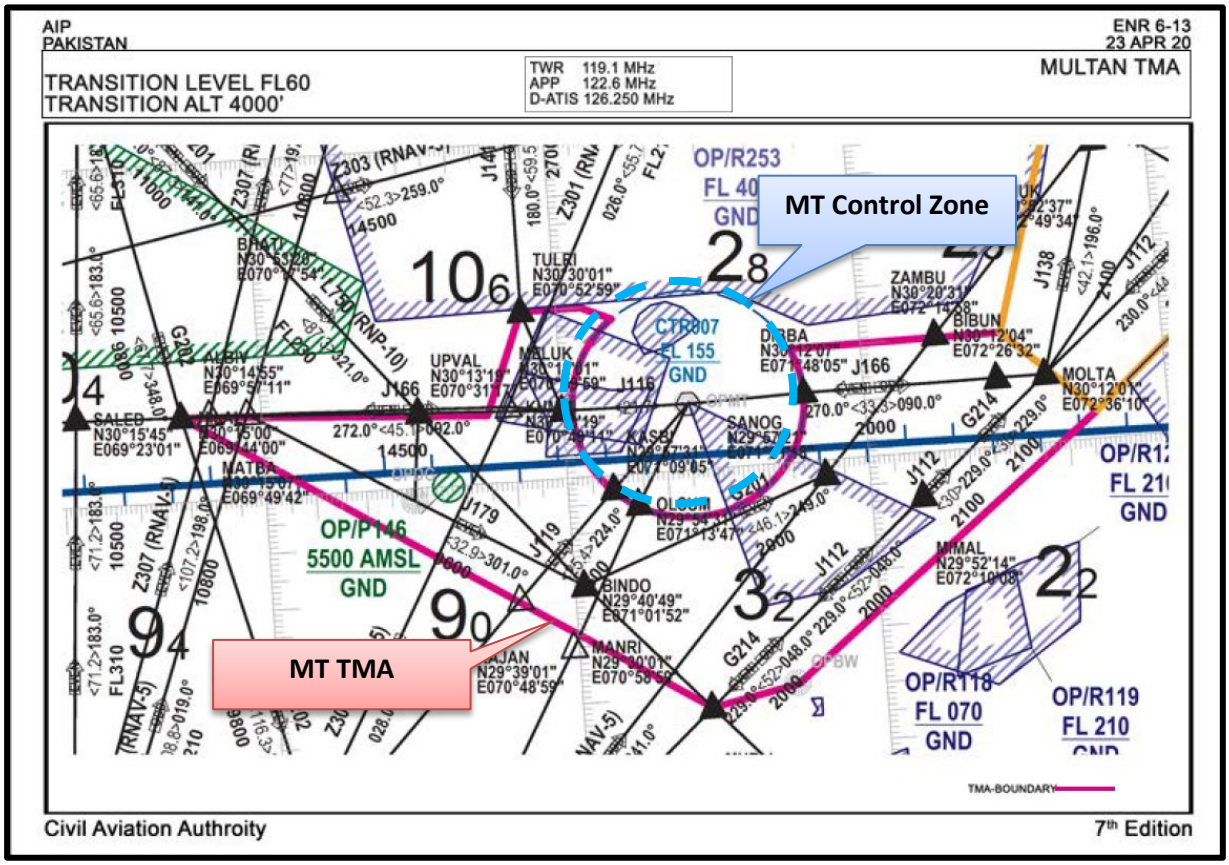


Figure 5 OPMT Control Zone (CTR) and TMA

## 1.11. Flight Recorders

1.11.1. Not Applicable.

## 1.12. Wreckage and Impact Information

1.12.1. Not Applicable.

## 1.13. Medical and Pathological Information

1.13.1. Not Applicable.

## 1.14. Fire

1.14.1. Not Applicable.

## 1.15. Survival Aspects

1.15.1. Not Applicable.

## 1.16. Test and Research

1.16.1. Not Applicable.

## 1.17. Organizational and Management Information

1.17.1. OPMT Control Tower provides Aerodrome Control Service, Approach Procedural Control Service, and Ground Control Service. The airspace surrounding OPMT is routinely shared by civil traffic and nearby Pakistan Air Force and Army Aviation operations. Consequently, CIVIL-ATCOs at OPMT Tower work alongside MILITARY-ATCOs, and the aerodrome functions as a joint-user facility accommodating both civil and military operations.

