

FINAL INVESTIGATION REPORT



SERIOUS INCIDENT OF TCAS – RA REPORTED BY AIR ARABIA FLIGHT ABY 555, A320 AIRCRAFT REG. NO. A6-ANL ON 06TH JUNE, 2018

Dated: 16th June, 2023

SCOPE

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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

Abbreviation	Full Form
AAIB	Aircraft Accident Investigation Board
ACAS	Airborne Collision Avoidance System
ADREP	Accident Incident Data. Reporting System
ATC	Air Traffic Control
BKIAP	Bacha Khan International Airport
CPA	Closest Point Approach
DMOD	Distance Modification
ft	Feet
h	Hour(s)
IOU	Incident Occurrence and Unserviceability
ICAO	International Civil Aviation Organization
MAC	Mid-Air Collision
PAF	Pakistan Air Force
PANS - ATM	Procedures for Air Navigation System – Air Traffic Manual
PCAA	Pakistan Civil Aviation Authority
RA	Resolution Advisory
RTF	Radiotelephony
R/W	Runway
s	Second
SID	Standard Instrument Departure
SL	Sensitivity Level
TA	Traffic Advisory
TCAS-RA	Traffic Alert and Collision Avoidance System – Resolution Advisor
UTC	Universal Time Coordinated

INTRODUCTION

The serious incident was reported by Pakistan Civil Aviation Authority (PCAA) Incident Occurrence and Unserviceability (IOU) Report. Ministry of Aviation, Government of Pakistan issued Memorandum and Corrigendum authorizing Aircraft Accident Investigation Board (AAIB), Pakistan to investigate the serious incident. The investigation has been conducted by AAIB, Pakistan. All corresponding timings are mentioned in Universal Time Coordinated (UTC).

SYNOPSIS

On 06th June, 2018, Air Arabia flight ABY 555, Airbus 320-214 aircraft, Reg. No. A6-ANL was a scheduled passenger flight from Bacha Khan International Airport (BKIAP), Peshawar to Sharjah International Airport, Sharjah. ABY 555 departed from Runway (R/W) 35 on Standard Instrument Departure (SID). While turning right to proceed from overhead Peshawar to HANGU, ABY 555 reported Traffic Alert and Collision Avoidance System – Resolution Advisory (TCAS – RA). At the time of TCAS – RA alert, MOMIN 171, Pakistan Air Force (PAF) fighter F-7 PG aircraft was cleared by Military Controller to carry pitchout maneuver for landing for R/W 35 behind the departure of ABY 555. PAF fighter delayed its pitchout maneuver and turned left at the end of the R/W instead of mid R/W which resulted in reduction of required separation between the two aircraft.

SECTION 1 - FACTUAL INFORMATION

1.1. History of the Flight

1.1.1. On 06th June, 2018 Air Arabia flight ABY 555, A320 aircraft, Reg. No. A6-ANL was a scheduled passenger flight from BKIAP, Peshawar to Sharjah International Airport, Sharjah. ABY 555 was given take-off clearance along with SID HANGU 1A Departure. ABY 555, took off at 02:04:00 hours (h) and just after getting airborne, it reported TCAS – RA alert. Tower Controller passed the traffic information to ABY 555 about PAF fighter crossing behind at circuit altitude and being visual with it. ABY 555 informed Air Traffic Control (ATC) that Military traffic was maintaining 2,000 feet (ft) and was very close. ABY 555 inquired as to why the traffic information was not passed to them. On query from ATC, ABY 555 confirmed on radiotelephony (RTF) that they had received TCAS – RA at 2,200 ft.

1.2. Injuries to Persons

1.2.1. No injury was reported to anyone on board both the aircraft.

1.3. Damage to Aircraft

1.3.1. During this occurrence there was no damage to any of the aircraft.

1.4. Other Damages

1.4.1. No other damages were reported.

1.5. Personnel Information

1.5.1. Not Applicable.

1.6. Aircraft Information

Aircraft # 01	
Operator	Air Arabia
Call Sign	ABY 555
Aircraft Make & Model	Airbus 320-214
Registration Marking	A6-ANL
Sector	Peshawar to Sharjah (PEW - SHJ)
Level	2,200 ft
Aircraft # 02	
Operator	Pakistan Air Force
Call Sign	Momin 171
Aircraft Make & Model	F-7 PG
Sector	Peshawar
Level	2,000 feet

Table 1 Aircraft details

1.7. Meteorological Information

1.7.1. Weather data during this event is as provided below: -

Time (UTC)	Wind Strength (knots)	Visibility (km)	Weather	Clouds	Temperature (°C)	Dew Point (°C)	QNH
1:00	Northerly 4 knots	5 km	Haze	Nil	27°C	18°C	1007.7 hpa
2:00	Northerly 4 knots	5 km	Haze	Nil	27°C	18°C	1008 hpa
3:00	Northerly 8 knots	5 km	Haze	Nil	29°C	18°C	1008.4 hpa

1.7.2. No significant weather was reported at the time of the incident which could have possibly contributed to the serious incident.

