FINAL INVESTIGATION REPORT

SERIOUS INCIDENT (TCAS – RA) BETWEEN AIRBLUE FLIGHT ABQ611, AIRBUS 321-211 AIRCRAFT, REG. NO. AP-BMW (DUBAI – PESHAWAR) AND MILITARY AIRCRAFT ON 13-12-2021

SCOPE

At Bureau of Aircraft Safety Investigation (BASI), Pakistan investigations are conducted in accordance with Annex-13 to the International Civil Aviation Organization (ICAO) Convention on International Civil Aviation and Civil Aviation Rules 1994 (CARs 94).

The sole objective of the investigation and the final report of an accident or serious incident under above stated regulations is the prevention of future accidents and incidents of similar nature. It is not the purpose of such an investigation to apportion blame or liability. Accordingly, it is inappropriate to use BASI Pakistan investigation reports to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

This report contains facts, which have been determined 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 incidents.

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ABBREVIATIONS

AAIB	Aircraft Accident Investigation Board
AGL	Above Ground Level
AHQ	Air Headquarters
AIP	Aerodrome Information & Publications
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATS	Air Traffic Services
BASI	Bureau of Aircraft Safety Investigation
BEA	Bureau of Enquiry and Analysis
BKIAP	Bacha Khan International Airport
CARs	Civil Aviation Rules
DME	Distance Measuring Equipment
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)
PAF	Pakistan Air Force
PCAA	Pakistan Civil Aviation Authority
R/W	Runway
RA	Resolution Advisory
STAR	Standard Instrument Arrival Route
TA	Traffic Advisory
TCAS	Traffic Collision and Avoidance System
UHF	Ultra High Frequency
UTC	Universal Time Coordinated
VOR	Very high frequency Omni directional Range

INTRODUCTION

This serious incident was reported to Bureau of Aircraft Safety Investigation (BASI) Pakistan previously Aircraft Accident Investigation Board (AAIB), Pakistan, by Pakistan Civil Aviation Authority (PCAA) vide Incident Occurrence and Unserviceability Report (IOU)[1]. Ministry of Aviation, Government of Pakistan issued Memorandum[2] and Corrigendum[3] issued by BASI, Pakistan to investigate the serious incident. This serious incident was notified[4] to International Civil Aviation Organization (ICAO) and Bureau of Enquiry and Analysis (BEA), France in line with Annex-13. The investigation has been conducted by BASI, Pakistan. All corresponding timings are mentioned in Universal Time Coordinated (UTC).

[1] PCAA IOU Report dated 13th December, 2021
[2] Ministry of Aviation Memorandum No. HQCAA/1902/002/TCAS/Inv dated 11th April, 2022
[3] BASI Pakistan Corrigendum No. BASI/1902/002/TCAS/Inv
[4] Initial Notification to ICAO and BEA dated 21st December, 2021

SYNOPSIS

On 13th December, 2021, Airblue flight ABQ 611, Airbus 321-211 aircraft, Reg. No. AP-BMW, was a scheduled passenger flight which was operating from Dubai International Airport, Dubai, United Arab Emirates (UAE) to Bacha Khan International Airport (BKIAP), Peshawar on Air Traffic Services (ATS) route PANJGUR (PG) – G325 – HANGU – OPPS.

As per Aerodrome Information Publication (AIP) Pakistan [5], BKIAP, Peshawar is a joint user airfield housing both Civil as well as Military aircraft.

Once ABQ611 came in contact with Peshawar Air Traffic Control (ATC) Tower, Controller asked ABQ611 to maintain Flight Level (FL) 160 and hold over Peshawar Very high frequency Omni directional Range (VOR) for 20 minutes (min) due to Pakistan Air Force (PAF) Military traffic at FL140 on recovery.

After joining the hold over Peshawar VOR, ABQ611 reported Traffic alert and Collision Avoidance System (TCAS) – Resolution Advisory (RA). ABQ611 climbed FL175 and reported clear of conflict. Upon query by ABQ611 about the traffic, the Controller confirmed the presence of PAF Military aircraft.

