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CIVIL AVIATION AUTHORITY

AIRCRAFT INCIDENT INVESTIGATION M/S PIAC BOEING - 747 REG.NO.AP-BAT WHICH OCCURRED ON 19TH DECEMBER, 1995

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QUAID-E-AZAM INTERNATIONAL AIRPORT KARACHI.

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CIVIL AVIATION AUTHORITY
KARACHI, PAKISTAN

AIRCRAFT INCIDENT INVESTIGATION

INVESTIGATION REPORT: M/S PIAC BOEING-747 AIRCRAFT REG NO AP-BAT WHICH HAD AN INCIDENT ON 19TH DECEMBER, 1995 NEAR QIAP KARACHI

Authority:- Director General Civil Aviation Authority Memorandum No. HQ CAA/1901/199/SIB dated 21st December, 1995

COMPOSITION OF INVESTIGATION TEAM

(a)	Wg Cdr (Rtd) Sajjad Ahmed Technical Investigator,SIB, CAA	Investigator-in-Charge
(b)	Mr.Muhammad Ali Siddiqui Ops Investigator, CAA SIB	Investigator

1. AIRCRAFT INFORMATION

1.1. Aircraft type : Boeing -747

1.2. Reg.Mks. : AP-BAT

2. CREW INFORMATION

2.1 Pilot-in-Command

2.1.1. Name : Hassan Iqbal

2.1.2. Position in the cockpit : Captain

2.1.3. Date of Birth : 26-06-1947

2.1.4. Type of Lic and No : ATPL - No.434

2.1.5. Medical dt with status : 25-03-1996, Fit for ATPL. Subject to use of corrective glasses.

2.1.6. Rating

2.1.6.1. Type(s) held : C-150, F-27, B-707/720, A-300 and B-747

2.1.6.2. Type current : B-747

2.1.6.3. Flt.Instructor :

2.1.7. **Flying Experience**

2.1.7.1. Grand total : 15432.19

2.1.7.2. Total -in - Command : 8351.00

2.1.7.3. Total-in-Command on the type accident/incident occurred : 267.00

2.2. Co-Pilot

2.2.1. Name : Kamran Khan

2.2.2. Position in the cockpit : Co-Pilot

2.2.3. Date of Birth : 22-07-1957

2.2.4. Type of Lic and No : ATPL No.698

2.2.5. Medical dt with status : 14-11-1995. Fit for ATPL.

2.2.6. **Rating**

2.2.6.1. Type(s) held : C-150/152,F-27,B-707,B-737,A-300 and B-747

2.2.6.2. Type current : B-747 (Co-Pilot)

2.2.7. **Flying Experience**

2.2.7.1. Grand total : 8880.12

2.2.7.2. Total - in - Command : 2427.57

2.2.8. Total-in-command/ Co-Pilot on the type accident/incident occurred. : 1614.00

2.3 Flight Engineer's

2.3.1. Name : Syed Tahir Mehdi

2.3.2. Position in the cockpit : Flight Engineer

2.3.3. Date of Birth : 15-06-1948

2.3.4. Type of Lic and No. : Flt.Engr Lic No.126

2.3.5. Medical dt with status : 19-10-1995
(Fit for Flight Engineer Licence renewal. To use of bar defenders when exposed to noise. Audio metry & air check yearly)

2.3.6. **Rating**

2.3.6.1. Type(s) held : B-707/720-B/ Airbus, A-300/ DC-10

2.3.6.2. Type current : Boeing - 747

2.3.7. **Flying Experience**

2.3.7.1. Grand total : 10,304.00 hrs

2.3.7.2. Total -in - Command : 4030 approx Boeing-747

2.3.8. Where trained : M/s PIAC

3. **SUMMARY:**

3.1 On 19th December, 1995 M/s. PIAC Boeing-747 aircraft Reg No AP-BAT while operating PK-302/303 from Karachi to Lahore and back had an incident near QIAP Karachi. During taxi at Karachi the left escape slide warning light came 'ON'. The aircraft was stopped and on confirmation by the flight engineer after physical inspection that the escape slide fairing door was secured and the positive latch indicator was flushed the Captain decided to continue the flight. On landing at Lahore an entry to this effect was made in the technical log. The ground engineer after carrying out necessary checks and in accordance with the provisions of the DDPG (Despatch Deviation Procedure Guide) the warning light defect was carried forward to base station. Throughout the flight back to Karachi no abnormality was observed. However, during post flight inspection the left escape slide was found missing and minor structural damage was observed on the aircraft.

