

ORIGINAL

NO.HQCAA/1901/218/SIB



CIVIL AVIATION AUTHORITY

**INCIDENT INVESTIGATION REPORT IN RESPECT
OF M/S BHOJA AIR YAK-42D AIRCRAFT REG.NO.LY-AAV**

WHICH OCCURRED ON 14TH MARCH, 1997

AT

**ISLAMABAD INTERNATIONAL AIRPORT
ISLAMABAD**

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CIVIL AVIATION AUTHORITY
KARACHI, PAKISTAN

INVESTIGATION REPORT: INCIDENT TO M/S BHOJA
AIRLINES (PVT) LTD YAK-42D AIRCRAFT REG NO. LY-AAV
OCCURRED ON 14TH MARCH, 1997

Authority:- Director General Civil Aviation Authority
Memorandum No. HQ CAA/ 1901/218/SIB dated 19th
March, 1997 (Refer Appendix 'A')

Composition Of Investigation Team

- | | | |
|-----|--|-----------------------|
| (a) | Air Commodore(Retd)
Rashid A. Bhatti
Pilot Investigator, SIB | Investigator Incharge |
| (b) | Wg Cdr (R) Sajjad Ahmed
Technical Investigator, SIB CAA | Investigator |

1. AIRCRAFT INFORMATION

- | | | |
|------|---|---|
| 1.1. | Aircraft type | : YAKOVLEV-42,
SNO. 4520424711399 |
| 1.2. | Reg. NO. | : LY-AAV |
| 1.3. | Engine types, airframe
positions & S.Nos. | : D-36, THREE AFT MOUNTED,
LEFT N 2253601201102
MIDDLE N7083601801001967
RIGHT N-2253603701095 |
| 1.4 | Certificate of Registration | : N00096 ISSUED BY LITHUANIAN
CIVIL AVIATION AUTHORITY
07.02.1992. NO TERMINATION |
| 1.5 | Certificate Of
Airworthiness No. & date
of expiry, and flight
manual No. | : N00096, ISSUED BY LITHUANIAN
CAA ON 15.11.93 DATE OF
EXPIRY 19.08.97 FLIGHT
MANUAL NO. N 1308. |

- 1.6 Certificate of Safety date : Valid.
& time (GMT) of issue and
period of validity.
- 1.7 Date of construction of : 13TH DECEMBER, 1987.
airframe.
- 1.8 Name address of Owner. : LITHUANIAN AIRLINES
A. GUSTAICIO. VILNIUS 2032,
LITHUANIA.
- 1.9 Airframe history. Give : 12757 FLIGHT HOURS SINCE
flying times since NEW, 7534 CYCLES SINCE NEW
manufacture, last over- PERIODIC CHECK 07.03.97
haul and last periodic (12650 FL.H, 7456CYC.) AN
check. OVERHAUL WAS DONE ON
15.05.1996.
- 1.10 Engine history. (Give : LEFT: 2532 F.H/1456 CYC SINCE
flying time since OVERHAUL 7025 F.H SINCE NEW
manufacture, last MIDDLE: 617 F.H/404 CYC.
overhaul and last periodic SINCE OVERHAUL 7508 F.H
check. List also essential SINCE NEW RIGHT: 2850
modifications completed). F.H/1702 CYC. SINCE
OVERHAUL 8403 F.H SINCE
NEW.
- 1.11 Gross Weights. Maximum : 56500 KGs.
permitted by C of A for
this flight, at the time of
accident.
- 1.12 Accessory history. (Give : ANTI-SKID SENSORS UA-58-9,
details of operating life UA-58-10 MAINTENANCE ON
and operating time since CONDITIONS, NO LIFE-LIMITS.
manufacture and INSTALLED BY AIRCRAFT
overhaul). MAKER, NO OVERHAUL IS
DONE.
- 1.13 Defects. (List and remark : ANTI-SKID SYSTEM OF LEFT
upon any technical defect AFT MAIN WHEELS WAS FOUND
in airframe engines or FAULTY.
accessories, discovered
during investigation.)

/1.14

- 1.14 Loading, centre of gravity : 46.%
limits in c of a and centre
of gravity position at the
time of incident and
commencement of flight.

2. CREW INFORMATION

2.1 **Pilot-in-Command**

- 2.1.1. Name : MR. VLADIMIR BAGAJEV
- 2.1.2. Position in the : LEFT COCKPIT.
Cockpit.
- 2.1.3. Date of Birth : 15-12-1958
- 2.1.4. Type of Lic and No : AT N 070
- 2.1.5. Medical date with : 01.02.1997 FIT FOR RENEWAL
status. OF ALTP
- 2.1.6. **Rating**
- 2.1.6.1. Type(s) held : AIRCRAFT YAK-42
- 2.1.6.2. Type current : AIRCRAFT YAK-42
AIRCRAFT YAK-42
- 2.1.6.3. Flt. Instructor :
rating. NIL
- 2.1.7. **Flying Experience**
- 2.1.7.1. Grand Total : 7377
- 2.1.7.2. Total -in - : 2950
Command
- 2.1.7.3. Total -in - : 2950
Command
on the type
accident/
incident
occurred

/2.1.8.