## 1.18. Additional Information

1.18.1. **TCAS Working Principle –** TCAS stands for Traffic alert and Collision Avoidance System, and its purpose is to minimize the risk of mid-air collisions between aircraft. Working independently from Air Traffic Control, TCAS uses nearby aircraft's transponder signals to alert pilots to the danger of mid-air collisions. It does so by constructing a three-dimensional map of airspace through which the aircraft is travelling. In detecting the other aircraft's transponder signals, it can foresee the potential collisions based on speeds and altitude of planes passing through the airspace in question. If TCAS detects a potential collision, it will automatically notify each of the affected aircraft. In this instance, it will automatically initiate a mutual avoidance manoeuvre. This involves the system informing the crews of the aircraft in question both audibly and visibly to either climb or descend in a manner that ensures that, when their paths cross, they do not meet.

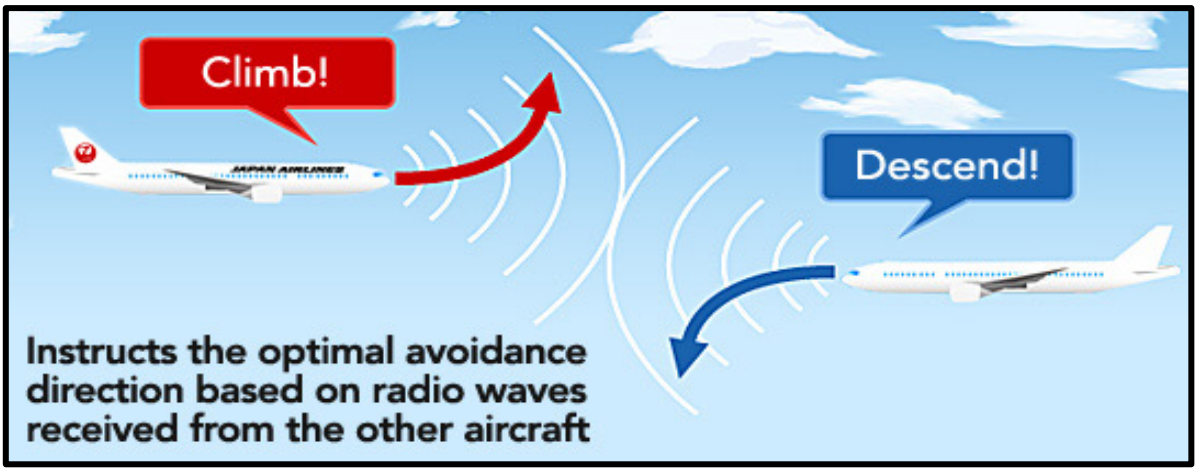


Figure 6 TCAS (TA) alert

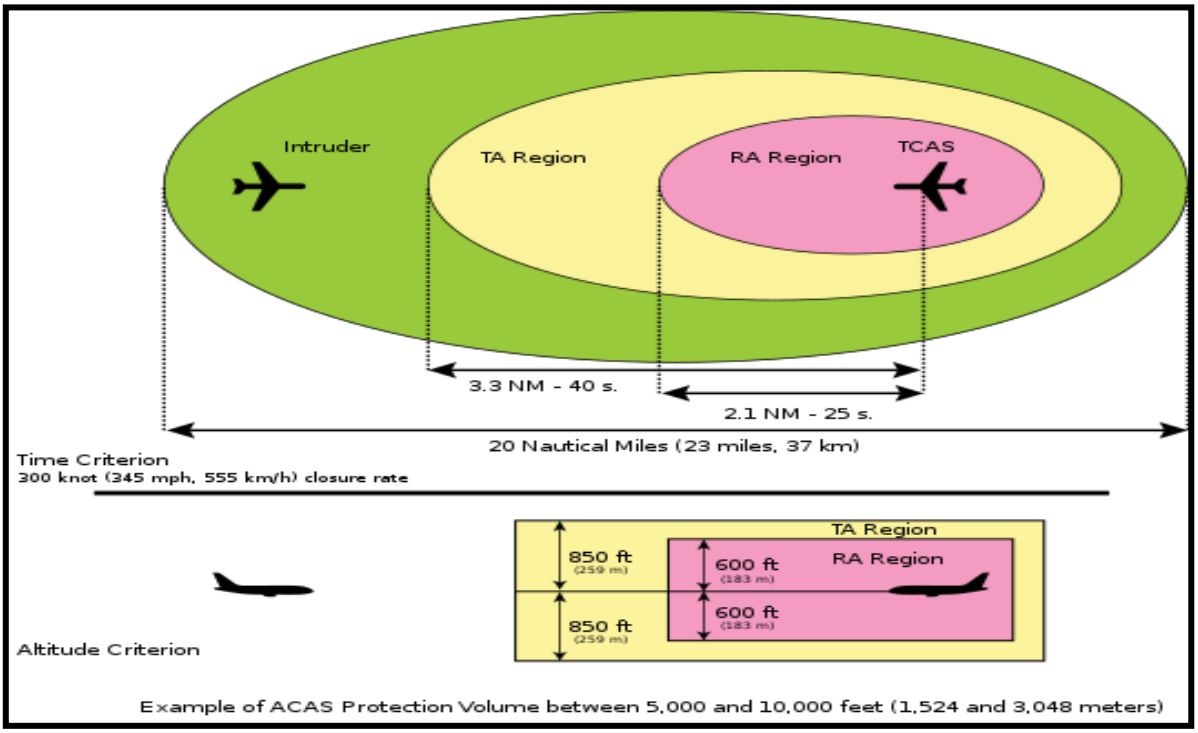


Figure 7 TCAS TA & RA ranges

### 1.18.2. **Airborne Collision Avoidance System (ACAS)**

1.18.2.1. The objective of ACAS is to provide advice to pilots for the purpose of avoiding potential collisions. This is achieved through Resolution Advisories (RAs), which recommend actions (including manoeuvres), and through Traffic Advisories (TAs), which are intended to prompt visual acquisition and to act as a precursor to RAs.

