

## **FINAL INVESTIGATION REPORT**



### **SERIOUS INCIDENT (TCAS – RA) BETWEEN SAUDI AIRLINE FLIGHT SVA724, BOEING 777-368(ER) AIRCRAFT, REG. NO. HZ-AK11 & MILITARY AIRCRAFT SAPHIRE-24, BEECHCRAFT-350 AIRCRAFT, ON 21-03-2022**

## **SCOPE**

Aircraft Accident Investigation Board (AAIB), 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 serious incidents of similar nature. It is not the purpose of such an investigation to apportion blame or liability. Accordingly, it is inappropriate to use AAIB 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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## TABLE OF CONTENTS

<b>SECTION 1 - FACTUAL INFORMATION</b>	<b>9</b>
1.1. History of the Flight	10
1.2. Injuries to Person(s)	12
1.3. Damage to Aircraft	12
1.4. Other Damage	12
1.5. Personnel Information	13
1.6. Aircraft Information	13
1.7. Meteorological Information	13
1.8. Aids to Navigation	14
1.9. Communications	14
1.10. Aerodrome Information	15
1.11. Flight Recorders	15
1.12. Wreckage and Impact Information	15
1.13. Medical and Pathological Information	15
1.14. Fire	15
1.15. Survival Aspects	15
1.16. Test and Research	15
1.17. Organizational and Management Information	16
1.18. Additional Information	16
1.19. Useful & Effective Investigation Techniques	18
<b>SECTION 2 – ANALYSIS</b>	<b>19</b>
2.1. General	20
<b>SECTION 3 – CONCLUSIONS</b>	<b>24</b>
3.1. Findings	25
3.2. Cause / Contributory Factors	26
<b>SECTION 4 – SAFETY RECOMMENDATIONS</b>	<b>27</b>
4.1. Safety Recommendations	28

## LIST OF FIGURES

<b>Fig No.</b>	<b>Title</b>	<b>Page</b>
1.	SVA724 Route Plan	10
2.	SVA724 came in Contact with Cherat Approach	10
3.	SAPHIRE-24 Holding Over Position KALMI	11
4.	Activation Of TCAS – RA	11
5.	SVA724 Started Descent from FL181 TO FL170	12
6.	TCAS (TA) Alert	16
7.	TCAS TA & RA Ranges	16
8.	Traffic Display	18
9.	SVA724 Reported Activation of TCAS - RA Alert	20
10.	SVA724 Crossing FL177 for FL170	20
11.	SAPHIRE-24 Holding Over Position KALMI	21
12.	SVA724 Climbed FL181 due to RA	22

## LIST OF TABLES

<b>Table No.</b>	<b>Title</b>	<b>Page</b>
1.	Injuries to Person(S) on Board Details	12
2.	Aircraft # 1 Information	13
3.	Aircraft # 2 Information	13
4.	METAR details IIAP, Islamabad	13
5.	METAR Description at Time 0800 UTC	13
6.	Radio Navigation & Landing Aids IIAP, Islamabad	14
7.	Communication & Radio Navigational Aids, IIAP, Islamabad	14
8.	Aerodrome Information IIAP, Islamabad	15

## ABBREVIATIONS

<b>ACAS</b>	Airborne Collision Avoidance System
<b>AAIB</b>	Aircraft Accident Investigation Board
<b>AOR</b>	Area Of Responsibility
<b>CARs</b>	Civil Aviation Rules
<b>CPA</b>	Closest Point of Approach
<b>ft</b>	Feet
<b>FL</b>	Flight Level
<b>GACA</b>	General Authority of Civil Aviation, Saudi Arabia
<b>hPa</b>	Hectopascal
<b>HVR</b>	High Vertical Rate
<b>h</b>	Hour
<b>IOU</b>	Incident Occurrence and Unserviceability Report
<b>ILS</b>	Instrument Landing System
<b>ICAO</b>	International Civil Aviation Organization
<b>IIAP</b>	Islamabad International Airport
<b>kg(s)</b>	Kilogram(s)
<b>kts</b>	Knots
<b>L</b>	Litre
<b>METAR</b>	Metrological Aerodrome Report
<b>MAC</b>	Mid-Air Collision
<b>min</b>	Minute(s)
<b>NTSB</b>	National Transportation Safety Board
<b>NM</b>	Nautical Mile
<b>PCAA</b>	Pakistan Civil Aviation Authority
<b>PST</b>	Pakistan Standard Time
<b>RTF</b>	Radiotelephony
<b>ROD</b>	Rate of Descend
<b>RA</b>	Resolution Advisory
<b>R/W</b>	Runway
<b>s</b>	Seconds
<b>SLs</b>	Sensitivity Levels
<b>SARPs</b>	Standard and Recommended Practices
<b>TA</b>	Traffic Advisory
<b>TCAS</b>	Traffic Collision Avoidance System
<b>UTC</b>	Universal Time Coordinated

## **INTRODUCTION**

The serious incident was reported to Aircraft Accident Investigation Board (AAIB), Pakistan, by Pakistan Civil Aviation Authority (PCAA) vide Incident Occurrence and Unserviceability Report (IOU)<sup>1</sup>. Ministry of Aviation, Government of Pakistan issued Memorandum and Corrigendum<sup>2</sup> authorizing AAIB, Pakistan to investigate the serious incident. This serious incident was notified<sup>3</sup> to International Civil Aviation Authority (ICAO), General Authority of Civil Aviation (GACA) Saudi Arabia and National Transportation Safety Board (NTSB) USA in line with Annex-13. The investigation has been conducted by AAIB, Pakistan.