2.1.8. Where trained : VILNIUS LITHUANIA
2.1.9. Date of Joining : 1ST DECEMBER 1980
the organization.

2.2 Co-Pilot

2.2.1. Name : MR. IVAN BOGOLOUSRICH
2.2.2. Position in the : RIGHT SEAT
Cockpit
2.2.3. Date of Birth : 29TH AUGUST 1958
2.2.4. Type of Lic and No : CPL NO. KA-178
2.2.5. Medical date with : 13TH MARCH 1997 FIT FOR
status RENEWAL OF CPL/ALTP.

2.2.6. Rating

2.2.6.1. Type(s) held : YAK-42
:
2.2.6.2. Type current : YAK-42
2.2.6.3. Flt. Instructor : NIL
rating.

2.2.7. Flying Experience

2.2.7.1. Grand total : 5350
2.2.7.2. Total -in - : NIL
Command
2.2.7.3. Total -in - : NIL
Command
on the type
accident/
incident
occurred

2.2.8. Where trained. : VILNIUS LITHUANIA

/2.2.9.

2.2.9. Date of Joining the : 1984.
organization.

2.3 Flight Engineer

2.3.1. Name : MR. ERNESTAS GASPARONIS

2.3.2. Position in the : Flight Engineer
Cockpit

2.3.3. Date of Birth : 14.03.1953

2.3.4. Type of Lic and No : C.A FLIGHT ENGINEER SI NV
006

2.3.5. Medical date with : FLIGHT ENGINEER'S LICENCE
status. BOARD

2.3.6. Rating

2.3.6.1. Type(s) held : YAK-42

2.3.6.2. Type current : YAK-42

2.3.7. Flying Experience

2.3.7.1. Grand Total : 8320 Hrs.

2.3.8. Where trained. : VILNIUS LITHUANIA

2.3.9. Date of Joining : 1978
the organization.

3. INTRODUCTION

3.1. On 14th March, 1997 M/s Bhoja Airlines (Pvt) Ltd aircraft Reg No. LY-AAV operating flight No. 0042 from Lahore to Islamabad had tyres burst incident during landing at Islamabad. Soon after touch down at Islamabad the pilot felt that the aircraft had tendency to pull to the right and comparatively more pressure was required on the left brake pedal to keep the aircraft on the center line of the runway. After stopping the aircraft on the runway the pilot reported /that

that he was unable to taxi the aircraft as three tyres of left main landing gear were burst. All passengers evacuated through normal exit door; however, the runway remained blocked for about forty minutes.

4. INJURY TO PERSONS

4.1. Nil.

5. DAMAGE TO AIRCRAFT

5.1. No damage was caused to the aircraft.

6. OTHER DAMAGE

6.1. Nil.

7. METEOROLOGICAL CONDITIONS

7.1. Not relevant to incident.

8. AIDS TO NAVIGATION

8.1. Not relevant.

9. COMMUNICATION

9.1. Not relevant.

10. AERODROME AND GROUND FACILITIES

10.1. Not relevant.

11. FLIGHT RECORDER

11.1. The DFDR analysis report is attached as appendix 'C' to this report.

/ 12.

12. **FIRE**

12.1. No fire was caused due to the incident.

13. **SURVIVAL ASPECT**

13.1. All passengers evacuated the aircraft safely and no person was injured as a result of the incident.

14. **TEST AND RESEARCH**

14.1. Tests on Anti-skid system placed at Appendix 'D'

15. **WITNESSES**

15.1. Statements of Witnesses are given in Appendix 'G' to this report.

16. **INVESTIGATION**

16.1. On 14th March, 1997 M/s Bhoja Airlines (Private) Limited Reg No. LY-AAV operating flight No. 0042 Karachi-Lahore-Islamabad had a tyre burst incident at Islamabad during landing. The pilot observed no abnormality while taxiing and take-off at Lahore for Islamabad. The wind reported at Islamabad was 140 degrees, 10 knots and runway-12 was in use. After touch down the pilot observed that the aircraft had tendency to pull to the right and had to compensate by applying left rudder and nose wheel steering. Additionally, comparatively more pressure was required on left brake pedal to keep the aircraft on the centre line. After the landing roll the aircraft stopped about 9000 feet down the runway; however, the pilot was unable to taxi the aircraft. On being informed by flight engineer that three tyres of left main landing gear were burst the pilot evacuated the passengers using normal exit door and the aircraft was cleared from the runway after about 40 minutes.