Subsequently, ABQ611 reported 06 Military aircraft operating overhead Peshawar VOR with one formation of Military aircraft operating at FL180. ABQ611 requested further climb to attain separation from the Military formation operating at FL180 in response to which Controller cleared ABQ611 to descend FL160 as it was vacant at that time.

While descending from FL175 to FL160, ABQ611 reported formation 500 feet (ft) higher with which it had had TCAS – RA. The formation was 2 x JF-17 PAF Military aircraft that were cleared from FL140 to FL160 and further to FL180 which resulted in activation of RA and multiple Traffic Advisories (TAs) for ABQ611.

Later on, ABQ611 was cleared for VOR / Distance Measuring Equipment (DME) Approach and landed safely at BKIAP, Peshawar.

[5] PCAA – Aerodrome Information Publication BKIAP, Peshawar

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SECTION 1 - FACTUAL INFORMATION

1.1. **History of the Flight**

1.1.1. On 13th December, 2021, Airblue flight ABQ611, Airbus 321-211 aircraft, Reg No. AP-BMW was operating from Dubai International Airport, Dubai, UAE to BKIAP, Peshawar, Pakistan on ATS route PG – G325 – HANGU – OPPS.

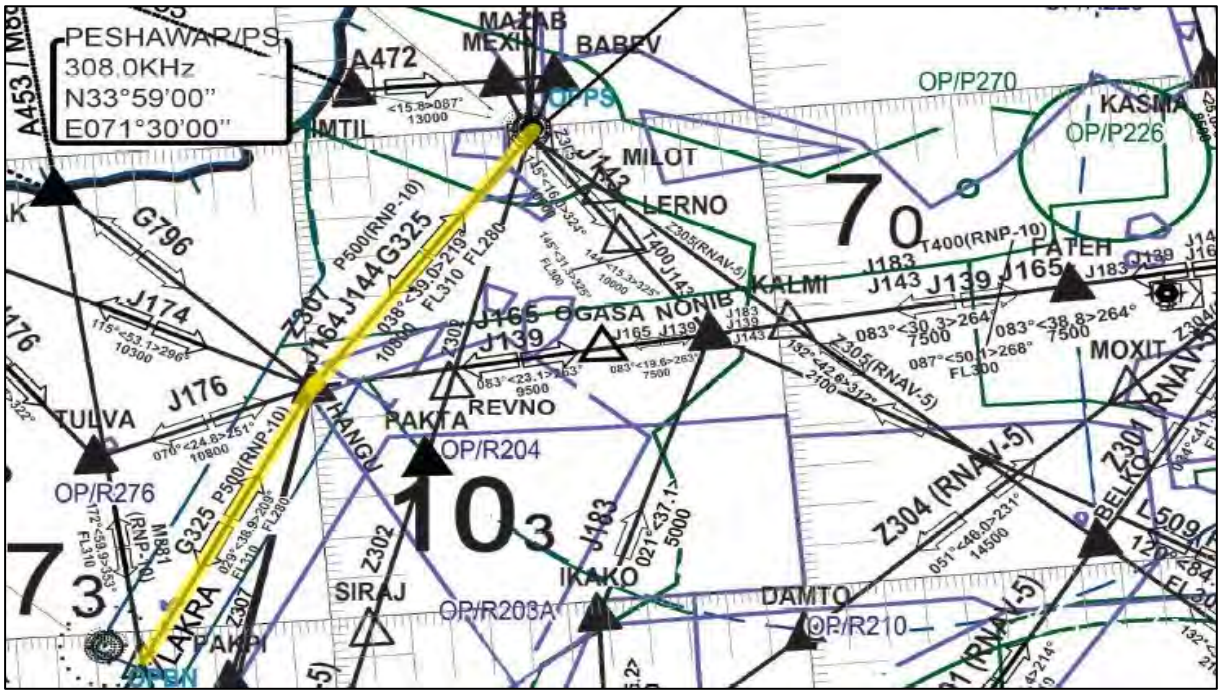

Figure 1 ABQ611 Route

1.1.2. Once ABQ611 came in contact with Peshawar ATC Tower, Civil Controller asked ABQ611 to maintain FL160 and hold over Peshawar VOR for 20 min as advised by Military Supervisor due to Military traffic at FL140 on recovery for landing.