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<sup>1</sup> PCAA IOU Report dated 21<sup>st</sup> March, 2022

<sup>2</sup> Ministry of Aviation Memorandum No. AAIB/1902/006/TCAS/Inv/213 dated 31<sup>st</sup> May, 2022 & Corrigendum No. AAIB/1902/006/TCAS/Inv

<sup>3</sup> ICAO Initial Notification dated 19<sup>th</sup> April, 2022

## **SYNOPSIS**

On 21<sup>st</sup> March, 2022 Saudi Airline flight SVA724, Boeing 777-368(ER) aircraft, Reg. No. HZ-AK11 was a scheduled passenger flight which was operating from King Khalid International Airport, Riyadh to Islamabad International Airport (IIAP), Islamabad on route HANGU – J139 – KALMI – ISLAMABAD.

When SVA724 came in contact with Cherat Approach South, it was given descent to Flight Level (FL) 170 by Cherat Approach Controller along with Standard Instrument Arrival (STAR) KALMI 1A for Instrument Landing System (ILS) Approach on Runway (R/W) 28L. Cherat Approach Controller also passed traffic information to SVA724 about Military aircraft SAPHIRE-24, Beechcraft-350 which was holding over position KALMI and maintaining single level FL160. Once SVA724 was 3 NM west of position KALMI, it reported TCAS – RA due traffic. At that time, SVA724 was in descending phase out of FL177 for FL170 and initiated RA climb up to FL181. Both SVA724 and SAPHIRE-24 were in contact with Cherat Approach South at the time of TCAS – RA. Later, SVA724 continued for Approach to land at IIAP, Islamabad. All corresponding timings are mentioned in Universal Time Coordinated (UTC).



## **SECTION 1 - FACTUAL INFORMATION**

1.1. History of the Flight

1.1.1. On 21<sup>st</sup> March, 2022 Saudi Airline flight SVA724, Boeing 777-368(ER) aircraft, Reg. No. HZ-AK11 was a scheduled passenger flight which was operating from King Khalid International Airport, Riyadh to IIAP, Islamabad on route HANGU – J139 – KALMI – ISLAMABAD.

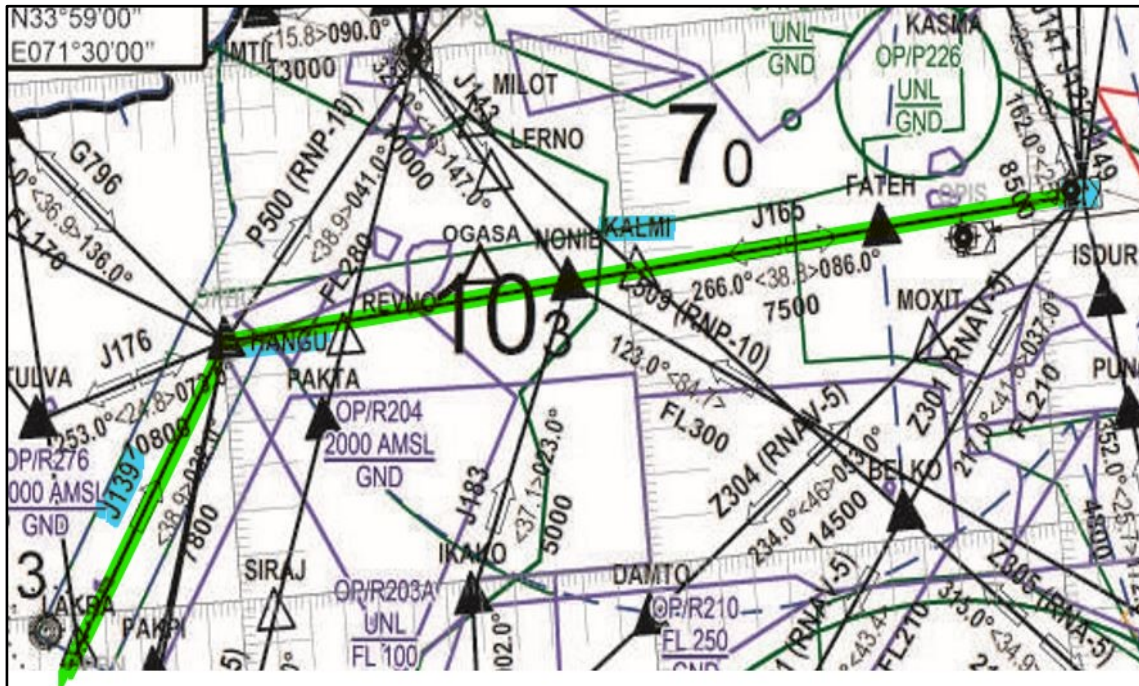


Figure 1 SVA724 Route plan

1.1.2. At 08:03:20 hours (h), SVA724 came in contact with Cherat Approach South and was given descent to FL170 along with STAR KALMI 1A route, ILS Approach for R/W 28L.



Figure 2 SVA724 came in contact with Cherat Approach

1.1.3. At 08:08:35 h, Cherat Approach Controller passed the traffic information to SVA724 about Military aircraft SAPHIRE-24, B350 aircraft, which had gotten airborne from Qasim Air Base (OPQS) and was holding over position KALMI maintaining single Level FL160.