16.2. Captain of the aircraft Mr. Bagajev Vladimir in his statement reported that gusty wind conditions prevailed at the time of
/landing

landing at Islamabad and the aircraft touch down speed was about 200 KPH. Additionally, soon after touch down the pilot had to apply comparatively more pressure on left brake pedal to keep the aircraft on the center line of the runway. Tyres marks on the runway displayed evidence of wavy pattern with drifting tendency to the right. Refer Appendices 'B7 to B9' to this report.

- 16.3. The 3 tyres of left main landing gear which were burst displayed evidence of flattened area of tread leaving a knot in the wood' type effect and scuffed appearance. Additionally, the slippage marks on all tyres were dislocated and all tyres had evidence of disfigurement. Refer appendices' B1 to B6 to this report.
- 16.4. The DFDR of the aircraft was sent to Lithuania and the analysis report brought out following important points :-
 - (a) At the time of landing the aircraft was maintaining speed in the range of 220-230 KPH.
 - (b) After touch down at 19:22:40 hrs PST while decelerating from 220 to 120 KPH the aircraft made directional changes which increased significantly as aircraft decelerated from 96 to 80 KPH.
- 16.5. A copy of the DFDR analysis report in Russian language with part-English translation is attached as appendix 'C' to this report.
- 16.6. The antiskid system sensors switches of the left main landing gear rear wheels were sent to Lithuania and the test report was received on 27th January, 1998. The test report analysis has brought out that the antiskid system brake releasing mechanism was found faulty due to material failure of induction valve from rocker body which restricted drop of hydraulic pressure from brakes even when brake pedals were released thereby rendering the wheels in locked position. The test carried out on the antiskid system components at State Centre of Flight Safety Air Transport Moscow are given in Report No. 8131-N/103 which is attached as appendix 'D' to this report.

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17. ANALYSIS

17.1. Aircraft Status. On 26th February, 1997 periodic check (F-42) was carried out on the aircraft in accordance with Maintenance Programme issued by Yakovlev's authority and approved by Lithuanian Civil Aviation Authority. During subject check anti-skid system operation was found satisfactory. Additionally, the aircraft maintenance historical record had no evidence of malfunction of aircraft brakes and antiskid system after the periodic check and prior to the incident. Moreover, the pilot operating Flight No. 0042 on 14th March, 1997 (Karachi-Lahore-Islamabad) observed no discrepancy in terms of brakes binding or aircraft pulling during taxi/take off/landing phase at Karachi and Lahore. Therefore, the Board is of the opinion that prior to the incident the aircraft brakes and anti-skid system operation was satisfactory.

17.2 Landing at Islamabad. The Captain stated that initially the wind reported by Islamabad ATC was 230/16 knots and runway-30 was in use. However, when the aircraft was 30 miles short of Islamabad the ATC reported wind changing direction to 140 degree and gusting to 30 knots and runway -12 was in use. Additionally, 4 miles short of runway the ATC reported winds at 140 degrees blowing at 10 knots and runway-12 was declared for landing. The weather report (PAF Form 2309) issued at 1900 and 2000 hrs on 14th March, 1997 by PAF Chaklala reported wind blowing at 230 degrees at 16 and 18 knots respectively (Refer appendices 'E1' & 'E2'). Moreover, the pilot stated that he felt strong cross wind at about 20 knots with light tail wind component and the aircraft touched down at about 200 KPH which is validated by the DFDR report. The Board is of the view that under the circumstances the pilot followed the correct procedure in order to keep the aircraft aligned with the centre line of the runway. However, due to strong cross wind the aircraft slightly drifted on right side of the centre line of the runway during initial phase of the landing roll and subsequently due to tyre burst the aircraft displayed directional change as reported in the DFDR report.

17.3. Tyres Burst. Three tyres of left main landing gear were burst during landing at Islamabad. The evidence on two rear tyres surface indicated considerable surface rubbing leaving

/a

a 'knot in the wood' type effect. The third tyre had disfigurement due to lateral rubbing and subsequent wear. The Board is of the opinion that the two rear tyres remained locked after the pilot applied brakes and eventually due to extensive wear the rear tyres of left main landing gear exploded. Subsequently, due to over loading and lateral rubbing the left forward inner main landing gear tyre also was burst. However, the tyres burst sequence occurred in the far later part of the landing roll at low speed prior to aircraft came to dead stop on the runway.