1.8. Aids to Navigation

1.8.1. Navigation facilities were fully functional at the time of event flight. Navigational aids for BKIAP, Peshawar are provided below: -

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	IKBK	108.3 MHz	H24	340031.00N 0713048.00E	-	-
DVOR/DME (2/2015)	PS	114.3 MHz CH90X	H24	335841.54N 0713100.91E	368.00M	-
NDB	PS	308.0 kHz	H24	335900.45N 0713000.16E	-	Coverage 150NM
GP / TDME 35	DOTS / DASHES	334.1 MHz CH20X	H24	335904.00N 0713052.00E	-	-

Table 2 Radio Navigation and Landing Aids – BKIAP, Peshawar

1.9. Communications

1.9.1. At the time of the serious incident no abnormality was reported. Communication facilities at BKIAP, Peshawar are provided below: -

Service designation	Call sign	Frequency	Hours of operation	Remarks
1	2	3	4	5
APP	Cherat APP	125.60 MHZ	H24	PAF. Primary Frequency.
ATIS	ATIS	126.70 MHZ	H24	-
G/A/G	Radio	2923.00 KHZ	-	-
G/A/G	Radio	5601.00 KHZ	-	-
GCA		118.30 MHZ	H24	-
TWR	Peshawar Tower	118.40 MHZ	H24	Standby Frequency
TWR	Peshawar Tower	121.50 MHZ	H24	-
TWR	Peshawar Tower	122.90 MHZ	H24	Primary Frequency.
TWR	Peshawar Tower	243.00 MHZ	H24	-
TWR	Peshawar Tower	121.80 MHZ	H24	-

Table 3 Communication Facilities – BKIAP, Peshawar

1.10. Aerodrome Information

1.10.1. At the time of the serious incident no abnormality was reported. Aerodrome information of BKIAP, Peshawar is provided below: -

Designations RWY NR	True bearing	Dimensions of RWY (M)	Strength (PCN) and surface of	THR coordinates	THR elevation and highest elevation of	Slope of RWY/SWY

Table 4 R/W Physical Characteristics – BKIAP, Peshawar

Designations R/W NR	Take Off Run Available (TORA)	Accelerated Stop Distance Available (ASDA)	Take Off Distance Available (TODA)	Landing Distance Available (LDA)
1	2	3	4	5
17	2743	2865	3017	2743
35	2743	2743	3017	2743

Table 5 Declared Distances – 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 & Research

1.16.1. **Airborne Collision Avoidance System (ACAS)** – Purpose of ACAS is to minimize the risk of midair collisions between aircraft. While working independently from ATC, ACAS uses nearby aircraft's transponder signals to alert pilots to the danger of midair collisions. 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 ACAS detects a potential collision, it will automatically notify each of the affected aircraft. In this instance, it will automatically initiate a mutual avoidance maneuver. This involves the system informing the flight crew 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.

