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AIRCRAFT INCIDENT INVESTIGATION REPORT

M/S PIAC BOEING 707 REG. MKS. AP-AXA
AT KARACHI AIRPORT
ON
31ST JANUARY, 1989

CIVIL AVIATION AUTHORITY

**INVESTIGATION REPORT ON THE INCIDENT TO M/S.PIAC
BOEING 707 REGISTRATION MARKS AP-AXA
ON 31ST JANUARY, 1989 AT
KARACHI AIRPORT**

**REPORT ON INCIDENT TO M/S.PIAC BOEING 707 AIRCRAFT AP-AXA
ON 31ST JANUARY 1989 AT KARACHI AIRPORT ON ARRIVAL OF V.V.I.P
FLIGHT FROM ISLAMABAD**

Authority: Director General Civil Aviation Authority's
Memorandum No.HQCAA/1901/93/AIB DT: 1.2.89.
(Attached to this Report as Appendix -'A').

1. AIRCRAFT INFORMATION

- | | | |
|---|---|---|
| 1.1. Registration Marking | : | AP-AXA |
| 1.2. A/C Type & Maker S.No. | : | B-707 S.No.19286 |
| 1.3. Engine type, airframe
Position & Makers S.No.
Hrs/Landings | : | Part & Whitney JT3D-3B
(Attached to wings)
No.1 S.No. 668756
No.2 S.No. 667811
No.3 S.No. 644927
No.4 S.No. 667815

All 4 engines were Airworthy
in all respects and are not
attributing factor in this
incident. No modification was
pending. Total airframe hrs
58110-08 landings 24148 |
| 1.4. Certificate of Reg. No. &
validity | : | No.449 (Rev.1), till further
order |
| 1.5. Certificate of Airworthiness :
No.and date of expiry | : | No.402 (Rev.1), valid till
24.9.89 |
| 1.6. Certificate of Maint. & date :
of issue and period of
validity | : | On 28.1.89, Certificate of
Maint. issued at A/C 58098-08
Hrs. Valid until 120 days or
upon completions of 58548-08
Hrs. (issued after check-28)
(Appendix 'B' attached to
this report). |
| 1.7. Date of Construction of
airframe | : | September, 1967 |
| 1.8. Name & address of Owner | : | M/s.PIAC, PIA Building,
Karachi Airport |

- 1.9. Gross weight, maximum : Certificate maximum take off
permitted by Chief of weight based on structural
Airworthiness and for this strength 150412.7 KG. Weight
flight & at the time of is not a factor in this
incident. incident.
- 1.10. Loading centre of gravity : Empty weight = 6158.7 Kg
position at the time of centre of gravity within
incident. limits. Loading is not a
factor in this incident.
- 1.11. Airframe History**
- 1.11.1. Flying time since : Time since new (TSN) 58110-08
manufacture last over hours. Landings since new
haul and last 24148. S.C.done at 58098-0
periodic check. hours.
- 1.11.2. Major part of A/C : Brake assembly P.N.9560569
component failure S.N. APR 66-304 forward No.3
involved in this position, T.S.I.211 landings.
incident P.N,S.N.
with position & TSI.
- 1.11.3. Installation of above : On 9.11.88 at Karachi
brake assembly.
- 1.11.4. Total No.of landings: 211 Landings
done by above brake
assembly since
installation.
- 1.11.5. Position at which : Threads internally damaged
brake assembly failed where steel adopter fitted
in the brake assembly housing.
(Appendix 'C' attached to
this report).
- 1.11.6. Any defects reported: Nil reports
on brake assembly
after release of air-
craft on 28.1.89
(Service check-28)
- 1.11.7. Any heavy landing : Nil Reports
reports or heavy
braking reports made
in technical log.
- 1.11.8. Technical Log : Hydraulic leak from F.3
defect, entires brake assembly (Appendix 'D' -
'D₁' attached to this report).

2. SUMMARY OF INCIDENT

- 2.1. On 31st Jan 1989 Boeing 707 aircraft bearing Nationality & Registration Marks AP-AXA belonging to Pakistan International Airlines had operated VVIP Flight Islamabad - Karachi Sector.
- 2.2. Aircraft landed at 1615 LT with Prime Minister of Pakistan & entourage on board. Aircraft was parked on Bay No.3. During taxiing when above aircraft entered the apron via taxiway Bravo, smoke was observed coming out from right main landing gear.
- 2.3. The aircraft was parked on Bay No.3 and CAA Fire Fighting vehicles were positioned at proper place near the aircraft.
- 2.4. Airport Manager and Maintenance Engineers also reached near R.H landing gear. It was noted that the brakes were hot and hydraulic splash was observed from No.3 forward brake assembly.
- 2.5. This hydraulic leak from shuttle valve attachment area was spilling on hot brake assembly rotors and stators, causing smoke to emit.
- 2.6. Soon after putting parking brakes off. Smoke gradually disappeared. No fire extinguisher agent was used.
- 2.7. Prime Minister & entourage disembarked safely. There was no panic etc.

