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INCIDENT TO PIA AIRBUS AIRCRAFT
AP-BAX ON 26-2-1983 AT KARACHI AIRPORT

AUTHORITY: CAA/1901/16/FS dated 28- 2-1983.

I: INVESTIGATION

1. Incident Details.

- 1.1. Location.
Karachi Airport.
- 1.2. Date & Time.
26-2-1983-0917Z
- 1.3. Type of Flying.
Schedule.
- 1.4. Object of Flight.
Schedule Flight PK-304.

2. Aircraft Information.

- 2.1. Aircraft Type and Manufacturers Serial No.
Airbus Aircraft A300-B4 (S.No.096)
- 2.2. Registration Marking.
AP-BAX.
- 2.3. Engine Type, Installation and Manufacturers Serial No.
GE: CF6-50E Engines.
- 2.4. Propeller Type.
N/A.
- 2.5. C of R.
No. 547.
- 2.6. C of A.
No.500 (valid)
- 2.7. C of M.
Valid
Issued on 8-2-1983 valid upto A/F hrs 8193-37
At incident: A/F hrs 7338
- 2.8. Date of Construction of Airframe.
February, 1980.
- 2.9. Owner.
M/s. P.I.A.C. Karachi.
- 2.10. Max Gross weight permitted.
1,65,000 Kg.
- 2.11. Weight at the time of incident.
1,36,087 (Ref Trim sheet at Appendix 'A')
- 2.12. C of G.
1.2. Nose up corresponding to 26.01%(Normal limits 18 to 33%)

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2.13. History of Airframe.

Aircraft purchased by P.I.A. in new condition since its manufacture in February, 1980 and inducted into service on 11-3-1980.

2.13.1. Hours Since New.

A/F 7338 hours.

2.13.2. Hours Since last overhaul.

Progressive Maintenance.

2.13.3. Hours Since last periodic inspection.

145 hrs.

2.13.4. Modification Status.

O.K.

2.13.5. Recent History of Airframe Defect.

Nil.

2.14. History of Engines.No.1.No.2.

2.14.1. Serial No. _____

517-616

455-932

2.14.2. Hours since new. _____

8876

6183

2.14.3. Hours since last overhaul _____

2964

3798

2.14.4. Hours since periodical inspection.

Same as above

Same as above

2.14.5. Modification.

Upto date

Upto date

2.14.6. Recent history of engine defects.

Nil

Nil

3. Crew Information.

Name of Crew Member	Duty	Age	Licences and Ratings				Total	Experience	
			Type	No	Expiry Date			Total	On Type With in 90 Days
1. Mr. Mansoor Malik	Pilot	42	ALTP	321	4.8.83		9231	774	121
2. Mr. Imran Usman	Copilot	31	C.P.L	741	11.3.83		2794	255	146
3. Mr. Asif Hayat	Flt. Engr.	32	F.E.L	146	24.7.83		3500	1200	130

32. Address of crew members.

C/o. P.I.A.C.

Flight Operation Karachi.

4. History of Flight.

On 26.2.1982 (PK-304) Airbus Aircraft AP-BAX Taxied out from Bay No.11 at Karachi Airport for runway 25.R for departure to Lahore. Near T.O. Point, brake hot temperature (400°C) was noticed and Pilot decided to

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return to ramp. On half way back, explosion occurred and its No.1 tyre burst and dislodged completely from the aircraft. After parking on ramp, No.1 Brake assy caught fire which was latter extinguished promptly by CAA Fire Section.

5. Injury to persons:

Nil

6. Damage to Aircraft. (As per CA-31 incident report (Appendix 'K') submitted by PIA).

6.1. Primary Damage.

No.1 wheel tyre blown off and rim blown off. Fan & grill damaged No.1 wheel off No. W4005. No.1 brake changed off No. U-39. Auto brake Controller replaced off No. 155. Antiskid control shield changed off No.27 Brake pedal TX off No.3085.

6.2. Secondary damage.

Checked, a slight dent on all speed aileron and L/E slats.

7. Other Damage.

Nil

8. Meteorological Conditions.

W/V = 220/08, QNH = 1014. 4mb, Temp 30°C, Vis = 7 Km.

9. Aids to Navigation.

(Available)
(Not a factor in the incident)

10. Communications.

Normal
(Not a factor in the incident)

11. Aerodrome and Ground Facilities.

Available
(Not a factor in the incident).

12. Flight Recorders.

(Available)
(Not a factor in the incident).