4. **INJURY TO PERSONS**

4.1. There was no injury to any passenger or the crew members.

5. **DAMAGE TO AIRCRAFT**

5.1. Minor damage to the aircraft was caused.

6. **OTHER DAMAGES**

6.1. None

7. **METEOROLOGICAL CONDITION**

7.1. The weather was fair and visibility was good.

8. **NAVIGATIONAL & LANDING AIDS**

8.1. Not relevant.

9. **COMMUNICATIONS**

9.1. Not relevant.

10. **AERODROME AND GROUND FACILITIES**

10.1. Not relevant.

11. **FLIGHT RECORDERS**

11.1. Not relevant.

12. **WRECKAGE & IMPACT INFORMATION**

12.1. Not relevant.

13. **FIRE**

13.1. No smoke or fire was caused due to the incident.

15. **TEST & RESEARCH**

15.1. The bayonets of the escape slide fairing door were sent to PNS laboratory Dockyard for metallurgical examination and the report on the subject is attached as exhibit ' G ' to this report.

16. **OBSERVATIONS**

16.1. There had been a total of 5 cases of inadvertent deployment of escape slide which have been reported to Boeing company so far (Refer exhibit 'H' to this report).

17. **WITNESSES**

17.1 Statement of witnesses are given in Exhibits 'J-1' to 'J-8' to this report.

18. **INVESTIGATION**

18.1. On 19th December, 1995 M/s PIAC Boeing-747 Reg No AP-BAT while descending at Karachi had an incident in which its left escape slide came out. The aircraft was operating PK-302/303 from Karachi to Lahore and back. Prior to departure at Karachi no discrepancy was observed; however, during taxi the left escape slide warning light came 'ON'. The Captain stopped the aircraft and directed the flight engineer to physically inspect the positive latch indicator and the escape slide fairing door. The flight engineer opened No 3 cabin door and inspected positive latch indicator and the fairing door. After it was confirmed by the flight engineer that escape slide door was closed and the latch indicator was flushed the captain decided to continue the flight. The warning light remained 'ON' throughout the flight and after landing at Lahore an entry to this effect was made in the technical log. The ground engineer cleared the subject entry after carrying out necessary checks and in accordance with the provisions given in para 52-1 page 2.52.1.0 of Dispatch Deviation Procedure Guide (Refer Exhibit 'A') the warning light defect was carried forward to the base station.

Throughout the flight back to Karachi the left escape slide warning light remained 'ON', but no other defect in the subject system was observed by the flight crews. However, during post flight inspection at Karachi the left escape slide was found missing and minor damage was observed on the upper surface of left inboard flap.

18.2. The aircraft had undergone check 'C' inspection from Ist to 19th December, 1995 during which the left escape slide was replaced which was a scheduled replacement (Refer exhibit 'B'). After the slide pack was replaced the system serviceability was again checked during post 'C' check ground run operation and the left escape slide warning light was validated to be in 'OFF' position. Additionally, on 19th December, 1995 during pre departure checks the light was observed to be in off position both by the ground engineers and the flight engineer (Refer exhibits 'J-1 to 'J-5').