Figure 2 ABQ611 came in contact with Tower Controller

1.1.3. ABQ611 reported joining the hold and turning inbound to Peshawar ATC.

1.1.4. After joining the hold over Peshawar VOR, ABQ611 reported TCAS – RA alert. ABQ611 climbed FL175 and reported clear of conflict.

1.1.5. Upon query by ABQ611 about the traffic, the Civil Controller approached Military Supervisor who confirmed the presence of Military traffic operating on Ultra High Frequency (UHF).

1.1.6. ABQ611 reported 06 Military aircraft operating overhead Peshawar VOR with one formation of Military aircraft operating at FL180. ABQ611 requested further climb for separation with the Military formation aircraft, in response to which Civil Controller cleared ABQ611 to descend FL160 as it was vacant at that time.

1.1.7. While descending from FL175 to FL160, ABQ611 again reported formation of two Military aircraft 500 ft high with which it had RA.

1.1.8. Upon query from Military Supervisor, it was revealed that Military aircraft (JAZZ formation of 2 x JF-17) were cleared from FL140 to FL160 initially and further to FL180 without information / coordination with Civil Controller, which resulted in activation of RA and multiple TAs for ABQ611.

1.1.9. Later ABQ611 was cleared for VOR / DME Approach and landed safely at BKIAP, Peshawar.

1.2. Injuries to Person(s)

1.2.1. No injury was reported to any person on board 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

ABQ611	
Aircraft Make & Model	Airbus 321-211
Registration Marking	AP-BMW
Manufacturer Serial No.	7171
Year of Manufacturer	2016
Operator	Airblue
Sector	Dubai to Peshawar
Engine Type	CFM56-5B3

Table 1 Aircraft details

1.7. **Meteorological Information**

1.7.1. No significant weather was reported by Pakistan Meteorological (MET) Department for BKIAP, Peshawar at the time of the incident.

METAR details
OPPS 130500Z 360/04KT 4000 HZ SCT200 10/02 Q1021 NOSIG=

Table 2 METAR for BKIAP, Peshawar at 0500 UTC

METAR details for BKIAP, Peshawar	
OPPS	**(Station ID)-** BKIAP, Peshawar
130500Z	**(Valid Time Period)-** Day 13, Time 05:00 UTC
360/04KT	**Wind Direction & Speed-** 360° 04 knots (kts)
4000	**Visibility-** 4,000 m.
HZ	**Weather-** Haze
SCT200	**Cloud Layer-** Scattered at 20,000 ft Above Ground Level (AGL)
10/02	**Temperature-** 10°C, **Dew Point-** 02°C
Q1021	**Altimeter Pressure-** QNH 1021 hectopascal (HPa)
NOSIG	**No Significant Weather for next 02 hours (h)**

Table 3 METAR description for BKIAP, Peshawar at 0500 UTC

1.8. **Aids to Navigation**

1.8.1. Navigational aids for BKIAP, Peshawar are provided below. At the time of incident, no abnormality was reported

TYPE OF AID CAT of ILS (VAR VAR/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 35	IBKB	108.3 MHz	H24	340031.00N 0713048.00E	-	-
DVOR/DME (2/2015)	PS	114.3 MHz CH90X	H24	335841.54N 0713100.91E	377.00M	-
NDB	PS	308.0 kHz	H24	335957.00N 0713010.00E	-	Coverage 150NM
GP/TDME 35	DOTS/DASHES	334.1 MHz CH20X	H24	335904.00N 0713052.00E	-	-

Figure 3 Navigational Aids for BKIAP, Peshawar

1.9. Communications

1.9.1. Communication frequencies for BKIAP, Peshawar are provided below. At the time of incident, no abnormality was reported.

