

ORIGINAL

NO.HQCAA/1901/234/SIB



CIVIL AVIATION AUTHORITY

KARACHI PAKISTAN

TYRE BURST INCIDENT INVESTIGATION IN RESPECT

TO M/S PIAC F-27 AIRCRAFT REG. NO.AP-ALW

OCCURRED ON 23RD OCTOBER, 1998

AT

TURBAT AIRPORT

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ON 23RD OCTOBER, 1998 AT TURBAT AIRPORT

Authority:- Director General Civil Aviation Authority
Memorandum No. HQ CAA/1901/234/SIB dated
30th October, 1998 (Appendix 'A')

Composition Of Investigation Team

- | | | |
|-----|--|-----------------------|
| (a) | Lt. Col. (Retd) Saleem Khan
C.M. Licensing, HQCAA | Investigator Incharge |
| (b) | Wg. Cdr. (R) Zia-ul-Haq
Ops. Engineer | Investigator |

1. AIRCRAFT INFORMATION

- | | | |
|------|--|--|
| 1.1. | Registration Marking | : AP-ALW |
| 1.2. | A/C type and makers Sl.
Nos. | : (FOKKER F-27) NSN-101087 |
| 1.3. | Engine types, airframe,
airframe positions and
makers serial Nos. | : DART 532-7E : No. 1 - 8273 At Time of
The Incident
No.2 -13124 |
| 1.4. | Certificate of Registration
No. and validity. | : S/No 275 / (Rev-I) |
| 1.5. | Certificate of Airworthiness
No. and date of expiry, and
flight manual No. | : UP TO 17-10-1999
CAA-251 (Rev-II) |
| 1.6. | Certificate of safety date and
time (GMT) of issue and
period of Validity | : 03-10-1998
(21 DAYS OR 125 HOURS) |

- 1.7. Date of construction of Airframe. : 1961.
- 1.8. Name and address of owner. : PIAC KARACHI AIRPORT
- 1.9. Gross Weights. Maximum permitted by C of A for this flight, at the time of accident. : 42000 LBS
1915 K.G.
- 1.10. Loading Center of gravity limits in C of A. for this flight, at the time of accident and commencement of flight. : Not Available
- 1.11. Airframe history. (Give flying times since manufacture, last overhaul and last periodic check. list also essential modifications completed. : TAFE=73676-35, LDG=83777
CHECK-D C/OUT on 15-08-1995.
TAFH=68090-26, LDG=77475
CHK-2C, TAFH=71900-23, LDG=81915
- 1.12. Engine history. (Give flying time since manufacture, last overhaul and last periodic check. list also essential modifications completed) . :

S/No.	TSN	TSO
CSO		
No.1 8273	49573-42	1486-44
	1300	
No.2 13124	125056-45	2199-20
	2887	

(AT THE TIME OF INCIDENT)

2. CREW INFORMATION

- 2.1. **Pilot-in-Command** :
- 2.1.1. Name : Nadeem Ahmad Chaudhry
- 2.1.2. Position in the Cockpit : Left hand seat
- 2.1.3. Date of Birth : 09-08-1962
- 2.1.4. Type of Lic. and No. : ATPL NO. 1007
- 2.1.5. Medical date with status : 20-08-1998
- 2.1.6. **Rating**
- 2.1.6.1. Type(s) held : F-27, S.E. PIST, A.310
- 2.1.6.2. Type Current : F-27

2.1.6.3. ssist/Flight Instructor : -
Rating.

2.1.6.4. Check Rating : -

2.1.7. Flying Experience

2.1.7.1. Grand total : 4620.51

2.1.7.2. Total -in - Command : 825.24

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

2.1.8 Where trained. : PIAC

2.1.9 Date of joining the organization : 26-12-88

2.2. CREW INFORMATION

2.2.1. First Officer

2.2.1.1. Name F/O : Tariq Mohsin

2.2.1.2. Poosition in the Cockpit : Right hand seat

2.2.1.3. Date of Birth : 30-12-74

2.2.1.4. Type of Lic and No : CPL No. 1938

2.2.1.5. Medical date with status : 06.11.98 Class I

2.2.1.6. Rating

2.2.6.1. Type(s) held : -

2.2.6.2. Type current : F-27

2.2.1.7. Flying Experience

2.2.7.1. Grand total : 750.39

2.2.7.2. Total -in - Command : 544.43

2.2.7.3. Total as Co-Pilot on : -
the type accident/
incident occurred.

2.2.8. Where trained. : PIAC

2.2.9. Date of joining. : 03.03.96

3. SUMMARY OF ACCIDENT

3.1 On 23rd October, 1998 PIAC Fokker (F-27) aircraft Reg. No. AP-ALW Operating PK-552, had an incident at Turbat in which its port-inner tyre burst during landing. The aircraft was operating a routine flight from Panjgur. Prior to Flight PK-552, the aircraft had operated normally from Karachi to Panjgur the same day. The Pilot reported that after touch down at Turbat, the First Officer, who was on the controls, felt the aircraft pull to the right. A correction was applied to counter the tendency. The normal procedure of first pulling throttles to GROUND FINE and then applying brakes was deviated from and both these actions were taken simultaneously. Vibrations were felt and the Captain took over the controls. After the aircraft came to a stop, on visual inspection from the cabin window, it was revealed that the port (Left) inner tyre had burst. PIA engineering staff was called for advise by the Captain. On clearance from them, the Captain taxied the aircraft back to the tarmac under its own power. The matter was reported and the aircraft was recovered the next day after a change of tyres at Turbat.