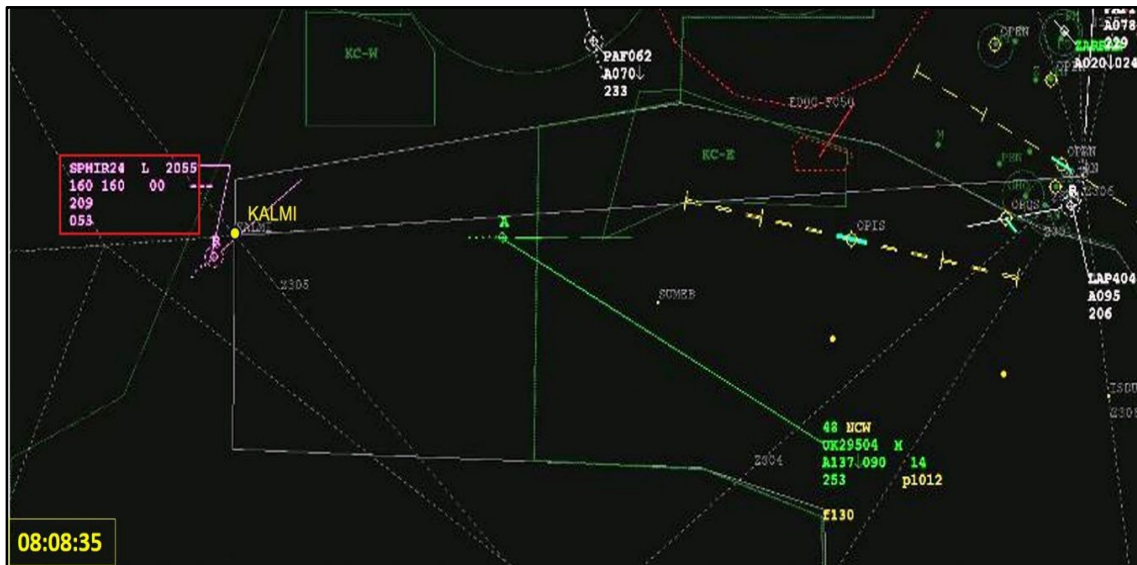


Figure 3 SAPHIRE-24 holding over position KALMI

1.1.4. At 08:10:46 h, once SVA724 was 3 NM west of position KALMI, it reported TCAS – RA due traffic. At that time SVA724 was in descending phase out of FL177 for FL170 with ROD 1,800 ft. On receiving TCAS – RA, SVA724 initiated climb up to FL181 due to RA.

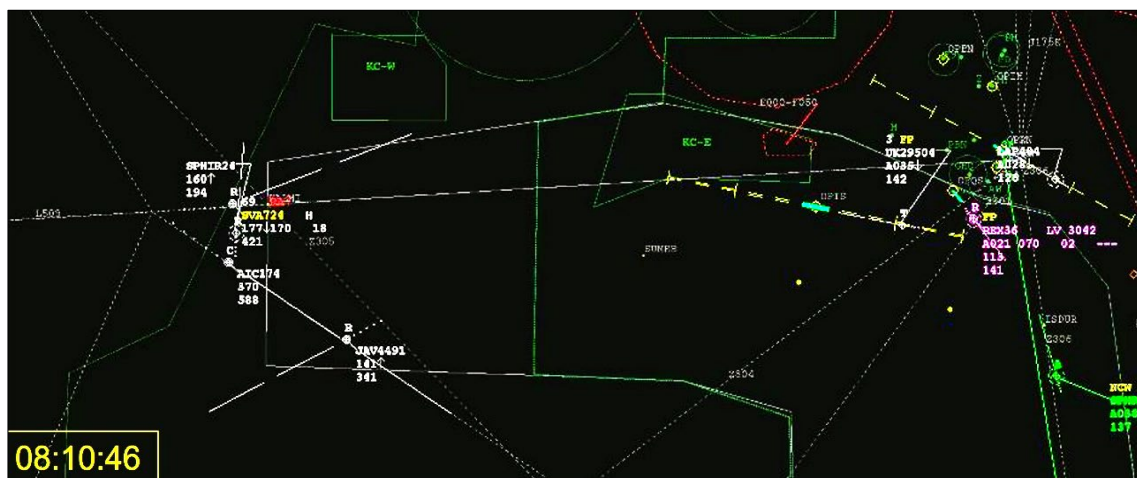


Figure 4 Activation of TCAS – RA

1.1.5. At the time of RA, minimum vertical separation of 1,700 ft and lateral separation of 03 NM existed between SVA724 and SAPHIRE-24.

1.1.6. At 08:11:00 h, Islamabad Approach Controller on radar scope also observed TCAS – RA between SVA724 and SAPHIRE-24 at 3 NM west of position KALMI.

1.1.7. At 08:11:08 h, SVA724 reported that it had gotten close to traffic at the same level due to which it had received TCAS – RA.

1.1.8. At 08:11:17 h, Cherat Approach Controller again provided traffic information about Military aircraft SAPHIRE-24 at FL160 holding over KALMI to SVA724.



1.1.9. At 08:11:27 h, SVA724 informed that it had levelled off at FL170 but due to traffic, it had executed RA climb.

1.1.10. At 08:11:48 h, SVA724 reported clear of conflict and descended from FL181 to FL170.

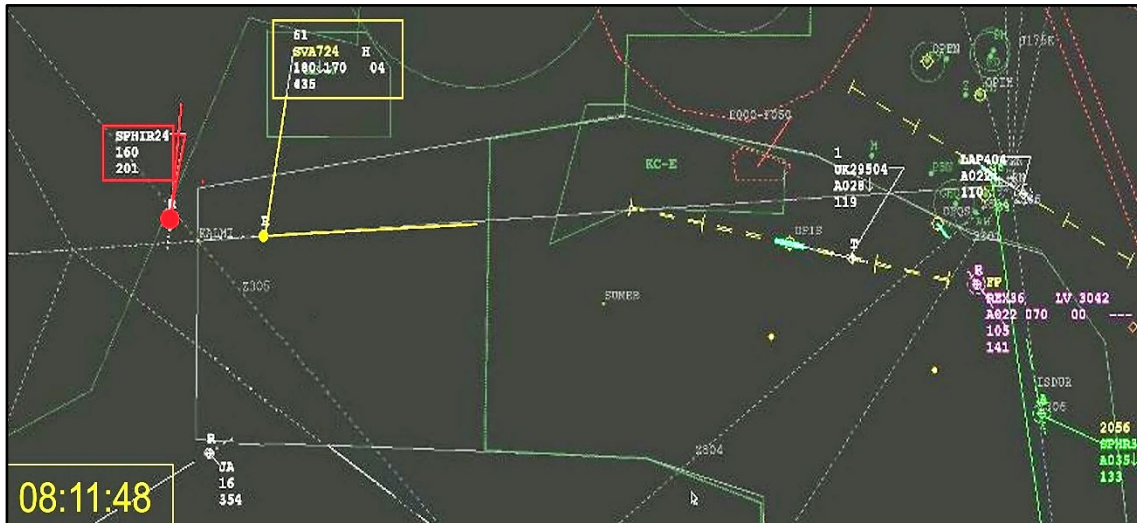


Figure 5 SVA724 started descent from FL181 to FL170.

