

ORIGINAL

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CIVIL AVIATION AUTHORITY

AIRCRAFT INCIDENT INVESTIGATION

A - 300 AP - BAX

WHICH OCCURRED ON
16TH JULY 1991

AT

QUAID-E-AZAM INT'L AIRPORT

CIVIL AVIATION AUTHORITY
KARACHI, PAKISTAN

AIRCRAFT INCIDENT INVESTIGATION

OVER-RUN INCIDENT TO PIAC AIRCRAFT A-300 AP BAX WHICH
OCCURRED ON 16TH JULY 1991, AT QIAP, KARACHI

Authority:- Director General Civil Aviation Authority
Memorandum No. HQCAA/1901/134/AIB dated 16th July
1991 (Appendix 'A')

COMPOSITION OF INVESTIGATION TEAM

- | | | |
|-----|--|------------------------|
| (a) | Mr. Abdul Basit
Chief Inspector & Pres AIB | Investigator-in-Charge |
| (b) | Mr. Ghulam Murtaza
Controller of Airworthiness
CAA | Investigator |
| (c) | Dr. S.G. Kadir
Chief of Avn. Medicine CAA | Investigator |
| (d) | Mr. Mohammad Ali Siddiqui
Ops. Investigator | Investigator |
| (e) | Capt. Amjid H. Faizi
Chief Pilot Corporate Safety
M/S. PIAC. | Co-opted Member |

1. AIRCRAFT INFORMATION

1.1. Registration Marking : AP-BAX

1.2. A/C type and Maker's Sl. No. : A-300 B4-2C S.No. 96

1.3. Engine types, airframe : CF-6-50/C2 No.1 S/N
position and maker's S.Nos. : 517-179
No. 2 S/N. 517-475

1.4. Certificate of Registration : No. 547 (Rev. 1)
Permanent

1.5. Certificate of Airworthiness : No. 500/1 valid upto
No. and date of expiry 27.02.1992.

1.6. Certificate of safety date : 8.1.91 at 2000 hrs
and time (GMT) of issue and till 29705-13 hrs
period of validity

1.7. Date of construction of : 1980
airframe

1.8. Name and address of Owner : M/S. PIAC, Karachi

1.9. Gross Weights. Maximum : 165000 Kgs (C of A)
permitted by C of A for this 150484 Kgs
flight, at the time of
accident

- 1.10.Loading, Centre of gravity : 23.7 limit 18 to 23
limits in C of A and centre
of gravity position at the
time of accident and commencement
of flight
- 1.11.Airframe history. (Give : TSN - 29612 - 31
flying times since manufacture TSO - 7918 - 80
last overhaul and last periodic (4.11.88)
check. List also essential
modifications completed)
- 1.12.Engine history. (Give flying : No. 1 517-665
time since manufacture, last TSN:21612-07
overhaul and last periodic TSI: 975-07
check. List also essential
modifications completed
- 1.13.Accessory history. (Give : Nil
details of operating life & a/c
operating time since manufac-
ture and overhaul)
- 1.14.Defects.(List and remark upon : Franch AD No.90-222
any technical defects in -116(B) (item 1.12)
airframe engines or accessories,
discovered during investigation). Aircraft attempted
T.O. after a hot
start which required
engine shut down and
inspection. (See
paras 19.1 & 19.22).