1.18.2.2. ACAS equipment in the aircraft interrogates Mode ‘A’ / ’C’ and Mode ‘S’ transponders on aircraft in its vicinity and listens for their replies. By processing these replies, ACAS determines which aircraft represent potential collision threats and provides appropriate display indications (or advisories) to the flight crew to avoid collisions.

1.18.2.3. **Traffic Advisories (TAs) –** TAs alert the flight crew to potential RAs and may indicate the range, range rate, altitude, altitude rate and bearing of the intruding aircraft relative to own aircraft. TAs without altitude information may also be provided on Mode ‘C’ or Mode ‘S’ equipped aircraft that have temporarily lost their automatic altitude-reporting capability. The information conveyed in TAs is intended to assist the flight crew in sighting nearby traffic.

1.18.2.4. **Resolution Advisories (RAs) –** If the threat detection logic in the ACAS computer determines that an encounter with a nearby aircraft could soon lead to a near-collision or collision, the computer threat resolution logic determines an appropriate vertical manoeuvre that will ensure the safe vertical separation of the two aircraft. The selected manoeuvres ensure adequate vertical separation within constraints imposed by the climb rate capability and proximity to the ground of the two aircraft.

1.18.2.5. The RAs provided to pilot can be divided into two categories: corrective advisories, which instruct pilot to deviate from the current flight path ("CLIMB" when aircraft is in level flight); and preventive advisories, which advise the pilot to maintain or avoid certain vertical speeds ("DON'T CLIMB" when aircraft is in level flight).