1.1.11. At 08:12:34 h, once clear of SAPHIRE-24, SVA724 was given further descent to 11,000 ft on QNH.

1.1.12. At 08:13:47 h, SVA724 was changed over to Islamabad Approach by Cherat Approach Controller.

1.1.13. Both SVA724 and SAPHIRE-24 were in contact with Cherat Approach South at the time of TCAS – RA and standard separation of 1,000 ft was never infringed.

## 1.2. Injuries to Person(s)

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

Injuries	Crew	Passenger	Total in the aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	17	353	370	-
<b>Total</b>	17	353	370	-

Table 1 Injuries to Person(s) on board details

## 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

<b>Aircraft # 1 – SVA724</b>	
Aircraft Make & Model	Boeing 777-368(ER)
Registration Marking	HZ-AK11
Manufacturer Serial No.	41048
Operator	Saudi Airline
Sector	Riyadh (RUH) – Islamabad (ISB)
Induction in Saudi Airline fleet	April, 2017
Total hours flown	344:21
Maximum Fuel Capacity	145,538 Liters (L)
Altitude	FL170

Table 2 Aircraft # 1 Information

<b>Aircraft # 2 – Military aircraft</b>	
Aircraft Make & Model	Beechcraft-350
Call Sign	SAPHIRE-24
Manufacturer Serial No.	N/A
Operator	Military Aircraft
Altitude	FL160

Table 3 Aircraft # 2 Information

## 1.7. Meteorological Information

1.7.1. No significant weather was reported at IIAP, Islamabad at the time of the incident.

<b>Meteorological Aerodrome Report (METAR) IIAP, Islamabad</b>
1300PST 210800Z 31012KT 8000 NSC 29/13 Q1011 NOSIG

Table 4 METAR details IIAP, Islamabad

<b>METAR IIAP, Islamabad</b>	
1300 PST	<b>(Local Time)</b> Time 13:00 Pakistan Standard Time (PST)
210800Z	<b>(Date &amp; Time)</b> Day 21, Time: 0800 UTC
31012KT	<b>Wind Direction &amp; Speed-</b> Wind Direction: 310°, Speed: 12 knots (kts)
8000	<b>Visibility-</b> 8,000 meters (m).
NSC	<b>No significant cloud (NSC)</b>
29/13	<b>Temperature:</b> 29°C, <b>Dew point:</b> 13°C
Q1011	<b>Altimeter setting-</b> Air pressure 1011 hpa
NOSIG	<b>No significant change</b> is expected to the reported conditions

Table 5 METAR description at time 0800 UTC

## 1.8. Aids to Navigation

1.8.1. Navigational aids for IIAP, Islamabad are provided below: -

TYPE OF AID	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 28R	IBIP	110.7 MHz	H24	333312.69N 0724812.32E	530.960000 M	-
ILS/LOC CAT III 28L	IBBA	103.1 MHz	H24	333306.01N 0724810.82E	535.390000 M	-
ILS/LOC CAT I 10R	IBAP	111.3 MHz	H24	333240.69N 0725052.37E	535.920000 M	-
DVOR/DME (2/2017)	BTR	114.6 MHz CH93X	H24	333239.54N 0725121.84E	535.11M	Coverage 200 NM
GP/TDME 10R	DOTS/DASHES	332.3 MHz CH50X	H24	333306.34N 0724834.23E	545.95M	-
GP/TDME 28R	DOTS/DASHES	330.2 MHz CH44X	H24	333254.84N 0725031.54E	549.50M	-
GP/TDME 28L	DOTS/DASHES	334.7 MHz CH18X	H24	333240.29N 0725029.68E	546.89M	-

Table 6 Radio Navigation & Landing Aids IIAP, Islamabad

1.8.2. There was no abnormality reported regarding Navigational Aids at IIAP, Islamabad during the time of incident.

## 1.9. Communications

1.9.1. Communication frequencies for IIAP, Islamabad are provided below: -

Service designation	Call sign	Frequency	Hours of operation	Remarks
1	2	3	4	5
Aerodrome Control Service	Islamabad Ground	124.350 MHz	H24	Fire
Aerodrome Control Service	Islamabad Departure	118.550 MHz	H24	Clearance Delivery
Aerodrome Control Service	GMC (N)	125.150 MHz	H24	Secondary
Emergency Service	Islamabad	121.500 MHz	H24	Function Emergency
Approach Control Service	Islamabad APP	124.650 MHz	H24	Secondary
Military Frequency	Islamabad APP	241.200 MHz	HX	Secondary
Aerodrome Control Service	GMC (N)	123.050 MHz	H24	Primary
Aerodrome Control Service	Islamabad Tower	122.150 MHz	H24	Primary
Approach Control Service	Islamabad APP	121.650 MHz	H24	Primary
Aerodrome Control Service	Islamabad Ground	122.950 MHz	H24	Secondary
Aerodrome Control Service	Islamabad Departure	119.650 MHz	H24	Departure Frequency
Aerodrome Control Service	Islamabad Tower	123.225 MHz	H24	Secondary
Military Frequency	Islamabad APP	240.500 MHz	HX	Primary
Aerodrome Control Service	Islamabad Ground	121.850 MHz	H24	Vehicle / Follow-Me
Aerodrome Control Service	Islamabad Ground	130.600 MHz	H24	Primary
D-ATIS	D-ATIS	126.200 MHz	H24	Weather Broadcast Service

Table 7 Communication & Radio Navigational Aids, IIAP, Islamabad

1.9.2. There was no abnormality reported regarding Communication facilities at IIAP, Islamabad during the time of incident.