13. Wreckage.

About 2/3th of the rim of wheel hub assembly, broke and shattered into pieces which were not recovered. The tyre released from the hub assembly was found subsequently lying 150ft. south of taxi way No.6.

14. Fire.

Small fire occurred on over heated No.1 brake assembly. Fire leader noting the flame used water and then dry chemical and controlled the fire instantly.

15. Survival Aspect.

None involved.

16. Test and Research.

Airbus wheels are manufactured by M/s. Messier Hispano Bugatti (MHB) France. A wheel assembly part No.28901-2001, Serial No.U-4005, installed on No.1 position had done 545 landings until 26-2-1983 (Date of incident). Its life is on-condition. It was

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installed on aircraft in October, 1982, and it is periodically checked at each layover check of aircraft. Installed on this wheel are fusible plugs (Qty 3) and Hub-Assembly which have contributed to the incident.

The fusible plugs are designed to operate under condition of excessive pressure and temperature. The plug bearing part No. GA-30009 (Qty 3) removed from the afore-said wheel were modified type and subjected to shop-check by simulating the operational conditions i.e. pneumatic pressure of 150 P.S.I. and varying temperature. It was observed that those plugs were blown at temperature ranging from 195° to 210°C, which is within limit of designed temperature of 183°C. The above experiment was carried out in P.I.A.C. shop jointly by officials of P.I.A.C. and A.I.D. on 27-2-1983. It may be mentioned here that fusible plugs on A-300 Aircraft are of different construction to these on other Wide Bodied aircraft i.e. DC-10 and Boeing 747. These plugs are 'disc' type and for their operation both temperature and pressure are required simultaneously whereas plugs of other Wide Bodied are operable with temperature only.

The Hub-Assembly examination revealed that its outer rim was found blowup circumferentially about 270°. The tyre bead was damaged while slipping over the damaged rim. Its rim fractured due to rise in the tyre pressure which in turn was generated by jammed brake heat, yet the temperature had not risen to 283°C and hence the plugs did not operate. This failed Hub-Assembly was Pre-Mod. type having done 545 landings since installation on 26-10-1982. For further detailed examination it is being sent to Manufacturers in France.

P.I.A. have experienced three such cases of Hub-rim failure during the year 1982 and 1983 (February). The previous failed units were sent to manufacturer (MHB) for examination and they reported that these were due to fatigue crack on the pre-mod Hub-Assemblies (Part No. 289021-2001). In the said cases twice outer rim and once inner rim was found cracked. The failed Hub-Assembly in question (AP-BAX) was also premod type and had its outer rim failure. The manufacturers have since introduced modified type of Hub-Assemblies with Part No. 28902-022. Out of the Hub-Assemblies available in PIAC nearly 2/3rd are still unmodified. Consequent upon third failure, C.A.I. Office, Karachi Airport had advised vide letter No. CAI/KAR/4663/BBA/4/ACFT, dated 14-2-1983 to expedite replacement with modified units and PIA confirmed that action was in progress.

As regard "CONFIG TEST" in the cockpit is concerned, it is stated that BRAKE HOT warning on the master warning pannel is indicated when T.O. CONFIG push button located on the central pedestal is pressed, provided the TEST push button on F.E. pannel is pressed simultaneously as this action adds 250°C to the real brake temperature detected by the channel. In this case in place of pushing test button such a condition was satisfied by the actual hot condition on the brake (400-600°C) which were displayed evidently on the temperature indicator (F.E. Panel). The warning on the Master Warning Pannel must have been exhibited as the pilot is stated to have carried out CONFIG TEST near take-off point. His statement that he did not get warning on M.W.P. (Even when broke was very hot) does not receive credence from the above analysis. Layout of cockpit warning lites is shown in Appendix 'B' attached.

17. Observations.

It is observed from the tape recording of A.T.C. as per Appendix 'C' that start clearance was given to aircraft at 0901Z by control tower while aircraft was parked at Bay No.11. Aircraft taxied out at 0906Z. But at 0914Z, the Captain reported that there was a bit of technical trouble and would like to return to ramp. A.T.C. cleared the aircraft for back track to night parking area. On way back at 0919Z, the Captain requested for parking at Bay No.14 or 15 yet not disclosing reason for this request. At 0922, A.T.C. enquired nature of technical trouble but pilot's reply transmission was garbled. At 0926Z the Captain stated that there was no Panic, however requested for Fire Tender positioning as precautionary measure. The Captain stated in his statement that F.E. called out Brake high temperature as they entered dumbel area after 3 to 4 min from start but A.T.C. tape indicates that even 8 minutes after

roll from Bay 11, crew was not aware of the problem as A.T.C. gave clearance for take off at 0913Z.