1.18.2.6. **Warning Times –** In any potential collision, ACAS generates an RA nominally 15 to 35 seconds (s) before the Closest Point of Approach (CPA) of the aircraft. The ACAS equipment may generate a TA up to 20 s in advance of an RA. Warning times depend on Sensitivity Levels (SLs) of RAs.

1.18.3. **Traffic Display Symbology –** On the TCAS traffic display both colour and shape are used to assist the pilot in interpreting the displayed information.

1.18.3.1. Own-aircraft is depicted as a white or yellow aircraft-like symbol. Targets are displayed by different symbols, according to their threat status

1.18.3.2. Hollow white diamond – for other traffic. (No threat).

1.18.3.3. Solid white diamond – for proximate traffic.

1.18.3.4. Solid yellow or amber circle – for intruders (i.e. aircraft which trigger a TA).

1.18.3.5. Solid red square – for threats (i.e. aircraft which trigger an RA).

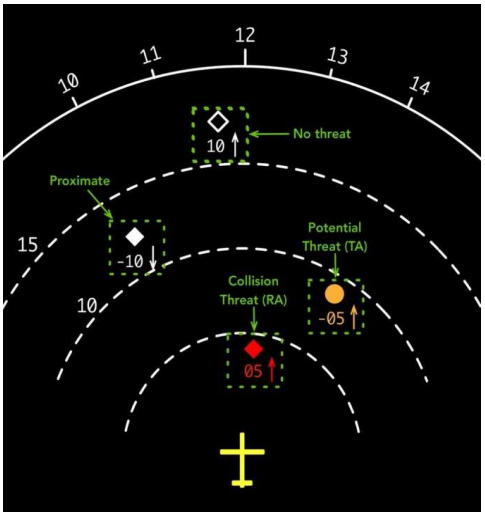


Figure 8 Traffic Display

## 1.19. Useful or Effective Investigation Techniques

1.19.1. Standard investigation procedures and techniques were used during the course of investigation.

# SECTION 2 – ANALYSIS

2.1. The analysis is based on **VHF communication recordings between the CIVIL-ATCO and FDB325**, as well as coordination exchanges between the **RAPCON (Military Radar Controller at OPRQ) and OPMT Tower (CIVIL-ATCO and MILITARY-ATCO)**, conducted via **DEFCOM link and Hotline between OPRQ and OPMT** due to non-availability of radar data except Occurrence reports shared by AHQ and PAA.

## 2.2. Airspace Complexity and Procedural Environment

2.2.1 Multan CTR is a Class 'C', joint-user airspace and routinely accommodates both civil and military traffic using Procedural Approach control service due to the absence of radar surveillance. Effective separation thus depends heavily on coordination, timely communication, and accurate execution of clearances. The airspace complexity is compounded when military recoveries overlap with scheduled civil arrivals, as occurred during this incident.

## 2.3. Initial sequencing conflict

2.3.1 Early coordination indicated that the military traffic would remain in the training area and recover after the arrival of civil traffic. Accordingly, RAPCON recommended that FDB325 be given priority and cleared for an unrestricted descent to 4,000 ft, establishing it as number one in the landing sequence.

2.3.2 However, this sequencing was disrupted when the military traffic initiated recovery earlier than expected. RAPCON issued descent instructions to the military traffic to FL120 and directed them to proceed toward Multan without prior coordination with OPMT Tower. As a result, both the civil and military traffic were observed converging toward Multan with overlapping estimated times of arrival (ETAs), setting the stage for a potential conflict.

## 2.4. Coordination Failures

1.4.1 When RAPCON observed conflicting trajectories, he made repeated requests; initially to level-off FDB325 at FL120, and later at FL100 followed by FL080. However, OPMT TWR (CIVIL-ATCO & MILITARY-ATCO) did not timely implement any of these level restrictions. FDB325 continued descent, and it was only at a later stage that a restriction to **FL070** was issued by CIVIL-ATCO.