**1.10. Aerodrome Information**

1.10.1. Aerodrome data of IIAP, Islamabad is provided below. At the time of incident, no abnormality was reported.

Designations RWY NR	True bearing	Dimensions of RWY (M)	Strength (PCN) and surface of RWY and SWY	THR coordinates	THR elevation and highest elevation of TDZ of precision APP RWY	Slope of RWY/SWY
1	2	3	4	5	6	7
10R	100.58°	3658 x 60	110/F/C/X/T ASPH Flexible	333304.28N 0724821.81E	THR 528.06 M / 1732.49 FT	0.12% UP
28L	280.60°	3658 x 60	110/F/C/X/T ASPH Flexible	333242.42N 0725041.37E	THR 532.53 M / 1747.14 FT	0.12% DOWN
10L	100.58°	3658 x 45	110/F/C/X/T ASPH Flexible	333310.98N 0724823.30E	THR 529.03 M / 1735.67 FT	0.12% UP
28R	280.60°	3658 x 45	110/F/C/X/T ASPH Flexible	333249.12N 0725042.87E	THR 533.41 M / 1750.04 FT	0.12% DOWN

SWY dimension (M)	CWY dimension (M)	Strip dimension (M)	RESA dimension (M)	Arresting system	Obstacle Free Zone	Remarks
8	9	10	11	12	13	14
-	1000 x 150	3778 x 300	240 x 150	-	-	Runway Shoulders: 7.5 m on each side of Both Rways
-	190 x 150	3778 x 300	240 x 150	-	-	-
-	1000 x 150	3778 x 300	240 x 150	-	-	-
-	1000 x 150	3778 x 300	240 x 150	-	-	-

Table 8 Aerodrome Information IIAP, Islamabad

**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.

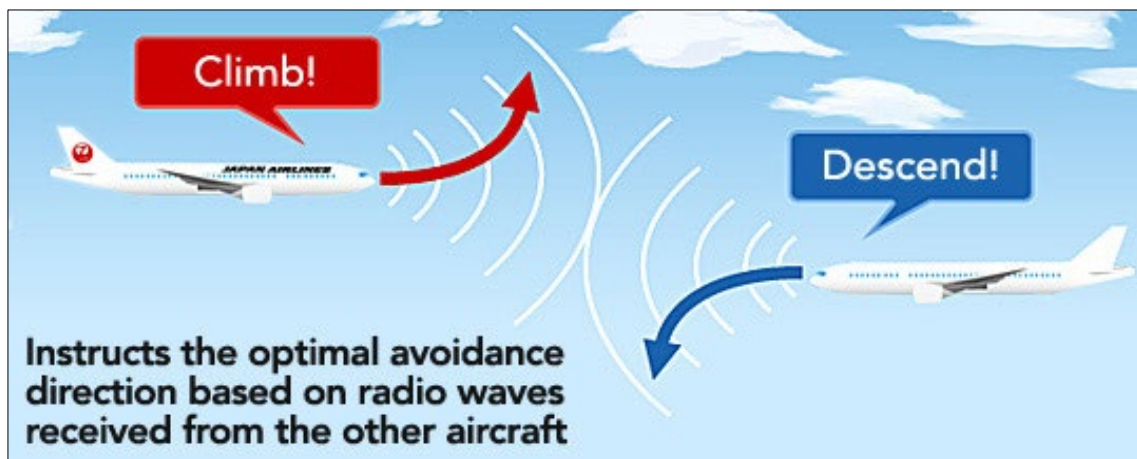


Figure 6 TCAS (TA) alert

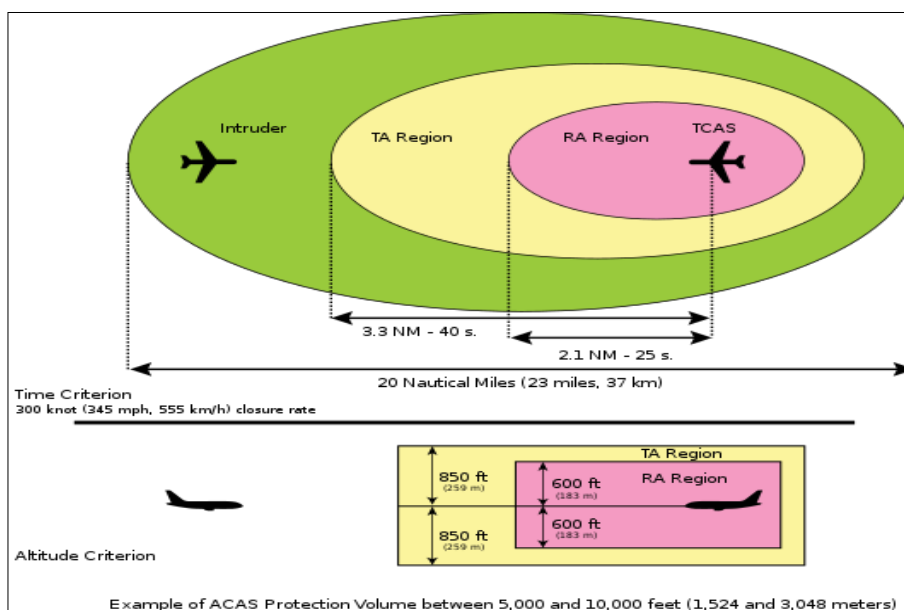


Figure 7 TCAS TA & RA ranges



## 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).

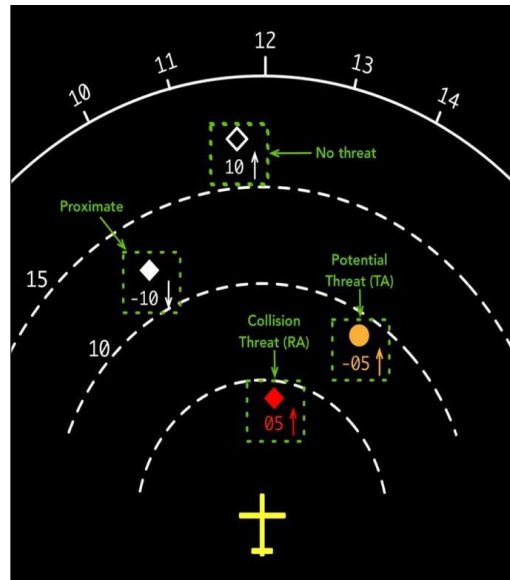


Figure 8 Traffic Display

## 1.19. Useful & 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 21<sup>st</sup> March, 2022 Saudi Airline flight SVA724, a scheduled passenger flight took off from King Khalid International Airport, Riyadh for IIAP, Islamabad on route HANGU – J139 – KALMI – ISLAMABAD.