Service designation	Call sign	Frequency	Hours of operation	Remarks
1	**2**	**3**	**4**	**5**
ATIS	D-ATIS	126.700 MHz	H24	-
TWR	Peshawar Tower	243.000 MHz	H24	-
TWR	Peshawar Tower	118.400 MHz	H24	Standby Frequency
TWR	Peshawar Tower	121.500 MHz	H24	-
TWR	Peshawar Tower	121.800 MHz	H24	-
TWR	Peshawar Tower	122.900 MHz	H24	Primary Frequency

Table 4 Communication & Radio Navigational Aids, BKIAP, Peshawar

1.10. Aerodrome Information

1.10.1. Aerodrome information of BKIAP, Peshawar is provided below.

OPPS AD 2.2 AERODROME GEOGRAPHICAL AND ADMINISTRATIVE DATA

1. ARP coordinates and site at AD	335938.09N 0713052.50E RWY Center
2. Direction and distance from (city)	1 NM West of Peshawar Cantt
3. Elevation/Reference temperature	1211 FT / 40.2 °C
4. MAG VAR/Annual change	02° E
5. AD Administration, address, telephone, telefax, AFS	Joint user PAF and Civil Aviation Authority Chief Operating Officer/ APM, Bacha Khan Int'l Airport, Peshawar Tel: (92) (091) 9211508 Fax: (92) (091) 9211507 AFTN: OPPSYDYX e-mail: APM.Peshawar@caapakistan.com.pk
6. Types of traffic permitted (IFR/VFR)	IFR/VFR
7. Remarks	AD not fit for B-747 due to parking and ground support equipment limitation.

Figure 4 Aerodrome Information BKIAP, Peshawar

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. Not Applicable.

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 5 TCAS Alert

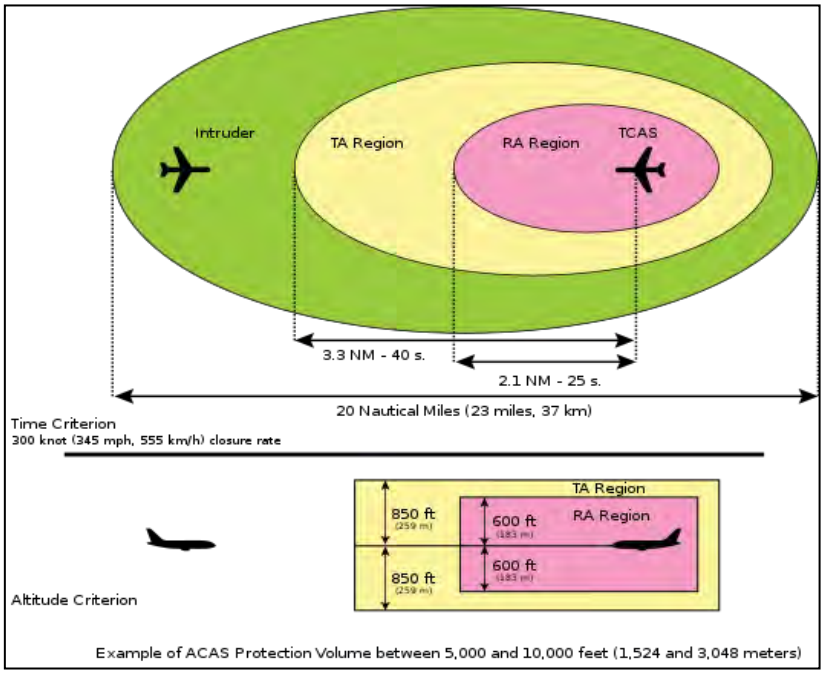

Figure 6 TCAS TA & RA ranges

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

Figure 7 Traffic Display

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

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

1.18.2.3. Solid white diamond – for proximate traffic.

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

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

1.19. Useful or Effective Investigation Techniques

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

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SECTION 2 – ANALYSIS

2.1. **General**

2.1.1. On 13th December, 2021, Airblue flight ABQ611 was a scheduled passenger flight which took off from Dubai International Airport, Dubai, UAE for BKIAP, Peshawar, Pakistan on ATS route PG – G325 – HANGU – OPPS.