2. CREW INFORMATION

2.1. PILOT-IN-COMMAND

2.1.1. Name : Capt. Ageel Ahmed Hashmi

2.1.2. Position in the Cockpit: Left hand seat.

2.1.3. Date of Birth : 4.2.1940

2.1.4. Type of Lic. and No. : ALTP NO. 354

2.1.5. Medical date with status : 2.2.91 Fit for renewal of ALTP Licence, subject to use of corrective glasses.

2.1.6. RATING

2.1.6.1. Type (s) held : In Group-I

2.1.6.2. Type current : A-300 (In group-I)

2.1.6.3. Flight Instructor Rating : B-707/720B (Lapsed)

2.1.7. FLYING EXPERIENCE

2.1.7.1 Grand total : 11434.00

2.1.7.2. Total in Command : 7788.00

2.1.7.3. Total in Command/Co- : 4299.00
Pilot/Flight Engineer
on the type accident/
incident occurred

2.1.8. Where trained : PIAC

2.2. CO-PILOT

2.2.1. Name : F/O Hassan Akhtar

2.2.2. Position in the Cockpit : Right hand seat

2.2.3. Date of Birth : 6.1.1954

2.2.4. Type of Lic and No. : CPL No. 842

2.2.5. Medical date with status : 30.4.1991 Fit

2.2.6. RATING

2.2.6.1. Type (s) held : Cessna-150, F-27,
B-737 (Lapsed)

2.2.6.2. Type current : Airbus A-300
(In group-II)

2.2.6.3. Assist/Flight : Nil
Instructor Rating

2.2.6.4. Flight Engineer : Nil
Instructor Rating

2.2.6.5. Check Rating : Nil

2.2.7. **FLYING EXPERIENCE**

2.2.7.1. Grand total : 5011 hrs on 25.4.91

2.2.7.2. Total in Command : 336 hrs

2.2.7.3. Total in Command/ : 632 hrs (Co-Pilot)
Co-Pilot/Flight
Engineer on the type
accident/incident
occurred

2.2.8. Where trained : PIAC

2.3. **FLIGHT ENGINEER**

2.3.1. Name : Jamil-uz-Zaman Khan

2.3.2. Position in the Cockpit : Flight Engineer

2.3.3. Date of Birth : 2.3.1955

2.3.4. Type of Lic. and No. : A-300 Lic. No. 214

2.3.5. Medical date with status : 16.12.90 (fit for
renewal of Flight
Engineer Licence)

2.3.6. RATING

2.3.6.1. Type (s) Held : Boeing 707/720B
(Lapsed)

2.3.6.2. Type Current : A-300 (Airbus)

2.3.6.3. Assist/Flight Engr. : Nil
Instructor Rating

2.3.6.4. Flight Engineer : Nil
Instructor Rating

2.3.6.5. Check Rating : Nil

2.3.7. FLYING EXPERIENCE

2.3.7.1. Grant total : 11699

2.3.7.2. Total in Command : 7788

2.3.7.3. Total in Command/
Co-Pilot/Flight : 4511 hrs (Flight
Engineer on the
type accident/
incident occurred

2.3.8. Where trained : PIAC

3. SUMMARY

- 3.1. The flight crew mentioned at paras 2.1, 2.2. and 2.3. were operating PIAC Airbus A-300 AP-BAX PK-266 Karachi to Dhaka on a scheduled passenger flight on 16th July 1991.
- 3.2. During start up at Karachi the pilot experienced a hot start on No. 1 engine. The EGT went upto 804 C. He reported the incident to maintenance on company's VHF frequency 131.6. Both Pilot and the maintenance decided that an inspection of the engine would be carried out by the engineers on board the aircraft at Dhaka. This was incorrect since the circumstances required an immediate shut down.
- 3.3. The aircraft was however taxied out for runway 25 R which is 10,000' long. They had to hold behind another PIA B-707 aircraft in front who was No. 1 for take off. During this period, the runway was being cleared of cowling and metal pieces that had fallen from No. 2 engine of another Airbus A-300 AP-BBA operating PK-300 Karachi to Islamabad.
- 3.4. After thorough inspection of the runway, and departure of B-707 aircraft, PK-266 was cleared for take off.
- 3.5. It was a rolling take off. The Captain advanced the power levers and the flight engineer set the flex power for take off. At V_1 (164 Kts) the Co-Pilot called out V_1 and immediately the crew experienced

severe vibrations on the aircraft. The Captain exercised his discretion decided to reject the take off. The power levers were brought back and brakes alongwith the reversers were applied. As the decision to reject take off was made after V_1 & V_R it was not possible to stop the aircraft on the runway. Seeing the obstacles at the end of the runway, the pilot turned the aircraft to the left leaving the runway. The aircraft came to a stop well past the overrun into the kutcha short of ASF office barracks.

- 3.6. ATC was informed. The crew carried out, engine damage on ground checklist. After debating and assessing the situation the Captain finally ordered evacuation of the passengers and the crew through L1 and R1 doors. There was no injury to any person caused during evacuation. The runway remained closed for almost two hours after the incident.