2.1.2. No significant weather was reported at IIAP, Islamabad as well as surrounding areas at the time of the incident.

2.1.3. SVA724 came in contact with Cherat Approach South and was given descent to FL170 along with STAR KALMI 1A for ILS R/W 28L.

2.1.4. Cherat Approach Controller passed the traffic information to SVA724 about Military aircraft SAPHIRE-24, which had gotten airborne from Qasim Air Base and was holding over position KALMI maintaining FL160.

2.1.5. Traffic information of SAPHIRE-24, which was passed by Cherat Approach Controller to SVA724, was not clearly acknowledged by SVA724.

2.1.6. Islamabad Approach Controller, on radar scope observed TCAS – RA between SVA724 and SAPHIRE-24 approximately 3 NM West of position KALMI in the AOR of Cherat Approach South.

2.1.7. When SVA724 was 3 NM west of position KALMI, it reported TCAS – RA which was due to Military traffic SAPHIRE-24.

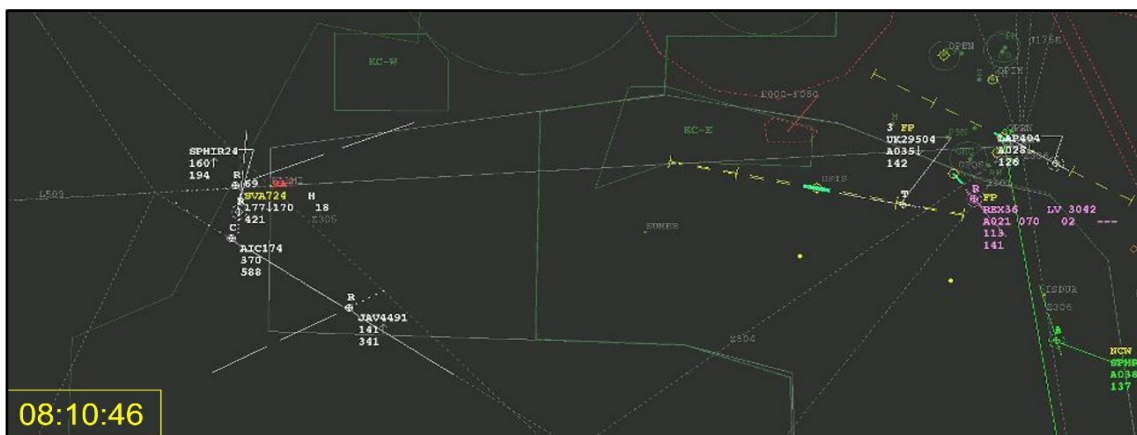


Figure 9 SVA724 reported activation of TCAS - RA alert

2.1.8. At the time of RA, SVA724 was crossing FL177 for FL170 and SAPHIRE-24 was maintaining FL160 single level as depicted in Figure 10



Figure 10 SVA724 crossing FL177 for FL170

2.1.9. According to Captain's statement<sup>4</sup>: -

*"SVA724 recalls being informed of Military Traffic climbing over / near KALMI, but SVA724 has no recollection of being informed traffic was holding over KALMI and there is no depicted published holding over this fix".*

2.1.10. Whereas, during the analysis of Radiotelephony (RTF)<sup>5</sup> extracts, it was revealed that Cherat Approach Controller had clearly passed the traffic information to SVA724 about SAPHIRE-24, maintaining single level FL160 in the hold overhead point KALMI which was not clearly acknowledged by SVA724.

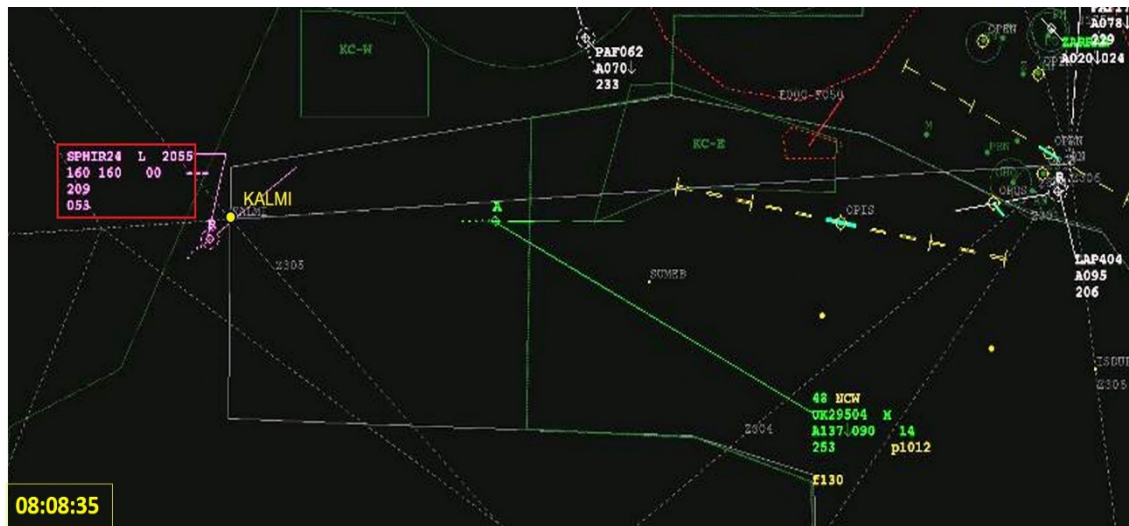


Figure 11 SAPHIRE-24 holding over position KALMI

2.1.11. At the time of activation of RA alert, SVA724 was maintaining ROD 1,800 ft which was contrary to ICAO Doc 8168<sup>6</sup>, Section 4, Chapter 3, Para 3.3 which states: -