At 0914Z, the crew noted the problem of High Brake temperature (600°C) and decided to return but technical defect was not intimated to A.T.C. untill 0922Z i.e. 9 minutes latter. Situation was further aggravated as crew, without indicating any reason asked for parking at Bay 14 or 15 but A.T.C. declined their request and advised for Night parking area which was about $\frac{1}{2}$ Km ahead. Meanwhile brake temperature had gone alarmingly high (600°C) which resulted in failure of rim of wheel Hub-Assembly and blowing away of tyre with explosion. But still aircraft continued to taxi to night parking Bay.

Aircraft reported fire on No.1 wheel after parking at 0936Z. CAA Fire Tenders were extremely active and responded promptly to A.T.C. instructions. Fire leader initially used water and latter used dry chemical. However the fire was instantly extinguished without any substantial damage to areas other than No.1 brake Assembly. As is customary, F.E. reads 'Check List' during taxi and Captain and F/O are engaged in actual checks. The rise in Brake temperature was not noticed by F.E. even after 8 min. roll. The Captain indicated in voyage report that aircraft demanded abnormal power at start and also during taxi and stated that suddenly the temper. shot upto 600°C. In actual fact the Brake temper. was already high long before as the brake was binding right from the start. Statement of Captain, F/O and F.E. and ground Engineer are attached as Appendix 'D', 'E', 'F' and 'G' respectively and check list of A300-B4 aircraft is at Appendix 'H'.

18. Scene of Accident.

Please refer to pictorial diagram supplied by crew at Appendix 'J', wherein point A indicates the position whence high Brake temper. was noticed, Point 'B' refers to position of explosion and tyre blowing, Point 'C' refers to Bay 11 i.e. position of start. Point 'D' indicates position where Captain asked for parking at Bay 14 or 15, Point 'E' refers to Night Parking area and point 'F' is position when aircraft turned back near Take off point. The positions marked thus # are places where Capt. claims to have carried out CONFIG TEST and position marked ● are places where F.E. was asked for Brake temperature by Capt.

19. Examination of the Wreckage.

Examination of the removed components as per Appendix 'K' 'CA-31 is in progress. While many components as stated therein were replaced as a precaution, the most relevant were examination of damaged rim of Hub-Assembly whose photograph is shown as Appendix 'L' and Fusible Plugs. These have been discussed at length at S.N. 16 (Test and Research).

20. Witnesses.

All relevant personnel were contacted personally and their statement, whenever necessiated, were taken and are enclosed with this report.

21. Documents. The following documents are attached to the report:

- 21.1. Trim sheet of Flt PK-304 dated 26.2.1983 (AP-BAX) is attached as Appendix 'A'.
- 21.2. Pictorial of Cockpit warning light shown as Appendix 'B'.
- 21.3. Tape-recording of Conversation between A.T.C. and Flight crew (of PK-304) etc., attached as Appendix 'C'.
- 21.4. Statement of Captain Mansoor Malik, attached as Appendix 'D'.
- 21.5. Statement of Co-Pilot Mr. Imran Usman as Appendix 'E'.
- 21.6. Statement of Flight Engineer Mr. Asif Hayat as Appendix 'F'.

- 21.7. Statement of Ground Engineer Mr. Iqbal as Appendix 'G'.
- 21.8. Check list of Airbus A-300-B4 Aircraft as Appendix 'H'.
- 21.9. Pictorial Diagram of Apron and Taxiway with location incident points as Appendix 'J'.
- 21.10. Defect/incident report submitted by P.I.A.C indicating components removed subsequent to this incident as Appendix 'K'.
- 21.11. Photograph of damaged rim of Hub Assembly as Appendix 'L'.
- 21.12. Statement of Fire Leader Mr. Muhammad Iqbal as Appendix 'M'.
- 21.13. Statement of Crash and Fire Rescue (C.F.R) Officer attached as Appendix 'N'.
- 21.14. Emergency procedure in case of HOT BRAKES as given in operation manual is attached as Appendix 'O'.

