

FINAL INVESTIGATION REPORT



**SERIOUS INCIDENT OF HYBRID AVIATION AIRCRAFT DIAMOND
DA-42 REG NO AP-BMR REAR PASSENGER DOOR FLYING OFF
IN AIR NEAR WALTON AIRPORT LAHORE ON 20-07-2018**

SCOPE

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TABLE OF CONTENTS

PARA NO.	DESCRIPTION	PAGE NO.
1	FACTUAL INFORMATION	1
1.1	History of Flight.....	1
1.2	Injuries to Person.....	1
1.3	Damage to Aircraft.....	1
1.4	Other Damages.....	1
1.5	Personal Information.....	1
1.6	Aircraft and Engines Information.....	1
1.7	Metrological Information.....	2
1.8	Aids to Navigation.....	2
1.9	Communications.....	2
1.10	Aerodrome Information.....	2
1.11	Flight Recorders.....	2
1.12	Wreckage and Impact Information.....	2
1.13	Medical and Pathological Information.....	2
1.14	Fire.....	2
1.15	Survival Aspects.....	2
1.16	Test and Research.....	2
1.17	Organisational and Management Information.....	2
1.18	Additional Information.....	3
1.19	Useful or Effective Investigation Techniques.....	3
2	ANALYSIS	3
3	CONCLUSIONS	5
3.1	Findings.....	5
3.2	Cause(s) of Occurrence.....	6
4	SAFETY RECOMMENDATIONS	6

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Synopsis

On 20 July 2018, Hybrid Aviation DA-42 aircraft (AP-BMR) got airborne from Walton Aerodrome for a training flight. During right downwind RWY 14, rear left passenger door light illuminated and door flew off in the air. The aircraft made normal landing. This serious incident was reported to Safety Investigation Board (SIB) Pakistan through Mandatory Occurrence Report (MOR). The incident was notified in accordance with ICAO Annex-13 and Aviation Division, Government of Pakistan issued memorandum authorizing SIB Pakistan to investigate the incident.

1. FACTUAL INFORMATION

- 1.1 **History of the Flight.** M/s Hybrid Aviation DA-42 aircraft (AP-BMR) got airborne at around 1045 LT from RWY 14 of Walton Airport. Aircraft leveled off at 1500ft IND, with throttle at 45% power setting and 120 kts IAS at right downwind for RWY 14. Pilot contacted Lahore Approach for practicing VOR let down and was told to standby. At the end of downwind pilot observed door open red light "ON" on the Primary Flight Display (PFD) followed by the audible warning sound. Pilot observed the door latch in halfway position between lock and unlock. Pilot brought the throttle to 35 % power, and reduced speed, as soon as pilot looked back at the very instance the rear canopy flew off. After a controllability check, the aircraft made normal landing, however did not inform ATC about emergency during or after the flight.
- 1.2 **Injuries to Persons.** There were no injuries to any person during the incident.
- 1.3 **Damage to Aircraft.** Left passenger door and right engine cowling.
- 1.4 **Other Damages.** None
- 1.5 **Personnel information.** The aircraft was flown by a qualified instructor / captain and a student pilot.
- 1.6 **Aircraft and Engines Information.**

Aircraft Make & Model	DA-42, Diamond Aircraft Industries, Austria
Registration Marking	AP-BMR
Manufacturer Serial No	42.126
Year of Manufacture	2006
C of A (S No expiry date)	905/1, 02 February, 2019
Total Aircraft hrs / cycles / landings	866.4 hrs / 800 / 800

- 1.6.1 The aircraft was being maintained in accordance with approved maintenance schedule.
- 1.7 **Meteorological Information.** Clear.
- 1.8 **Aids to Navigation.** Not applicable.
- 1.9 **Communications.** VHF 119.4 Mhz and 121.8 Mhz.
- 1.10 **Aerodrome Information.** The aerodrome information is not published in AIP. Standard information as per CAA Station Air Traffic Instructions was considered.
- 1.11 **Flight Recorders.** Not applicable.
- 1.12 **Wreckage and Impact Information.** Not applicable.
- 1.13 **Medical and Pathological Information.** Post occurrence blood and urine samples could not be taken, as the occurrence was not reported by the operator. However, both the Aircrew have valid medical fitness for flying duties.
- 1.14 **Fire.** No fire was reported by the cockpit crew members.
- 1.15 **Survival Aspects.** Not applicable.
- 1.16 **Test and Research.**
- 1.16.1 The flown off door was sent by the operator to its OEM (Diamond Aircraft Industries, Austria) for repair. Technical evaluation of the flown off door was persuaded through Civil Aviation Safety Investigation Authority of Austria which confirmed that:-
- “The damaged passenger door of the DA 42, AP-BMR was inspected at the maintenance facility of DAI. All damages of the passenger door can be attributed to the door separation from the fuselage and the impact of the door on ground. The door locking mechanism and the safety hook mechanism do not show any abnormalities.”*
- 1.16.2 A data on industry experience was sought from the OEM about similar incidents. This feedback confirmed that there have been similar cases of door flying off in the air however in almost all the cases the door had flown off due to improper locking (partial locking) of the door by the crew prior to departure.
- 1.17 **Organisational and Management Information.**
- 1.17.1 The flown off door was spotted / seen by local people / police who informed Airport Manager (APM) Walton Aerodrome. The APM inquired all flying clubs located at Walton for any such happening.
- 1.17.2 Captain of the aircraft did not inform ATC about the occurrence on losing his aircraft's passenger door while in the air as well as after the landing. The aircraft was parked inside their maintenance hangar and covered, besides closing down the hanger doors.
- 1.17.3 In the absence of any emergency call from the Captain, the emergency services were not alerted by ATC.
- 1.17.4 A physical search was launched by the APM along with his team which discovered that the missing door belonged to Hybrid Aviation's aircraft DA-42.