***"3.3 HIGH VERTICAL RATE (HVR) ENCOUNTERS***

*Pilots should use appropriate procedures by which an aeroplane climbing or descending to an assigned altitude or flight level, especially with an autopilot engaged, may do so at a rate less than 8 m/s (or 1,500 ft / min) throughout the last 300 m (or 1,000 ft) of climb or descent to the assigned altitude or flight level when the pilot is made aware of another aircraft at or approaching an adjacent altitude or flight level, unless otherwise instructed by ATC. Some aircraft have auto-flight systems with the capability to detect the presence of such aircraft and adjust their vertical rate accordingly. These procedures are intended to avoid unnecessary ACAS II resolution advisories in aircraft at or approaching adjacent altitudes or flight levels. For commercial operations, these procedures should be specified by the operator"*

<sup>4</sup> SVA724's Captain's Statement

<sup>5</sup> RTF Extracts

<sup>6</sup> ICAO Doc 8168, Section 4, Chapter 3

2.1.12. SVA724 initiated climb up to FL181 due to RA response.

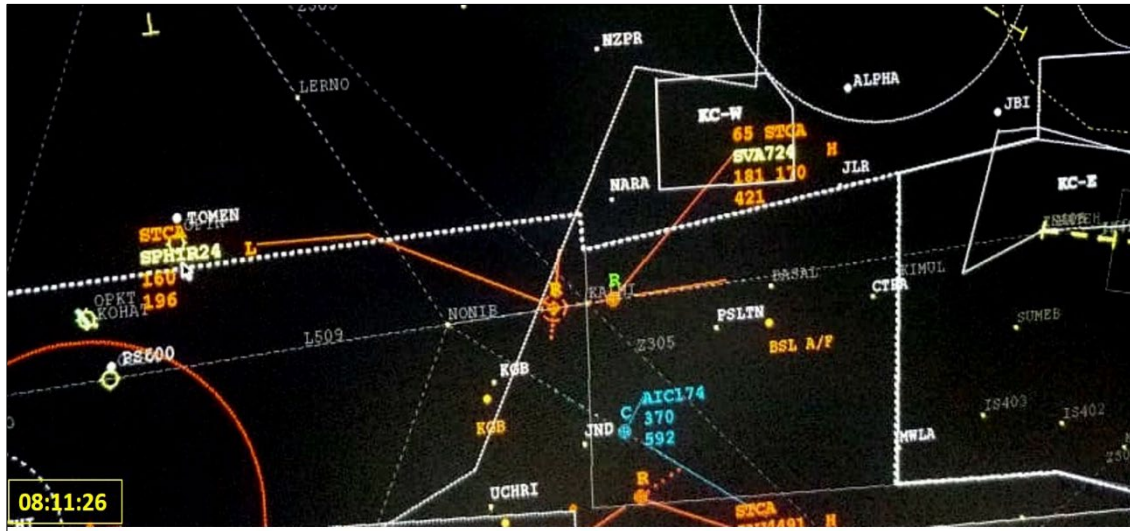
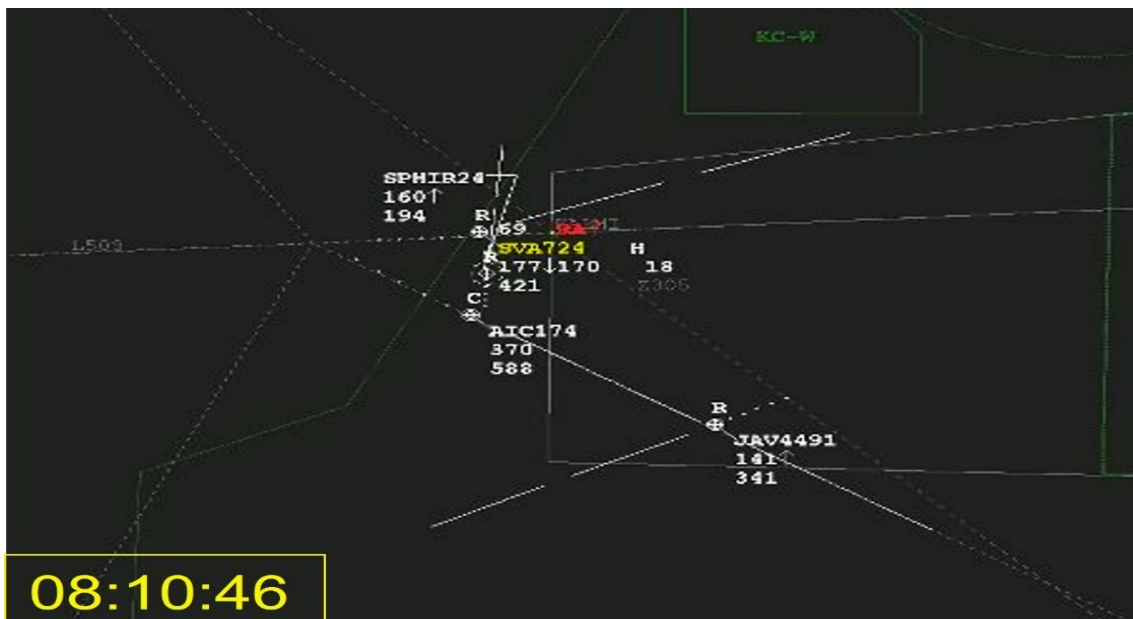


Figure 12 SVA724 climbed FL181 due to RA

2.1.13. At 08:11:08 h, SVA724 reported that it had gotten close to traffic at the same level and got RA, upon which Cherat Approach Controller again provided traffic information about Military aircraft SAPHIRE-24 at FL160 holding over position KALMI.