4. INJURY TO PERSONS

4.1 There was no injury to any person or member of the crew.

5. DAMAGE TO AIRCRAFT

5.1 One tyre had burst while the other three tyres of the main landing gears had flat spots. All four tyres were rendered beyond repairs.

6. **OTHER DAMAGES**

6.1 None

7. **METEOROLOGICAL CONDITIONS**

7.1 The weather was fair, visibility was good, the wind was light and variable.

8. **NAVIGATIONAL & LANDING AIDS**

8.1 Not relevant.

9. **COMMUNICATIONS (INCLUDING RADIO COMMUNICATION)**

9.1 Not relevant.

10. **AERODROME & GROUND FACILITY**

10.1 Not relevant.

11. **FLIGHT RECORDERS**

11.1 Copy of the FDR is attached as Appendix 'D' to this report.

12. **WRECKAGE & IMPACT INFORMATION**

12.1 Not relevant.

13. **FIRE**

13.1 No fire was caused in the incident.

14. **SURVIVAL ASPECTS**

4.1 Not a factor in the incident.

15. **TEST & RESEARCH**

15.1 Maxaret Units of the aircraft were bench-tested in the PIAC pneumatic shop and found to be functioning within their normal parameters. Report of bench tests are attached at Appendix E1-E4 to the report.

16. **OBSERVATIONS**

16.1 The aircraft had operated from Karachi to Panjgur (PK-521) before it took off from Panjgur for Turbat.

16.2 The maxaret unit was checked at Panjgur before take off and found satisfactory. The wheels rotation at take off from Panjgur was also satisfactory.

17. **INVESTIGATION**

17.1 During landing at Turbat on 23rd October, 1998 M/S PIAC'S F-27 Fokker Reg. No. AP-ALW had a tyre burst incident while operating Flight PK-552. Before this landing the same aircraft had landed un-

eventfully at Panjgur. The maxaret unit was found functional when checked at Panjgur before take off. The approach seemed to be normal at bug plus fifteen knots while the bug was at 95 knots. The aircraft made a positive touch down about 700/800 feet down R/W 08.

- 17.2 The tyre marks of both the sides were vividly discernible to the inquiry team, which visited Turbat about a week after the incident Appendix 'B'.
- 17.3 The tyre marks of the left tyres were very dark and almost continuous for the first 1200 feet after touch down.
- 17.4 The direction of the left wheel marks were roughly 084°.
- 17.5 The right side tyre marks originated at about 45 – 50 feet ahead of the left tyre marks.
- 17.6 The right tyre marks also indicate being rubbed deeply against the runway surface almost continuously after touch down.
- 17.7 The direction of the right tyre marks was also about 084°.
- 17.8 The left inner tyre burst mark was evident abeam the 1000' marker (5000' Remaining)
- 17.9 On visual inspection the left inner tyre was found burst.
- 17.10 All four tyres were found with flat spots at one point only.
- 17.11 The aircraft taxied back to the tarmac under its own power and the R/W was not blocked for any appreciable length of time.
- 17.12 The tyre marks also indicated a touch down in a slight crab to the right of the runway heading.
- 17.13 This fact is also accentuated by the FDR which indicates frequent heading changes on the final approach (Appendix 'D6').

17.14 As per the incident report (App. 'C') emergency brakes were in the 'OFF' position and found wire locked.

17.15 Maxaret units were checked thoroughly in the PIA's pneumatic work shop and all four were found functioning within their normal parameters Appendix 'E1- E4'.

17.16 All brake assemblies were checked in PIA's workshop and found within normal functional limits. The report, however, indicated a binding of piston of all brake assemblies. This aspect was gone into by the investigation team and wheels locking due to a binding of piston/pistons was ruled out. Brakes assembly report is attached at Appendix 'G1 - G4'.

18. **WITNESSES**

18.1 Statements of witnesses is placed at Appendix 'L1-L4'.

19. **ANALYSIS**

19.1 Basically there can only be two reasons for locked wheels :-

(a) Operational Reasons

(b) Technical Reasons

20. **OPERATIONAL REASONS**

This aspect of locked wheels on landing pertains to pilot action in the air or immediately on landing.