18.3. The escape slide system installed in Boeing-747 aircraft Reg No AP-BAT is fairing mounted and the system consists of two slide packs on either (R/L) side of the aircraft. The two slide packs each side are stowed in the respective cabin door and wing fairing door. The fairing compartment is located in the fuselage wing root fairing aft of the main passenger cabin overwing entry door(Refer exhibits 'C1&C2'). The fairing door latching mechanism consists of four door latches and connecting rod assemblies attached to the latch slider is connected to the system integrator coupling shaft (Refer exhibit 'D'). Operation of the system integrator moves the latch sliders to latch or unlatch the door latches. A micro switch is secured to the door opening structure. Actuation of the switch, by forward movement of the door latch mechanism, illuminates a door warning light on the flight engineer's panel (P4). Additionally a positive latching indicator provided for each fairing compartment door latching mechanism is installed immediately forward of the aft door latch and provides external means to verify the latched or unlatched condition of the door latching mechanism. If the fairing door is in unlatched condition the positive latching indicator which is coloured red protrudes

through fairing skin above the door. The system is activated automatically with the escape ramp system activation (Refer exhibit 'E').

18.4 The fairing door latching mechanism consists of four latches attached to the latch sliders and four bayonets installed on the inner surface of the fairing door. When the door is closed the bayonets are held by the catchers in the latches (Refer exhibit 'D').

18.5. After installation of fairing escape slide pack and closing the fairing door, close-up inspection is performed through system integrator access door during which fairing compartment door latching mechanism system and the door is checked for proper locking as per the procedure given in Chapter 25-64-04 paras 6 to 8 page 407&408 of B-747 Maint Manual the details of which are given in exhibit 'F' to this report. Door open indicator light installed on flight engineer's panel (P 4) illuminates if the fairing door locking mechanism is faulty. However, in case the escape slide door warning system is inoperative and the fairing door is closed, locked, and secured in accordance with the manufacturer's recommended procedure given in chapter 25-65-04 of B-747 Maint Manual referred above then an aircraft can be released for flight under the provisions of chapter 52-1 item (d) page 2.52.1.0 of Dispatch Deviation Procedure Guide.

18.6. During scheduled replacement of fairing escape slide pack the bayonets of the fairing door were checked visually. Additionally, no rigging of bayonets/latches was carried out during 'C' check when the escape slide was replaced. It was observed that ground engineers correctly followed the procedure for installing the escape slide procedure contained in chapter 25-65-04 para 7 & 8 page 407 of B-747 Maintenance Manual (Refer exhibit 'F').

18.7. During examination of escape slide fairing door it was observed that while outer two bayonets were intact the inner two bayonets were sheared-off. The two sheared off bayonets were removed from the fairing door and were sent for

metallurgical examination to PNS Dockyard Laboratories Karachi the details of which are given in exhibit 'G' to this report.

18.8. Before the lab report is discussed it is pertinent to describe the construction of four bayonets which secure the fairing door. The bayonet top (T) is screwed in the bayonet bottom base (B) as shown in Exhibit 'D' & 'G' to this report. Once the bayonet top part is fully tight no thread on the bayonets shank is visible. Hence, if the bayonets are fully tight the unthreaded portion of the bayonet shank would normally come in contact with the catcher walls. Additionally, a small rectangular piece of flexible material placed in the slot of bayonet screwed portion ensures positive locking of the bayonet screw with the body.

18.9. In the metallurgical report following evidence has been brought out:-

(a) The sheared off surface of both bayonet screws had deposit of dark greasy material.

(b) At the time of fracture both bayonet screws were not fully tight and the male parts were inside the female part by 8 to 9 threads out of thirteen threads.

(c) Both bayonets sheared surfaces had evidence of fatigue failure.

18.10. From the evidence brought out in the lab report it is inferred that:-

(a) Both bayonets had developed cracks due to fatigue much before the time when the failure occurred. The deposit of blackish greasy substance on the bayonet sheared surface would occur in case the bayonet shank is already cracked through which penetration of greasy material would occur.

(b) Both bayonets were not screwed fully in at the time of fracture and were loose by four to five turns.