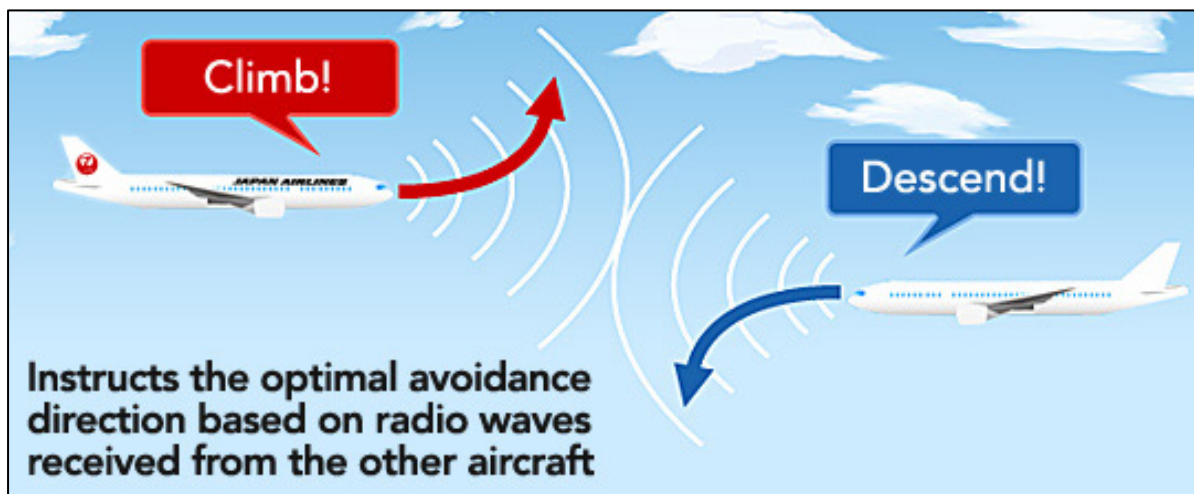


Figure 1 Airborne Collision Avoidance System Ranges

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

1.16.1.2. 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.

1.16.2. 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.

1.16.3. 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 maneuver that will ensure the safe vertical separation of the two aircraft. The selected maneuver ensure adequate vertical separation within constraints imposed by the climb rate, capability and proximity to the ground of the two aircraft.

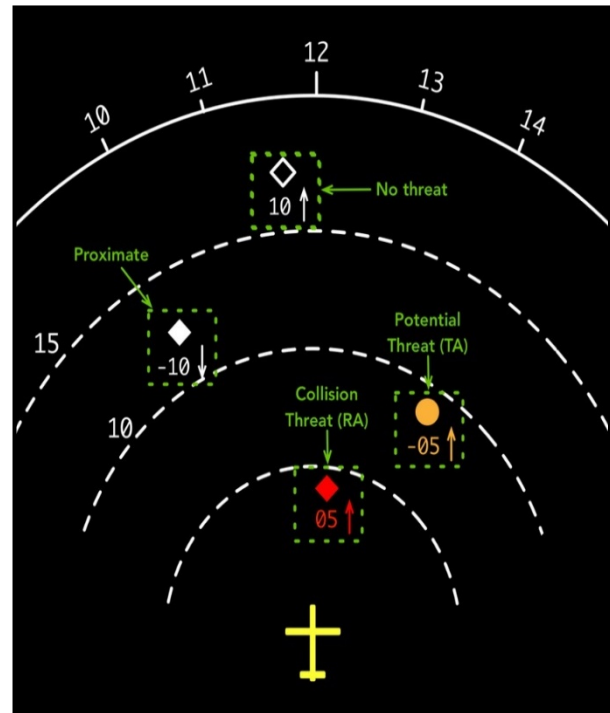


Figure 2 Traffic and Resolution Advisory

1.16.3.1. 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).

1.16.4. 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.

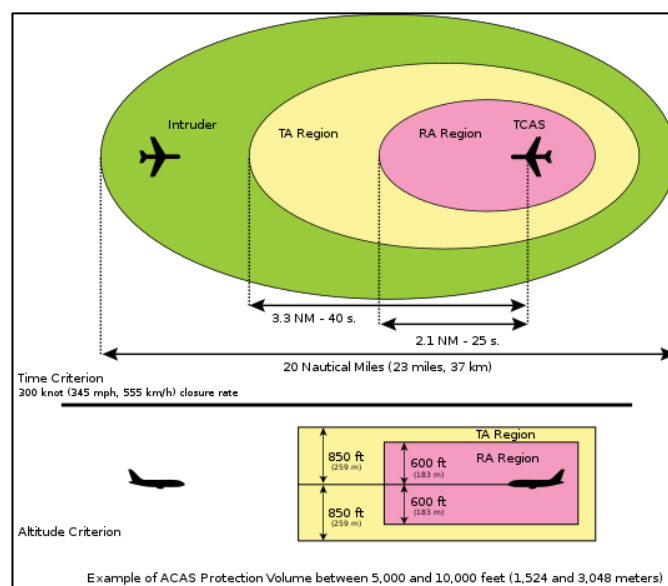


Figure 3 TA and RA ranges

1.16.5. ICAO Doc 9863 [Airborne Collision Avoidance System (ACAS) Manual]
Section 3.2.2.1 states: -

“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 ofn

1.18. Additional Information

1.18.1. Not Applicable.

1.19. Useful & Effective Investigation Techniques

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

SECTION 2 – ANALYSIS

2.1. General

2.1.1. On 06th June, 2018 Air Arabia flight ABY 555, A320 aircraft, Reg. No. A6-ANL was a scheduled passenger flight from BKIAP, Peshawar to Sharjah International Airport, Sharjah.