- 1.18 **Additional Information.** Not applicable.
- 1.19 **Use of Effective Investigation Techniques.** Standard investigation procedure and techniques were used.

2. ANALYSIS

- 2.1 The aircraft and its detached door were examined at the Operator's premises next morning ie (21 July 2018). During this activity, following was discovered:-
- 2.1.1 The passenger door was missing from the aircraft.



Passenger door missing after the incident



Door intact on a serviceable aircraft

- 2.1.2 Right engine cowling was found damaged as a consequence of door flying off in the air and hitting the cowling.



- 2.1.3 The flown off door was recovered and kept separately in a safe custody in the office of APM, Walton Aerodrome on the instructions of SIB.
- 2.1.4 Locking handle of the passenger door was observed to be de-shaped due to its impact on ground and at open position.



Door handle found de-shaped in open position after the incident

Door handle in closed position on a serviceable aircraft

- 2.1.5 The de-shaped locking handle was re-shaped and the door was placed back on the aircraft to check the door locking mechanism.
- 2.1.6 The door locking mechanism was found in a serviceable condition and no anomaly was observed with the door or its locking mechanism.
- 2.1.7 The passenger's door of DA-42 aircraft is attached with the aircraft through hinges and secured in closed position with a locking handle. Additionally there is lock operated by a key, which is meant to lock the door, when on ground. During flight this lock latch should be in vertical / unlock position. Accordingly, the door is likely to fly off in the air (while lock latch in vertical / recommended position) due to one or both of the following reasons: -
 - 2.1.7.1 The door hinges fail (in this case, the door open light and audible warning would occur at the same time when door flies off in the air).
 - 2.1.7.2 The door locking handle is not completely engaged and it opens at its own due to vibrations, or becomes faulty (in this case the door light and audible warning would occur before the time the door flies off in the air).
- 2.1.8 The condition of door hinge indicates that it didn't fail. It rather got sheared away from the aircraft skin. This infers that the door locking handle first got unlocked at its own and then the door flew off in the air by shearing off its hinges from the aircraft skin, as shown below:-



2.1.9 The Captain of the flight was interviewed at SIB after the occurrence. The Captain mentioned that they were flying a right hand circuit and approximately at the end of downwind, the audio warning blew which was subsequently followed by flying off of the rear left door. The reported evidence of location where the door was recovered from indicated that it flew off somewhere towards the end of downwind. In the absence of any technical abnormality with the door locking mechanism prior to take off and considering the data of such occurrences on DA-42 aircraft, the only possibility of such occurrence is that door was not locked properly prior to take off.

3. CONCLUSIONS

3.1 Findings

- 3.1.1 On 20 July 2018, during pre-flight inspection for a training flight, the crew missed out to check thoroughly the door lock position.
- 3.1.2 During flight at the end of downwind, an audible warning along with door open light appeared on PFD, and the door lock opened. This led to the opening of the door and its separation from aircraft body.
- 3.1.3 The flown off door and its locking handle were thoroughly examined and found without any technical anomaly.
- 3.1.4 The door locking handle was found in open position and bent because of impact on ground after the occurrence. However the door locking mechanism was found in a serviceable condition.
- 3.1.5 The aircraft skin / body adjoining the door hinges had indication of a sheared off condition.
- 3.1.6 As a consequence of the door flying off in the air, it caused damage by hitting the right engine cowl.

- 3.1.7 There had been similar cases of door detachment in the air in other countries but almost all the cases were due to improper locking (partial locking of the door) by the crew.
- 3.1.8 The pilot did not announce (during flight) the emergency situation to the ATC.
- 3.1.9 The operator did not report the incident contrary to the prescribed procedures.
- 3.2 **Cause of the Occurrence.** The passenger door flew off in the air because it was not properly locked and the crew missed out to check thoroughly door handle position during pre-flight inspection.

4. SAFETY RECOMMENDATIONS

- 4.1 The involved Flight Instructor is to undergo DA-42 aircraft normal & emergency procedures refresher training. The compliance report may be submitted to Directorate of Flight Standards CAA Pakistan upon completion, with intimation to SIB.
- 4.2 Directorate of Flight Standards CAA Pakistan may issue instructions to General Aviation flying units for compliance of OEM recommended procedures mentioned in QRH and regulatory procedures as per PCAA approved Ops Manual and to informing ATC of any in-flight incident / abnormal situations in order to alert the emergency services.
- 4.3 DDG (Reg) CAA Pakistan may issue instructions to all General Aviation Flying Units about timely reporting of occurrences / abnormal situations to CAA Authorities as per in-vogue procedures.