3. INJURY TO PERSON(S)

3.1. None.

4. DAMAGE TO AIRCRAFT

4.1. None.

5. OTHER DAMAGE

5.1. Nil

6. METEOROLOGICAL CONDITIONS

6.1. The weather was fair.

6.2. Weather is not a factor in this incident.

7. NAVIGATIONAL & LANDING AIDS

7.1. They were operating normal.

7.2. These were not a factor in this incident.

8. COMMUNICATIONS

8.1. All radio facilities were serviceable.

8.2. These were not a factor in this incident.

9. AERODROME GROUND FACILITIES

9.1. Adequate for operation of Boeing 707 aircraft.

9.1. These were not a factor in this incident.

10. FLIGHT RECORDERS

10.1. Flight Data Recorder indicates no heavy landing nor previously reported.

10.2. C.V.R. not required in this incident.

11. WRECKAGE IMPACT INFORMATION

11.1. Not applicable.

12. FIRE

12.1. No fire occurred during or after the occurrence.

13. SURVIVAL ASPECTS

13.1. It was a survivable incident.

14. TEST & RESEARCH

14.1. Brake assembly was tested in the shop. Found adopter holding threads in brake assembly housing damaged.
(Appendix 'E' attached to this report).

15. OBSERVATION:

15.1. PIA Boeing 707 Aircraft AP-AXA made a safe landing at Karachi on 31st Jan 1989 at 1615 LT after operating a VVIP Flight from Islamabad with Priminister on board. During taxi smoke and fumes were seen from R/H main wheels, therefore emergency equipment were immediately positioned in the close vicinity of the aircratt which included the fire tenders, but fortunately the same were not utilized, as there was no fire, and smoke and fumes around the wheels were due to hydraulic leak from No.3 fwd brake unit. Leaking hydraulic fluid was splashed on the hot brake units which resulted the formation of smoke and fumes, noticed during taxi of the aircraft. After disembarkation of the passengers the aircraft was

...from the/

towed from the VVIP Parking bay to bay No.20 for Investigation and rectificational action in connection with the hydraulic leak on No.3 fwd brake unit. Initially the lock out deboost valve had to be charged as the same was bottomed due to hydraulic leak and then leak checks of the brakes were carried out. Severe hydraulic leak was experienced from No.3 fwd brake unit shuttle valve adopter base, with brakes parked and hydraulic system pressurised. No efforts were required in removing the leaking adopter as the same appeared to be loose. Metal thick burs of light alloy thread of the brake unit wrapped around the steel adopter thread also came out, indicated the pulling out of the thread of light alloy body of the brake unit by the steel adopter due to excessively over torquing of the adopter. The failure of brake unit thread, resulted the severe hydraulic leak, during taxi of the aircraft.

15.2. Leaking brake unit S.No.APR.66-304 was replaced by S.No.SEPT.69-201. Brake were bled leak check carried out and aircraft released again for flight to Islamabad, which departed at 2015 hrs LT dated 31st Jan 1989.

15.3. Later undersigned carried out a detailed inspection of the unserviceable brake unit in participation with the overhaul shop experts and quality control engineers of PIA in the brake unit overhaul shop. The following were the observations:

...15.3.1.Light

15.3.1. Light alloy body threads of the brake unit body were found damaged and pulled out, particularly the four initial threads.

15.3.2. A new adopter with new seal was forcibly installed on the damaged threads and intentionally forced over torqued the adopter on the brake unit to check any other sign of hydraulic leak, but no leak was observed from any where, up to a pressure of 1000 PSI, (which is a normal working pressure). The pressure was not exceeded beyond 1000 PSI as a precautionary measure, because the forced over torqued adopter on the damaged thread might have blown out from the brake unit.

15.4. Brake unit overhaul, shop experts of the PIAC overhaul shop have also commented exactly, in the shop report of leaking brake unit as stated above. Please refer Appen.'E'.

16. INVESTIGATION:

16.1. The subject brake unit was initially installed on AP-AXA on 10th Nov 1988 and the same had done only 211 landings, since its installation. The hydraulic leak problem was noted first time on 15th Jan 1989 after the arrival at Karachi from PK-284. Ground Engineer Mr.Rashid AME-887 observed the leak from this brake unit and made the entry in the work sheets as follows:

"Skydrol leak observed from No.3 fwd brake unit, please check and rectify. AME-887".