2.1.2. BKIAP, Peshawar is a joint user airfield where Civil and Military Controllers are working side by side in the same Aerodrome Control Tower and handling commercial and Military traffic respectively. In addition to the two Aerodrome Controllers (responsible for Civil and Military aerodrome traffic), there is also a Military Approach Controller and a Military Supervisor who is responsible for the coordination between Civil and Military Controllers and overall in-charge of Peshawar Tower.

2.1.3. At 04:58:20 h, ABQ611 came in contact with Peshawar Tower while it was maintaining FL160 following Standard Instrument Arrival Route (STAR) HANGU 1C.

Figure 8 ABQ611 came in contact with Tower Controller

2.1.4. At 04:59:39 h, ABQ611 was informed by Civil controller to expect VOR Approach Runway (R/W) 35.

2.1.5. At 05:03:05 h, Civil Controller advised ABQ611 to join the hold over Peshawar / VOR for 20 min as advised by Military Supervisor due to Military traffic operating at FL140 on recovery for landing.

2.1.6. At 05:06:24 h, ABQ611 joined the hold over Peshawar VOR maintaining FL160.

2.1.7. At 05:08:57, JAZZ formation 2 x JF-17 were cleared from FL140 to FL160 by Military Aerodrome Controller.

Figure 9 Fighters given climb from FL140 to FL160

2.1.8. At 05:12:20 h, ABQ611, while in the hold over Peshawar VOR, reported TCAS – RA.

Figure 10 Activation of TCAS - RA

2.1.9. At the time of occurrence, ABQ611 was maintaining FL160 and 02 x JF-17 Military aircraft were operating at FL159 as a single formation, which was revealed after the analysis of available Radar Video recording. (Refer Figure 9).

2.1.10. At 05:12:41 h, ABQ611 climbed to FL175 and reported clear of conflict.

2.1.11. At 05:13:19 h, upon query by ABQ611 about the traffic, the Civil Controller, after confirmation by Military Supervisor, informed the presence of Military traffic operating on UHF and restricted at FL140 with traffic information regarding ABQ611. The Military formation was in contact with Military Controller.

2.1.12. Civil Controller was unaware of the Military traffic operating overhead Peshawar as it was not coordinated timely by Military Controller.

2.1.13. ABQ611 reported about 06 Military aircraft operating overhead Peshawar VOR with one formation of Military aircraft operating at FL180.

2.1.14. During the analysis of Radar video following formations of Military aircraft were observed operating overhead Peshawar at the time ABQ611 reported TCAS – RA: -

2.1.14.1. 02 x JF-17 Military aircraft bearing call sign JAZZ1 and JAZZ2 were at FL159.

2.1.14.2. 02 x Military aircraft bearing call sign VIKING1 and VIKING2 were at FL121 and FL120 respectively.

2.1.14.3. 02 x Military aircraft bearing call sign VIKING3 and VIKING4 were FL130 and FL141 respectively.

2.1.14.4. Single Military aircraft bearing call sign TIGER1 was at FL109.

2.1.15. ABQ611 requested further climb for separation with the formation aircraft, in response to which Civil Controller cleared ABQ611 to descend FL160 as FL160 was vacant at that time.

2.1.16. While descending from FL175 to FL160, ABQ611 reported again about the formation of two Military aircraft which were operating 500 ft above ABQ611 and it had RA with the same traffic.