22. ANALYSIS.

The Aircraft Airbus AP-BAX, prior to the incident, conducted Flt No. PK-301 (LHE-KHI) and was parked at Bay 11, whence application of Brakes was done by Parking Brakes at about 0730Z (dt. 26.2.1983). After placement of chocks, the brakes were released, but in this case most probably brakes did release on 7 wheels except No.1 (Front left, port side), due sticking of one of the Brake piston in extended position. This caused partial jamming of rotors and stators of that Brake Assy. Aircraft remained parked and its brakes cooled in that position (jammed).

About 2 hrs latter i.e. at 0906Z when this aircraft rolled from the same Bay for PK-304, the Pilot experienced that aircraft was demanding extra power to move i.e. 50% (normal 42%). He throttled back and called ground Engineer who advised that extra power was required as some oil was lying on the tarmac. After taxiout again aircraft was experiencing drag and demanding extra power. Although after 3 to 4 minutes of roll, No.1 Brake temperature must have risen to above 185°C with warning (amber) on F.E. Panel but F.E. was reading out check list during taxi and facing to the front, he did not notice warning until 8 minutes after taxi. By then temperature, had reached to 400°C. It is at this moment (0914Z) that Cpt. indicated to A.T.C. that he would like to return to Ramp due to what he called "bit of tech; trouble". Pilot statement that aircraft movement after initial start became normal is not compatible with actual happenings. F/E also failed to monitor High Brake temperature during taxi.

Pilot was relying heavily on the functioning of safety device i.e. Fusible plugs which did not blow. He did not stop the aircraft as he did not want to block the taxi way. Also he felt that fire fighting and other allied facilities would be readily available on the ramp. So he continued to taxi back, but temperature kept on rising untill it shot to 600°C and at this stage outer rim cracked and tyre dislodged completely.

Fusible plugs are designed to blowout and give vent to heat of wheel at 183°C coupled with pressure. In this case it did not receive temperature to that extent. Before this the rim gave away due tyre pressure which had developed excessive owing to heat generated by jammed Brakes. It may be noted that Fusible plug and rim are cooled by fan and always have much lesser temperature than Brake Assembly temperature, Which is indicated on F.E. Pannel. All indications and warnings were operating normal on the aircraft.

Again while requesting A.T.C. for Bay 14 or 15 parking, the pilot did not specifically give out the seriousness of the problem, indeed not even apprised A.T.C. of the nature of defect. The A.T.C. advised aircraft to proceed to Night parking area and immediately afterwards Brake temperature went very high causing explosion etc. Finally the aircraft parked at 0926Z at Night parking area. After Parking No 1 Brake Assy. emitted heavy smoke coupled with fire.

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Brake fire was first tried with water (available at time) by Fire Leader which was not proper, and latter dry chemical was used. The fire was instantly put out. In this connection statement of Fire Leader Mr. Mohammad Iqbal and C.F.R. Officer Mr. Mohammad Amanullah Khan are attached as Appendix 'M' and 'N' respectively.

23. Conclusions.

The incident could have been fatal, had the tyre burst and dislodged on the tarmac with many persons in the vicinity or had the inner rim failed, it could have caused substantial damage to the aircraft. The crew neglected the seriousness of the situation and were entirely relying on the operation of safety device, fusible plugs, without having adequate knowledge of its operating requisites at variance with other aircraft. Lack of sufficient coordination between Capt. and A.T.C. as regards selection of parking Bay aggravated the situation. PIA's selection to purchase wheel Assembly of Airbus aircraft from a relatively ~~not~~-so-experienced manufacturer MHB was not well thought of. No such problem is known to have occurred on the wheel rims of other Wide bodied aircraft Viz Boeing 747 and DC-10 which use Bendix and Good Year wheel Assembly.

Emergency procedure in case of HOT BRAKES as given in operation manual (attached as Appendix 'O') does not adequately cover various cases, such as in question.

24. Findings.

The aircraft AP-BAX, carried out Flt., PK-301 earlier on the day of incident and was parked on Bay No.12. Parking Brakes were used and though released subsequently after chocks ON, one of the Brake cylinder got stuck in extended position, causing jam on the Brake No.1. After 2 hrs. aircraft started for PK-304 with jammed brake from the same bay. By the time aircraft taxied to dumbel area its temp. shot and Capt. decided to return. Aircraft continued to taxi back. Although pilot's action to continue to taxi even after observing high temper on brake was not proper but the fact that he did not meet any other abnormality and that he did not want to block the taxi way and cause disruption to operations at Karachi Airport, and that aircraft was fully loaded with passengers, needs due consideration under the circumstances. Pilot action of not specifying nature of tech trouble to A.T.C. was however improper. Improper was also the requesting of nearest parking Bay and yet not specifying reason for the same. During taxi Flt. Engineer did not notice High Temperature Warning.