....The

16.2. The rectificational action in this regard was taken by the Ground Engineer Mr.Ali Dawood Gul AME-981, and the brake unit entry was cleared in the T.A work sheets in the following wordings.

"Bolt retroqued, L/Check done OK AME-981".

Comments: "Whereas the Ground Engineer should have replaced the seal under the adopter and gripped the adopter with another spanner while torquing the Bolt which scured the shuttle valve over the adopter to prevent over torquing".

16.3. After the turn around check on 15th Jan 89 the aircraft did not operate any flight and was directly taken on, service check-28. During service check-28 comprehensive inspection as per inspection card 1024-Q-2 was carried and its serviceability condition and leak check was carried out and once again certified by Mr.Ali Dawood Gul AME - 981.

16.4. Upon completion of service check on 28th Jan 89 the subject aircraft operated two flights from Karachi to Islamabad on 28th and 30th Jan 89 respectively. The T.A check was also carried out at the termination of each flight but neither any leak from No.3 fwd brake unit was reported by the crew nor Ground Engineers found any leak during inspection. Finally the leak was noticed during taxi while operating VIP flight at Karachi on 31st Jan 89.

17. FINDINGS

- 17.1. under the light of above stated facts, we feel that Mr.Ali Dawood Gul AME-981, over tighten the bolt which secured the shuttle valve with adopter, while he was tightening the bolt he did not grip the adopter with another spanner during torquing of the shuttle valve bolt. During this irregular practice adopter went on over torquing in the light alloy body of the brake unit in the efforts to stop the leak from the brake unit. Finally the leak stopped, but adopter was over torqued. Later when the aircraft operated two flights after the service check - 28, (between 28th Jan and 31st Jan 89). The vibrations resulted from take off landings, and with the application of brakes the over torqued adopter over stressed and strained the light alloy threads of the brake unit, which finally resulted the pulling out of brake unit threads by the steel adopter threads, which caused the severe leak at Karachi, after the VVIP flight on 31st Jan 89.
- 17.2. Secondly, instead of over torquing the Bolt Mr.Ali Dawood Gul AME-981 should have replaced the "O" ring of the adopter.
- 17.3. It may also please be noted that Maint.Manual chapter-32 specially specify the max.permitted torque on the adopter i.e 400 inch pounds and it appears that adopter must have had torqued much more than the stated figure.

18.WITNESSES

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18.1. In connection with the Investigation of the subject incident the statement of the following personnels are recorded which as attached Appendix 'F', 'G₁', 'G₂', 'H', 'J', 'K'.

18.1.1. MR.FARMANUDDIN — AIRPORT DIRECTOR

Who witnessed the smoke and fumes from the No.3 fwd brake unit and made the emergency equipment arrangements. APP. 'F'

18.1.2. MR.ARIF SAJJAD — AME-1019 GROUND ENGINEER

Responsible to attend the aircraft AP-AXA on arrival on 31st Jan 89 and witnessed the smoking brake unit and finally supervised the replacement of the leaking No.3 fwd brake unit. APP. 'G₁' & 'G₂'

18.1.3. MR.ALI DAWOOD GUL — AME — 981 GROUND ENGINEER

Engineer responsible to rectify the hydraulic leak of brake unit by improper methos on 15th Jan 89. APP. 'H'

18.1.4. F/E. MANZOOR AHMED — FLIGHT ENGINEER OF VVIP FLIGHT

Who witnessed the location of hydraulic leak & smoke. APP. 'J'

18.1.5. MR.BAQAR ALI AWAN — SR.TECH. APP. 'K'

19. DISCUSSION OF EVIDENCE

19.1. The complete incident alongwith its history was discussed with overhaul shop experts, DCE Quality Control PIAC, and all the witnesses stated above, and finally came to the conclusion that overtorquing the adopter of the brake unit resulted the severe hydraulic leak incident.

20. CAUSE

- 20.1. Basic cause was overtorquing the adopter with improper procedure, and seal should have been replaced instead of over torquing.

21. RECOMMENDATIONS:

- 21.1 M/s.PIAC to take personnel discrepancy action against AME 981 Mr. Ali Dawood Gul responsible for adopting incorrect procedure for rectifying the hydraulic leak which resulted in the incident on 31st Jan, 1989.
- 21.2 M/s.PIAC to issue necessary circular to all maintenance staff to strictly follow the instruction as laid down in the maintenance manual for rectification of leaks and other defects and ensuring proper tool are used.
- 21.3 M/s.PIAC to ensure that overhauled brakes are released from the shop after ensuring that they comply with the Manufacturers Recommended procedures and inspection requirements in all respects.