2.1.17. As per ICAO Procedures for Air Navigation Services – Air Traffic Management (Doc 4444): -

> *"The vertical separation minimum (VSM) shall be: -*
>
> *a) a nominal 300 m (1,000 ft) below FL 290 and a nominal 600 m (2,000 ft) at or above this level, except as provided for in b) below; and*
>
> *b) within designated airspace, subject to a regional air navigation agreement: a nominal 300 m (1,000 ft) below FL 410 or a higher level where so prescribed for use under specified conditions, and a nominal 600 m (2,000 ft) at or above this level."*

2.1.18. Brief report by COO, BKIAP, Peshawar reveals that upon query from Military Supervisor, JAZZ formation of 2 x JF-17 Military aircraft were cleared from FL140 to FL160 and further to FL180 without information / coordination with Civil Controller, which resulted in activation of RA and multiple TAs for ABQ611.

2.1.19. As per the statement of Civil Controller[6], Military Aerodrome Controller did not inform and update about Military traffic which were operating overhead Peshawar.

2.1.20. At 05:43:38 h, ABQ611 was cleared for VOR / DME Approach and landed safely at BKIAP, Peshawar at time 05:56:12 h.

[6] Civil Controller's statement

SECTION 3 – FINDINGS

3.1. Findings

3.1.1. ABQ 611 operated from Dubai to Peshawar on ATS route PG – G325 – HANGU – OPPS. Weather was fair at BKIAP Peshawar.

3.1.2. ABQ611 established contact with Peshawar ATC Tower while maintaining FL160 and following STAR HANGU 1C. The Civil controller informed it to expect a VOR Approach to R/W 35 with instruction to hold over Peshawar VOR at FL160 for 20 minutes, as advised by Military Supervisor.

3.1.3. Upon joining the hold over Peshawar VOR, ABQ611 reported a TCAS-RA and initiated an RA climb to FL175. ABQ611 again reported same formation at FL180, just 500 ft above, which had triggered the previous TCAS-RA.

3.1.4. ABQ611 was then cleared to FL160 by Civil Controller to resolve the conflict. ABQ611 reported six military aircraft operating overhead Peshawar VOR, with one formation at FL180. Later, when Military Supervisor was queried, he confirmed three military formations were operating overhead Peshawar: -

3.1.4.1. 02 x JF-17 Military aircraft bearing call sign JAZZ1 and JAZZ2 were at FL159 (which were given climb from FL140 to FL160 and further to FL180).

3.1.4.2. 02 x Military aircraft bearing call sign VIKING1 and VIKING2 were at FL121 and FL120 respectively.

3.1.4.3. 02 x Military aircraft bearing call sign VIKING3 and VIKING4 were FL130 (Altitude 13,000 ft) and FL141 respectively.

3.1.4.4. Single Military aircraft bearing call sign TIGER1 was at FL109.

3.1.5. JAZZ Formation was given clearance by Military Controller to climb from FL140 to FL160 and further to FL180 without coordination / information with Military Supervisor as well as Civil Controller, which triggered TCAS-RA and multiple TAs of ABQ 611.

3.2. Cause / Contributory Factors

3.2.1. Cause

3.2.1.1. Lack of coordination by the Military Aerodrome Controller, who changed the altitude of the fighter aircraft without communicating with Military Supervisor and Civil Controller, resulting in the activation of TCAS-RA.

3.2.2. Contributory Factors

3.2.2.1. Lack of situational awareness by Military Supervisor and Military Aerodrome Controller.

3.2.2.2. Lack of information sharing between Military Aerodrome Controller with Civil Controller.

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. Air Headquarters should ensure regular briefings for all PAF aircrew as well as military ATCOs on the operation and limitations of TCAS-RA in civil aircraft (particularly regarding speed variations and rates of climb and descent) to maintain proper separation and spacing between the traffic.

4.1.2. PCAA / PAA and Air Headquarters should establish proper coordination between civil and military controllers through formal letters of agreement (LOAs) to promote safe air operations practices.