20.1 In case, for the purpose of teaching a co-pilot, the Captain operates the emergency brakes in the air the wheels will get locked. To avoid inadvertent use of the emergency brakes, the emergency brake knob is wire locked. If used in the air for instruction purposes as

mentioned earlier, the only way to unlock such a jammed wheel situation is to pump the brakes a few times after putting the emergency brake lever to the off position. In this case, according to the incident report, the wire lock of the emergency brake knob was found in-tact after the incident. This possibility was, therefore, considered but negated as it was not supported by evidence. Incident report to this effect is attached at Appendix 'C' to this report.

20.2 A possibility of the pilot coming up on the brake immediately after touch down was also considered. This was discussed in view of the fact that on modern aircraft a 'brakes-on' touch down can be made and no damage to the wheel/tyres would occur unless the anti-skid is either disconnected or unserviceable. The normal pattern followed in PIAC is that pilots fly as first officers on wide body aircraft and are then promoted captains on Fokker. Having come from an advanced technology machine to the basic aircraft, the tendency of operating with the same technique as could be practiced with the wide bodied aircraft could not be ruled out altogether. Having considered it and finding it not collaborating with a statement to support the contention, this factor of landing with brakes on was also negated.

21. TECHNICAL REASONS

A detailed Analysis of the brake system was carried out to determine the reason for the tyre burst. The important point to note was that all the four tyres had the flat spots indicating that the wheels were locked at the time of touch down. The layout of the brake system is placed as Appendix 'H'. This indicates that the components which constitute the brake system are:-

- a) Metering valve.
- b) Rapid Exhaust valve.
- c) Maxaret Unit
- d) Brake Assembly
- e) Emergency control knob.

Each of the above component was functionally checked for serviceability.

21.1 Malfunction of Brake Assemblies

All the four brake assemblies were taken to the shop and visual as well as functional checks were carried out. The brake assemblies were found to be serviceable and thus the possibility of this malfunction was ^{eli}minated. The shop investigation reports are placed at Appendix "G1-G4".

21.2 Maxaret Units

All the maxaret units were tested in the shop to check their functional status. The units were tested for leakage, flow rate, run on time and delay time. No defect was noticed in the component and flow rate as well as delay time and run on time were found to be within Maintenance Manual limits specified, shop reports are placed at Appendix 'E1-E4'.

21.3 Rapid Exhaust Valve.

This component is used to relieve line pressure quickly when ever pressure from brake pedals is removed. The malfunction of this component would delay the brake release but could not cause brake application. This component was also tested in the shop for serviceability and function. The component was found serviceable and all parameters were within limits. The test report is placed at Appendix 'F'.

21.4 Emergency Brake Application

The possibility of emergency brake application was also considered. The tyres could burst if emergency brakes were applied since it by passes the regulatory valve. This possibility was eliminated because the emergency handle was found to be wire locked, indicating that Emergency Brake was not applied. Incident report placed at Appendix C.

22. FINDINGS

- 22.1 The aircraft was on a scheduled flight from Karachi to Punjgur, Turbat and back to Karachi.
- 22.2 The aircraft was serviceable when it took off from Karachi on 23rd October, 1998.
- 22.3 The flight from Karachi to Punjgur and again from Punjgur to Turbat was uneventful.
- 24.4 The wind at Turbat was light and variable, while the visibility was good.
- 22.5 Landing at Turbat was carried out by the first officer.
- 22.6 The aircraft made a positive touch down at Turbat in a crab to the right.
- 22.7. Tyre marks indicated deep rubbing of both the wheels from the touch down to about 1200 feet down the runway.
- 22.8. The aircraft remained on the runway after landing.
- 22.9. Due to rubbing action of the tyres on the runway all four tyres of the main landing gears had one flat spot each.
- 29.10. The port inner tyre was found burst.
- 29.11. The emergency brake handle was found wire locked when checked immediately after the incident.
- 22.12. No malfunction or damage occurred to brake assemblies and they were found serviceable when tested in the pneumatic shop.
- 22.13. The Maxaret units were found serviceable.
- 22.14. The rapid exhaust valve was found serviceable.

23. **CAUSE(S)**

23.1. The cause of the tyre burst could not be determined.

24. **Recommendations**

24.1. PIAC should re-emphasize the use of correct landing technique and adherence to the laid down policy by the pilots more rigidly at short airfields.

24.2. PIAC may consider the possibility of having an Engineer Support Unit at Turbat to avoid delay/night stays.

24.3. In view of the high frequency of traffic at Turbat, CAA may take up a study of installing a communication recording facility at Turbat.



2



TYRES AS VIEWED FROM THE AIRCRAFT REAR
LEFT OUTER, LEFT INNER, RIGHT INNER, RIGHT OUTER.



LEFT TYRE MARKS AT TOUCH DOWN

3



RIGHT TYRE MARKS AT TOUCH DOWN



4

LEFT TYRE MARKS UPTO POINT OF BURST



LEFT INNER TYRE BURST POINT