2.1.2. Peshawar is a joint user airfield with Civil and Military Controllers working side by side in the same Control Tower.

2.1.3. At 02:03:00 h, ABY 555 was given take-off clearance on SID HANGU 1A Departure from R/W 35 and got airborne at 02:04:00 h.

2.1.4. At 02:05:38 h, while turning right to proceed from overhead Peshawar to HANGU, ABY 555 reported TCAS – RA due traffic.

2.1.5. After the TCAS – RA reported by ABY 555, Tower Controller passed the traffic information to ABY 555 about PAF fighter aircraft crossing behind at circuit altitude and informed that fighter was visual with ABY 555. Tower Controller did not pass the essential traffic information (ICAO Doc 4444 Section 5.10.1.1 and 5.10.1.2) of PAF fighter aircraft to ABY 555 prior to take-off.

2.1.6. PAF fighter aircraft was cleared by Military Controller to carry pitchout maneuver for R/W 35 from mid of R/W 35 behind the departure of ABY 555. PAF fighter aircraft instead of pitching out by mid of R/W 35, delayed its pitchout maneuver and turned left at the end of the R/W 35 which probably resulted in reduction of required separation between the two aircraft. PAF fighter aircraft was visual with ABY 555 during the maneuver.

2.1.7. At 02:08:00 h, ABY 555 informed ATC that Military traffic was maintaining 2,000 ft and was very close. Upon query from ATC, ABY 555 confirmed that they had received TCAS – RA alert at 2,200 ft after take-off.

2.1.8. The occurrence took place probably due to the reduced threshold horizontal spacing leading to activation of TCAS – RA [Refer para 1.16.8 - ICAO Doc 4444 (PANS – ATM) Section 5.10.1.1 and 5.10.1.2].

2.1.9. It was observed that RTF was un-readable between 02:05:38 h to 02:08:13 h.

SECTION 3 – CONCLUSIONS

3.1. Findings

- 3.1.1. On 06th June, 2018, Air Arabia flight ABY 555, A320 aircraft, Reg. No. A6-ANL was a scheduled passenger flight from BKIAP, Peshawar to Sharjah International Airport, Sharjah.
- 3.1.2. Peshawar is a joint user airfield with Civil and Military Controllers working side by side in the same Control Tower.
- 3.1.3. ABY 555 was given take-off clearance on SID HANGU 1A Departure from R/W 35 and got airborne at 02:04:00 h.
- 3.1.4. While turning right to proceed from overhead Peshawar to HANGU, ABY 555 reported TCAS – RA due traffic.
- 3.1.5. Tower Controller did not pass the essential traffic information of PAF fighter aircraft to ABY 555 prior to take-off.
- 3.1.6. PAF fighter aircraft was cleared by Military Controller to carry pitchout maneuver for R/W 35 from mid of R/W 35 behind the departure of ABY 555.
- 3.1.7. PAF fighter aircraft instead of pitching out by mid of R/W 35, had delayed its pitchout maneuver and turned left at the end of the R/W 35 which probably resulted in reduction of required separation between the two aircraft.
- 3.1.8. At the time of occurrence, PAF fighter aircraft was maintaining 2,000 ft whereas ABY 555 was at 2,200 ft.
- 3.1.9. The occurrence took place probably due to the reduced threshold horizontal spacing leading to activation of TCAS – RA.

3.2. Cause(s) / Contributing Factors

3.2.1. Cause

- 3.2.1.1. Delayed pitchout maneuver by Military aircraft resulted in reduction of separation with Civil aircraft after take-off.

3.2.2. Contributing Factors

- 3.2.2.1. Proper separation was not maintained by Military aircraft while being visual with Civil traffic.
- 3.2.2.2. Prior to take-off, no essential traffic information was passed to Civil aircraft by Civil ATC.

Note: Aviation Occurrence Category (ADREP Taxonomy)

“Mid-Air Collision (MAC): Traffic Collision Avoidance System (TCAS) / Airborne Collision Avoidance System (ACAS) alerts, loss of separation as well as near collisions or collisions between aircraft in flight”.

SECTION 4 – SAFETY RECOMMENDATIONS

4.1. Safety Recommendations

4.1.1. PCAA to educate and enhance the knowledge on the working of TCAS – RA to joint user Military Controllers / flight crew as per ICAO Doc 9863.

4.1.2. PCAA to ensure designing / implementation of procedures based on enhanced separation, keeping in view the high speed and manoeuvrability of fighter aircraft vs Civil aircraft.