2.1.14. Once clear of traffic, SVA724 descended from FL181 to FL170.

2.1.15. At 08:11:48 h, SVA724 again informed that it had levelled off at FL170 but due to traffic, it had initiated climb in response to RA activation, which is contrary to screen shot data at the time of incident as depicted in figure below: -



2.1.16. As per the Captain's statement<sup>7</sup>:

*"It was sometime after having been already level at the intermediate assigned altitude of FL170, and awaiting further descent instructions, that SVA724 received a TCAS (RA) of the intruding traffic and the associated TCAS / RA command to climb".*

<sup>7</sup> SVA724's Captain Statement

2.1.17. As per Captain's statement SVA724 received TCAS alert while it was maintaining FL170 and was waiting for further descent instructions by the ATC; however, at the time of activation of TCAS – RA, SVA724 was in a descent passing FL177 for FL170.

2.1.18. Once clear of SAPHIRE-24, SVA724 was given further descent to 11,000 ft on QNH.

2.1.19. At 08:13:47 h, SVA724 was changed over to Islamabad Approach by Cherat Approach Controller and subsequently landed at IIAP, Islamabad without any further incident.

2.1.20. Both SVA724 and SAPHIRE-24 were in contact with Cherat Approach South throughout. At the time of TCAS – RA, standard vertical separation was never infringed. Minimum vertical separation of 1,700 ft and lateral separation of 03 NM existed between the two aircraft.

## **SECTION 3 – CONCLUSIONS**



### 3.1. Findings

- 3.1.1. Saudi Airline flight SVA724 was a scheduled passenger flight from King Khalid International Airport, Riyadh to IIAP, Islamabad.
- 3.1.2. No significant weather was reported at IIAP, Islamabad as well as surrounding areas at the time of the incident.
- 3.1.3. Islamabad Approach Controller on radar scope observed TCAS – RA between SVA724 and SAPHIRE-24 approximately 3 NM west of position KALMI in the AOR of Cherat Approach South.
- 3.1.4. Once SVA724 came in contact with Cherat Approach South, it was given descent to FL170 along with STAR KALMI 1A for ILS Approach R/W 28L.
- 3.1.5. Military traffic, SAPHIRE-24 was operating from Qasim Air Base and was holding over position KALMI maintaining FL160.
- 3.1.6. Traffic information regarding SAPHIRE-24 was also passed to SVA724 by Cherat South Controller, however; this traffic information was not acknowledged by SVA724.
- 3.1.7. SVA724 reported activation of TCAS – RA when it was 3 NM west of position KALMI.
- 3.1.8. At the time of activation of RA alert, SVA724 was in descending phase out of FL177 for FL170 while SAPHIRE-24 was maintaining FL160 single level.
- 3.1.9. Captain's statement revealed that SVA724 was informed about Military Traffic over position KALMI; however, SVA724 was not aware of SAPHIRE-24 holding over position KALMI as there is no published holding over this fix.
- 3.1.10. RTF extract of the incident states that Cherat Approach Controller clearly passed the traffic information of SAPHIRE-24 maintaining single level FL160 in the hold overhead point KALMI.
- 3.1.11. At the time of activation of RA, SVA724 was maintaining ROD 1,800 ft / min which was contrary to ICAO Doc 8168, Section 4, Chapter 3 (maximum ROD 1,500 ft / min in last 1,000 ft of climb or descent).
- 3.1.12. SVA724 initiated climb up to FL181 due RA alert.
- 3.1.13. Later, SVA724 reported that it got close to traffic at the same level and got RA, upon which Cherat Approach Controller again passed the traffic information about Military aircraft SAPHIRE-24 at FL160 holding over position KALMI.
- 3.1.14. Once clear of conflict, SVA724 descended from FL181 to FL170.
- 3.1.15. As per Captain's statement SVA724 received TCAS alert while it was maintaining FL170 and was waiting for further descent instructions by the ATC; whereas at the time of activation of TCAS – RA, SVA724 was in a descent passing FL177 for FL170.
- 3.1.16. SVA724 informed that it had levelled off at FL170 however, due to presence of traffic, SVA724 executed RA climb which is contrary to the factual information.

- 3.1.17. Once clear of SAPHIRE-24, SVA724 was given further descent to 11,000 ft on QNH and was changed over to Islamabad Approach by Cherat Approach Controller.
- 3.1.18. SVA724 landed at Islamabad without any further incident.
- 3.1.19. Both SVA724 and SAPHIRE-24 were in contact with Cherat Approach South at the time of TCAS – RA and standard separation of 1,000 ft between both the aircraft was never infringed.
- 3.1.20. At the time of incident, minimum vertical separation of 1,700 ft and lateral separation of approximately 03 NM existed between the two aircraft.
- 3.1.21. High ROD maintained by SVA724 may have triggered its TCAS – RA.

### 3.2. Cause / Contributory Factors

#### 3.2.1. Cause

- 3.2.1.1. Activation of TCAS – RA (**MAC – Mid Air Collision**) due to high Rate of Descent maintained by SVA724.

#### 3.2.2. Contributory Factors

- 3.2.2.1. Non-adherence to procedures specified in ICAO Doc 8168, Section 4, Chapter 3, Para 3.3 regarding climb and descent.
- 3.2.2.2. Improper acknowledgement of traffic information passed.

*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. General Authority of Civil Aviation (GACA), Saudi Arabia may advise aircrew for following: -

4.1.1.1. Proper read back of information, instruction or any clearance passed by ATC.

4.1.1.2. Following the procedures mentioned in ICAO Doc 8168 regarding High Vertical Rate (HVR) encounters in order to maintain standard separation between aircraft.