As regards fire fighting the whole affair was miscoordinated. The nature of technical trouble was known to the pilot at 0914Z but it was not until 0926Z i.e. 12 min. later that he asked tower to send fire tender to Night parking area. Earlier to this at 0922Z the conversation between tower and (PK-304) aircraft is reproduced below from relevant appendix.

<u>TIME</u>	<u>FROM</u>	<u>TO</u>	<u>TEXT</u>
0922	TWR	PK-304	Request nature of snag Sir.
	PK-304	TWR	Brake is (numbly) Sir most....(<u>Transmission garbled</u>).
	TWR	PK-304	Thank you Sir,
0926	PK-304	TWR	Calls.
	TWR	PK-304	Go ahead.
	PK-304	TWR	Sir there is actually no panic but could. You be kind enough that as a precautionary measure to send a fire tender to night parking area please.
	TWR	PK-304	WILDO.

From the above it is obvious that the Captain asked for fire Tender and ATC without properly understanding the nature of fire from the Aircraft, passed on the same demand to Fire Section even 11 mins. before parking of Aircraft. As after parking smoke and fire was noticed by the fire crew, they immediately used the available Fire Tender containing water. Latter on dry chemical vehicle (RIV) was sent at the scene at 0946Z i.e. 10 mins. after parking. As such the fire crew used water earlier and dry chemical later.

It was surprising to know that out of over 100 fire staff at Karachi Airport, only two have received formal training in C.A.T.U. Karachi of Civil Aviation. However local training is reportedly being given on and off without any notes and other training aids. It is relevant to mention here that Civil Aviation Authority has recently spent huge amount on import of modern fire vehicles and associated equipment but no regard has been given to the training aspect. In short, the C.A.A. Fire Staff is ill trained to combat any serious or complicated fires on Aircraft. It is understood that fire training has been started in C.A.T.T. Hyderabad but only 12 persons have so far been trained since August, 1982 from all Airports in Pakistan.

A.T.C. responded well to the situation, However, when Communication (R/T) from the aircraft was not clear i.e. garbled, A.T.C. Controller sent for Fire Tender without knowing nature of Fire.

P.I.A. Engineering experienced 3 similar failure of wheel rim Assy. but did not take prompt action to replace modified hub assy. Even at the time of writing this reports about 2/3rd of the Assemblies in use are un-modified type.

III--RECOMMENDATIONS

25. Recommendations.

- i) Flight crew (of Flt PK-304) may be adequately warned for neglecting to take suitable preventive measures in the incident.
- ii) All PIA Flight crews must specifically apprise ATC of any deviations in the intended Flight Plan/Schedule and any abnormalities noted during taxiing.
- iii) Till such time the entire fleet is equipped with modified brakes assy; Pilots 'Check List' (of A300 Aircraft) may be amended to include switching ON of Brake Fan at the time of start of Taxiing and F.E. should monitor Brake tempr. frequently.
- iv) Emergency procedure in case of HOT BRAKES as given in Flight manual must be adequately reviewed to include such like cases and actions thereof.
- v) All un-modified brake Hub of Air-Bus fleet must be immediately replaced with modified ones, on A.O.G. basis.
- vi) Pending replacement of modified hub Assy the un-modified hub assemblies may be inspected by ultra sonic method at the rim flange area at each overhaul and visually during each transit by PIA Engineering. Their life be fixed at 1500 landings. (Action already taken).
- vii) P.I.A. may be advised to carryout sufficient evaluation of aircraft and its equipment before ordering its purchase. C.A.A. (A.I.D) officials may also be associated in this exercise as far as possible to supplement evaluation process. Also efforts must be made to standardise the fleet equipment-wise (This problem is more pronounced in case of fleet of F.27 and Boeing 707/720B Aircraft).



- viii) Fire Fighting Staff of CAA at all Airport, may be given appropriate refresher training on the use of adequate fire fighting equipment viz-a-viz different aircraft parts and systems *fires*.
- ix) A.T.C. Controllers may also be advised to demand 'again' the information from aircraft in case the reception on R/T is garbled or ambiguous.
- x) P.I.A. may be advised to immediately notify appropriate C.A.A. officials in case of incidents/accidents. Previous instructions on the subject may be revised, if necessary, in view of formation of 'C.A.A.'


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