- 17.4. Antiskid System Keeping the evidence of locking on the two rear tyres of left main landing gear the antiskid sensors YA-58-10 No.42050428 and YA-58-09 No.42050255 of aft left main landing gear antiskid system were sent for investigation to Moscow. Sensor No.42050255 and No.42050428 were manufactured on 16th and 18th August, 1995 respectively and were installed on aircraft on 15th October, 1995. These sensors are replaced on condition.
- 17.5. According to the investigation report NO. 81-31-N/103 prepared by State Centre of Flight Safety Air Transport Moscow the antiskid system of the rear pair of wheels was found faulty. In that due to material failure of induction valve from rocker valve the cam shaft of antiskid system resulted in blockage of valve operation in the reverse regime thereby restricting drop of brake pressure when brake pedals were released. A copy of investigation report is attached as appendix 'D' to this report.
- 17.6. Keeping evidence of rubbing observed on two rear tyres (Refer Appendices 'B1 to B6') after the incident and faulty antiskid system of the left rear main wheels the Board is of the opinion that two rear left main landing gear tyres were locked during landing roll at Islamabad due to faulty antiskid system caused by material failure of camshaft No. YA51-034 which restricted drop of brake pressure when brake pedals were released.

18. FINDINGS.

- 18.1. On 14th March, 1997 M/s Bhoja Airlines (Pvt) Ltd
/YAK-42

YAK-42 aircraft Reg No. LY-AAV while operating Flight No. 0042 from Lahore to Islamabad had a tyres burst incident at Islamabad Airport in which three left main landing gear tyres were burst.

- 18.2. Prior to subject flight the aircraft had operated from Karachi to Lahore on the same day.
- 18.3. No discrepancy was observed by the Captain during taxi/take-off at Karachi and landing/taxi/take-off at Lahore before subject incident.
- 18.4. Captain Bagajer Vladimir was on the controls at the time aircraft executed landing at Islamabad.
- 18.5. The weather was fair with gusting winds blowing at 140 degrees at 20 knots and runway 12 was in use.
- 18.6. Soon after touch down at Islamabad under the circumstances the pilot applied correct technique to maintain directional control of the aircraft i.e. using left rudder and nose wheel steering. After touch down at about 200 KPH the aircraft displayed drifting tendency to right while decelerating from 96 to 80 KPH and the aircraft stopped on right side of the centre line of the runway.
- 18.7. After stopping on the runway the pilot was unable to taxi the aircraft due to left main landing gear tyres burst and the runway remained blocked for about 40 minutes.
- 18.8. Both rear tyres that were burst displayed evidence of rubbing caused by locking of wheels.
- 18.9. The forward left inner main tyre which was burst displayed evidence of lateral rubbing and disfigurement.
- 18.10. The aircraft antiskid system had no history of maintenance discrepancy after major inspection (F-42) carried out on 26th February, 1997.
- 18.11. The antiskid system of rear pair of wheels of left landing gear was found faulty. In that due to material failure of camshaft No. YA51-034 the drop of brake pressure was restricted in the return hydraulic line which resulted in locking of wheels even when brake pedals were released.

/ 19.

19. **CAUSES**

- 19.1. Malfunction of aircraft left rear main wheels anti-skid system resulted in locking of rear wheels during the landing roll.
- 19.2. Material failure of camshaft NO. YA51-034 of rear wheels antiskid system restricted drop of brake pressure even after brake pedal were released thereby resulting in locking of left main landing gear rear wheels.
- 19.3. Poor quality control during the manufacture of antiskid camshaft Pt No. YA51.034.

20. **RECOMMENDATIONS**

- 20.1. The manufacturer of antiskid system Kamensk Ural Factory in Russia must ensure proper Quality Control of camshaft Part No. YA51.034 of YA-58 anti-skid system used on YAK-42 aircraft.



REAR TYRE

NOTE: RUBBING EVIDENCE - SLIPPAGE, MARK MISALIGNMENT



REAR TYRE ANOTHER VIEW

NOTE: RUBBING EVIDENCE & 'KNOT IN THE WOOD' MARK



REAR TYRE : RUBBING MARK DUE TO WHEEL LOCK
NOTE - KNOT IN THE WOOD TYPE EVIDENCE



REAR TYRE : KNOT IN THE WOOD TYPE
EVIDENCE (ANOTHER VIEW)



LEFT MLG FORWARD WHEEL
NOTE: * LATERAL RUBBING MARKS
* DISFIGUREMENT



FORWARD WHEEL
NOTE: NOTE LATERAL RUBBING MARKS

APP. B7



LEFT MLG TYRE MARKS BETWEEN 4000 TO 5000 FEET
FROM THE STOPPING POINT OF A/C

APP. B8



TYRE MARKS BETWEEN 500 - 1000 FEET BEFORE THE
STOPPING POINT OF A/C

NOTE: WAVY PATTERN OF LEFT TYRE.



TYRE MARKS OF RT MLG TYRES ABOUT 2000 TO 3000 FEET
FROM THE STOPPING POINT OF A/C.