4. INJURY TO PERSON(S)

- 4.1. No injury was caused to any person on board the aircraft or outside as a result of the incident

5. DAMAGE TO THE AIRCRAFT

- 5.1. Damage report at Appendix H₁ & H₂

6. OTHER DAMAGE

- 6.1. Nil

7. METEOROLOGICAL CONDITIONS

7.1. 3 Oktas Alto cumulus clouds were reported at 10,000 ft. Visibility 7000 meters and the surface wind was 300 degree/09 Kts. Outside air temperature was 25 degree C. and local QNH was 999.7 millibars.

8. NAVIGATION AND LANDING AIDS (VISUAL/NO VISUAL)

8.1. All navigation and landing aids were available and serviceable at the time of the incident. These were not a factor in the incident.

9. COMMUNICATION (INCLUDING RADIO COMMUNICATION)

9.1. All Communications were available and serviceable at the time of the incident. These were not a contributory factor in the incident.

10. AERODROME AND GROUND FACILITIES

10.1. All Aerodrome and Ground facilities were available. Crash fire tenders and rescue facilities immediately rushed to the scene of the incident.

10.2. The Captain ordered emergency evacuation from R-1 and L-1 doors after a delay and on request from the fire fighter. At the time of the incident the Fire and Rescue shift was changing shifts therefore some of the fire fighters could not change into their uniforms. This created confusion in recognizing them as being authorized to help rescue the passengers or not.

11. FLIGHT RECORDERS

11.1. Digital Flight Data Recorder, (D.F.D.R) Permanent Maintenance Record (PMR) and the Cockpit Voice Recorder (C.V.R.) were removed from the aircraft. They were later on taken to France for Analysis by the President Accident Investigation Board.

12. WRECKAGE AND IMPACT INFORMATION

12.1. The aircraft was found in the Kutcha ahead of Runway 25 R. The Pilot had deviated left from the runway to avoid obstacles and cause minimum damage to the aircraft. It was facing approximately 240 degree and had come to a halt approximately 100 yds from ASF Barracks. Left outer rear tyre had burst. There was no noticeable damage to the fuselage. However engine No.2 had some damage due to ingestion of soft rubber like material probably from the tyre and hard body damage probably from torn cowling pieces or pieces of compressor blades which broke and passed through the engine

13. SURVIVAL ASPECTS

13.1. The incident was survivable. No injury was caused to any person on board or outside the aircraft.

14. TEST AND RESEARCH

14.1. Nil

15. OBSERVATIONS

- 15.1. Removal of Debris from the runway after an accident/ incident. Earlier an incident occurred to an Airbus aircraft AP-BBA operating PK-300 Karachi- Islamabad where the cowling of No.2 engine tore open and separated from the engine. The runway was cleared of metal pieces prior to take off of a Boeing 707 and Airbus AP-BAX PK-266 which aborted take off. The runway was again cleared of debris before AP-BBA was permitted to land. In case of incident to AP-BBA no report was made to the Accident Investigation Board and the runway was cleared of debris without making a note of their position.
- 15.2. In case of AP-BAX when debris was cleared the positions were not recorded, as such in both instances the investigators did not have this evidence to establish the sequence of failure which may have been provided by the position of these parts.
- 15.3. A letter was addressed to Director ATS requesting him to ensure in future that note be made of exact position of parts before they are picked up (Appendix "O").
- 15.4. Although the fire rescue facilities were available and reached the scene promptly, it was noted that a few fire fighters were not in proper uniform. This created confusion for the aircraft crew as they did not know whether they were qualified to be trusted

with the job of rescuing the passengers. In an emergency to be evacuated in seconds, such confusion can hinder rescue operations and may cost a life or two. When questioned, the officer incharge stated that due changing the shift at the time of incident there was no time for the new crew to change into the uniforms. While we appreciate the prompt action on their part, for future it must be ensured that the shift which is already on duty must handover the charge only when the next shift is properly geared to take over.

16. **INVESTIGATION**

- 16.1. The Chief Inspector and President A.I.B. were informed by Deputy Chief of Airworthiness that an A-300 aircraft belonging to PIA had aborted take off and had crossed the runway into the Kutcha. This information was received 40 minutes after the occurrence. The ATC had earlier informed Operations Investigator that an aircraft had aborted take off however nothing regarding the overrun was mentioned. The matter was considered a routine abort without any mishap. No action was initiated.
- 16.2. The Chief Inspector and President A.I.B., who received a delayed report proceeded to the scene of the incident along with operations investigator .
- 16.3. The aircraft was found beyond the overrun on the left side of runway 25 R. It had stopped in Kutcha approximately 100 yds from ASF Barracks.