18.11. From the discussion above it can be argued with certainty that the fairing door was correctly secured during 'C' check. After installation of escape slide the system warning light was in ' OFF ' position which was also validated both by ground and air crews in the pre- departure checks. However, during taxi out the warning light came 'ON'. The inner two bayonets had already developed microscopic cracks which went undetected during visual examination when the escape slide was replaced. However, subject cracks propagated under structural load as aircraft was taxing under loaded configuration. The initial cracking of two inner bayonets Off-set the rigged position of the catcher and caused the light to illuminate which remained 'ON' throughout the flight. The ground engineer at Lahore during inspection carried out visual checks but failed to detect the discrepancy which existed in the two inner bayonets and took a wrong decision to carry forward the discrepancy to base station without conducting through investigation or obtaining advise from senior engineers at base station. On its way back to Karachi the cracks already existing in the two inner bayonets further propagated and finally when flaps were lowered prior to landing at Karachi the fairing door was exposed to intense pressure gradient due to change in camber of the wing. The cracked bayonets eventually sheared-off and the fairing door opened thereby the escape slide was dropped near Malir Cantonment Karachi. The air crew discovered about this mishap during post flight inspection at Karachi.

18.12. **CONCLUSION**

From the foregoing discussion it is concluded that fairing escape slide was deployed in air due to shearing off of two middle bayonets which were already cracked due to fatigue prior to take off from Karachi. At Karachi the air crew took a

wrong decision to continue the flight which was based on misinterpretation of of the provisions given in Chapter 52-1 page 2.52 .1.0 of DDPG under which an aircraft can be released for flight if the fairing door unsafe warning system is inoperative. Whereas, in subject case the system was operative and was giving correct warning which was erroneously judged to be faulty as if the system was inoperative and the aircraft was released for flight to Lahore.

18.13 Instead of checking the discrepancy thoroughly when it was reported at Lahore the ground engineer after carrying out security checks of the fairing door took a wrong decision based again on misinterpretation of the action recommended in Chapter 52-1 par page 2.52.1.0 of Dispatch Deviation Guide in case the warning system is inoperative; whereas, in subject case the warning light was 'ON' and the warning system was operative.

19. FINDINGS

The Board finds that:-

19.1. Documentation of the aircraft was in order.

219.2. The license of the air crews were appropriate and valid.

19.3. The left fairing escape slide was replaced during 'C' check in accordance with the manufacturer's recommended procedure on 4th December, 1995.

19.4. A visual examination of the bayonets and the allied area is carried out in the process of fairing escape slide pack replacement.

19.5. No quality inspector was involved in the accomplishment of subject job.

19.6 The left escape fairing slide door warning light on flight engineer's panel (P4) was validated to be off both by ground and air crews during pre- flight checks.

19.7. The left escape slide fairing door warning light came ' ON' during taxi at Karachi.

19.8. The Captain of the aircraft decided to continue the flight after it was confirmed by the flight engineer that positive latch indicator was flushed and left escape fairing door was closed. His decision to continue the flight was based on wrong interpretation of the provisions contained in chapter 52-1 page 2-52.1.0 of Despatch Deviation Procedure Guide which permits aircraft flight when the escape slide warning system is inoperative provided the fairing door is secured , flushed and locked. Whereas, in subject case the warning system was operative and was giving correct warning.

19.9. Throughout the flight the left escape slide door light remained 'ON' and the flight engineer made an entry to that effect in the technical log after landing at Lahore.

19.10. The ground engineer at Lahore after ascertaining that the left fairing door was secured and the positive latch indicator was flushed carried forward the discrepancy to the base station. His decision to release the aircraft was based on wrong interpretation of the provisions contained in Chapter 52-1 page 2.52-1.0 of Despatch Deviation Procedure Guide which permits flight in case the escape slide warning system is inoperative provided the fairing door is secured, flushed and locked.

19.11 Misinterpretation of the provisions of DDPG by air and ground crews referred in paras 19.8 & 19.9 above was done in good faith.

20. **CAUSES.**

The following are the causes of the incident:-

20.1 Wrong interpretation both by air and ground crews of the provisions given in Chapter 52-1 page 2.52.1.0 of Dispatch Deviation Procedure Guide.

20.2 Failure of the inner bayonet screws was due to fatigue.

20.3 Non involvement of quality control in the component change maintenance activity during schedule inspection.

21. RECOMMENDATIONS

21.1 Both air and ground crews should be briefed about the causes of the incident.

21.2 Quality control should be involved in all component change maintenance carried out during schedule inspection.