1.4.2 It was further observed that the MILITARY-ATCO, during coordination on the DEFCOM link assured RAPCON that FDB325 was restricted at FL100. In reality, no such level-off instructions were issued. This misrepresentation of aircraft status contributed to a false assumption of vertical separation and delayed further tactical intervention.

### 2.5. Phraseology Ambiguity

2.5.1 At 051452 UTC, the OPMT CIVIL-ATCO attempted to issue a level-off instruction to FDB325 but used ambiguous phraseology, stating "**STOP CLIMB FL080**". The aircraft was in descent, not climb, and the instruction was not understood. The controller then re-issued **"STOP CLIMB FL70,"** to which the crew responded **"STOP DESCEND FL070"** indicating miscommunication.

### 2.6. Non-Compliance with ATC Level Restriction

2.6.1 Although the FDB325 crew acknowledged level restriction, the aircraft continued its descent crossing FL070. Radar observations later confirmed that FDB325 descended to FL064, while the military formation was maintaining 6,000 ft, reducing vertical separation to approximately 400 ft, below the ICAO-prescribed minimum of 1,000 ft.

### 2.7. TCAS Resolution Advisory and Flight Crew Response

2.7.1 At 051642 UTC, a TCAS Resolution Advisory (RA) was triggered as FDB325 continued descending through FL070 reaching FL064. The crew promptly responded with a climb and reported being "clear of conflict", stabilizing at FL070. The correct and immediate response to the TCAS-RA was effective in restoring separation and preventing further risk.

### 2.8. Operational Pressure and Fuel Considerations

2.8.1 Following the TCAS-RA event, FDB325 declared minimum alternate fuel, indicating that further delay could have led to a fuel emergency. The recovery of military traffic without prior intimation resulted in holding of FDB325, contributing to the aircraft reaching its minimum fuel state. Although the aircraft ultimately did not proceed to an alternate aerodrome, the situation reflected operational pressure and fuel limitations.

### 2.9. Sector Workload and Controller Task Saturation

2.9.1 During the incident, the CIVIL-ATCO at OPMT Tower was managing six other aircraft and helicopters in addition to FDB325. Despite the expected recovery of military formations, additional military flights were permitted, unnecessarily increasing circuit congestion. This contributed to task saturation and have reduced the controller's ability to respond effectively to the unfolding civil-military conflict.

### 2.10. Controller Knowledge Gaps

2.10.1 The MILITARY-ATCO stationed at OPMT Tower exhibited limited familiarity with local procedural requirements and was observed to rely primarily on instructions received from RAPCON via the coordination line (DEFCOM). This reliance, rather than exercising autonomous situational judgment, reflects a deficiency in operational knowledge, which contributed to procedural inconsistencies and reduced effectiveness in the civil-military coordination and handling aircraft.

# SECTION 3 – FINDINGS

## 3.1. **Findings**

3.1.1 Fly Dubai flight FDB325, Boeing 737-800, Reg. No. A6-FGB operated a schedule passenger flight from OMDB to OPMT on 12 July 2018.

3.1.2 Multan CTR is a non-Radar (procedural control) airspace with joint civil-military use, hence the Approach control is procedural and subject to coordination limitations.

3.1.3 At the time of the incident, 02 (two) controllers were deployed at OPMT Tower, including CIVIL-ATCO handling VHF traffic and MILITARY-ATCO handling military traffic on UHF. Coordination between the two controllers was informal (over the shoulder) and not recorded.

3.1.4 Military traffic was operating under the control of RAPCON, in the OPRQ training area and were planned to recover to OPMT.

3.1.5 Initial coordination between RAPCON and OPMT TWR specified that FDB325 was number one in sequence, with unrestricted descent to 4,000 ft, and recommended re-coordination for descent below 3,000 ft.

3.1.6 The military traffic initiated early recovery than expected thus disrupted the landing sequence on a short notice.

3.1.7 RAPCON repeatedly requested OPMT Tower to restrict FDB325 initially at **FL120**, and subsequently at **FL100**, due to known conflicting military traffic operating at those levels. However, **CIVIL-ATCO did not issue any such level restrictions to FDB325**, allowing it to continue descent through the conflicted airspace.

3.1.8 Meanwhile, MILITARY-ATCO also assured RAPCON that the civil aircraft was maintaining **FL100** whereas, FDB325 continued descend to 4,000 ft as no such instructions were received and both military and civil traffic were descending simultaneously and getting closer on converging path.

3.1.9 Realising that the military traffic getting closer to FDB325, CIVIL-ATCO finally restricted FDB325 and issued ambiguous phraseology, stating **"STOP CLIMB FL080"**, followed by **"STOP CLIMB FL070**" instead of **STOP DESCENT**. Pilot interpreted the call correctly and read back **"STOP DESCEND FL070"**.

3.1.10 Despite acknowledgement of level restriction, FDB325 continued descend to **FL064**, resulting in the activation of TCAS-RA with the military traffic operating at **FL060**. (reducing vertical separation to approximately **400 ft**)

3.1.11 As an evasive action, FDB325 climbed to **FL070** and once clear of conflict informed CIVIL-ATCO.

3.1.12 FDB325 was instructed to maintain FL070 until further advise, since the military traffic were number in sequence for landing at OPMT.

3.1.13 Later, FDB325 informed approaching alternate fuel / minimum fuel, prompting ATC to give it priority for approach and landing.

3.1.14 The aircraft landed safely with no injuries or damage reported.

3.1.15 The MILITARY-ATCO at OPMT Tower demonstrated limited familiarity with local procedures and relied heavily on RAPCON instructions / advisories.

3.1.16 CIVIL-ATCO was handling six other aircraft / helicopters simultaneously, contributing to task saturation and lack of situation awareness thus resulting into delayed tactical response.

## 3.2. Cause / Contributory Factors

### 3.2.1. Cause

3.2.1.1. Activation of **TCAS-RA (MAC – Mid Air Collision)** due to the continued descent of FDB325 beyond the assigned level FL070 to FL064, leading to close proximity with military traffic at FL060, resulting in a vertical separation to 400 ft.

3.2.1.2. Lack of efficient and effective coordination between civil-military ATCOs at OPMT TWR for traffic management; delayed / failed to implement level restrictions as instructed by RAPCON.

### 3.2.2. Contributory Factors

3.2.2.1. Early recovery of military traffic from the training area and failure of OPMT TWR (Civil and Military ATCOs) to manage traffic sequence and level restrictions.

3.2.2.2. Incorrect assurance by MILITARY-ATCO to RAPCON regarding level restrictions to FDB325, however, no such instructions were passed to FDB325 as advised by RAPCON.

3.2.2.3. Ambiguous and non-standard ATC phraseology used by the CIVIL-ATCO during descent, contributing to temporary miscommunication and delayed FDB325 crew response.

3.2.2.4. Lack of proactive approach and situational awareness portrayed by OPMT TWR controllers (CIVIL-ATCO and MILITARY-ATCO).

3.2.2.5. Inadequate procedural knowledge demonstrated by the MILITARY-ATCO at OPMT as he was completely relying on RAPCON instructions.

*Note:* *Aviation Occurrence Category (ADREP Taxonomy)*
*"**Mid-Air Collision (MAC):** Separation-related occurrences caused by either air traffic control or cockpit crew*

# SECTION 4 – SAFETY RECOMMENDATIONS

## 4.1. Safety Recommendations

4.1.1 Pakistan Airports Authority (PAA) and Pakistan Air Force (PAF) should jointly establish clearly defined, documented, and standardized civil-military coordination procedures for joint-user aerodromes, particularly within non-radar airspace, to ensure effective traffic sequencing and conflict resolution.

4.1.2 PAA should reinforce controller training programs at non-radar aerodromes with emphasis on situational awareness, effective coordination protocols and proper handling of civil-military traffic scenarios.

4.1.3 PAA should conduct targeted training and assessments for civil ATC personnel to improve adherence to ICAO-standard radiotelephony phraseology, in order to reduce ambiguity and enhance safety during critical phases of flight.