- 16.4. Tyre burst of left rear outer tyre caused rubber injection in # 1 Engine. Secondary damage was caused due to compressor blade pieces breaking and going through the engine. Possibility of some parts of the failed cowling being injected by the No. 1 engine also exists but has not been confirmed.
- 16.5. Aircraft technical log, certificate of maintenance, certificate of Airworthiness and other important documents were taken in possession for scrutiny by the Airworthiness member of the Board. These were found in order.
- 16.6. Digital Flight Data Recorder (D.F.D.R.), Permanent Maintenance Record (PMR), and Cockpit Voice Recorder (C.V.R.) were also removed and taken into custody for analysis at the Airbus Industry, and the aircraft was cleared by the Investigator in Charge for removal from the scene of incident.
- 16.7. The Chief Inspector and President A.I.B., who is also the Investigator Incharge wanted to inspect the runway for evidence. The Chief Operations Officer displayed his ignorance on the priorities assigned to Accident Investigation Board. He stopped the Chief Inspector entering the runway even though runway being closed to traffic. The Investigation Board were not permitted to examine the runway. Meanwhile the runway was cleared of the debris by Air Traffic without making a note of the positions of the bits and pieces.

17. DISCUSSION OF EVIDENCE

- 17.1. **START UP** During start up of the engines at Karachi Exhaust Gas Temperature (EGT) exceeded limits on No. 1 Engine. (See extract from DFDR Appendix-'S').
- 17.2. Standard Operating Procedures laid down in the Flight Operations Manual states that, "Engines will be started as per normal procedures defined in the FCOM. In case of any malfunction during start the relevant abnormal procedure laid out in the FCOM will be followed. Captain and First Officer will monitor EGT and Fuel flow and ensure no limitations are exceeded. Flight Engineer will announce EGT peak value and or satisfactory engine stabilization. **"All parameter correct"**. The **Pilot Flying** will record time by punching the clock should the EGT rise beyond 750 Degrees C.

The Flight Crew Operators Manual for A-300 aircraft lays down the procedures for a Hot Start as follows:-

i. Announce "EGT 750"

ii. Start Clock.

If EGT continues to rise above 750 C at such high rate that exceedance of 900 C seems consequential,

or

if EGT above 900 Degrees C.

or

if EGT above 750 Degrees C for more than 40 seconds:-

- Fuel Lever -----off
- Crank the engine for 30 seconds.
- Engine Start selector ----- start abort
- Perform normal engine shut down procedure.
- Maintenance action is due.
- Record EGT maximum value.
- **Stop clock when EGT below 750 C.**

From the CVR transcript (Appendix CI) it is evident that the Captain did not punch clock as per laid down procedures in the FCOM. Because of his failure to monitor the EGT/time limits the Captain asks other members of the crew as to how much time the EGT remained above the hot start limit (Page 2 of CVR transcript Appendix CI). The Flight Engineer does mention that the EGT came below 750 C after 45 or 49 seconds. **To which the Captain replies that the engine should have been shut down after 40 seconds.** This indicates that the Captain was aware that the EGT limits had been exceeded. The engine should have been shut down in this case. He, however, completely ignored the malfunction and involved himself in a discussion to confuse the issue by only talking about the highest temperature (804 Degree C) reached during the start. He convinced himself and the rest of the crew alongwith the ground engineer that the limits had not been exceeded and there was no requirement to take shut down action. From that moment the aircraft was not airworthy.

17.3. OPERATING PROCEDURES

17.3.1. From the CVR (see transcript Appendix CI) it is more than evident that the Captain and his crew did not follow the standard procedures and use of correct phraseology. Half the discussion in the cockpit were in vernacular and half in english. English is the required language for use during operation. Before take off as per SOP in the Flight Operation Manual the PIA Captain is required to brief his crew. The FOM contains the minimum briefing required. The CVR did not indicate that the briefing was conducted (See CVR transcript Appendix CI).

17.3.2. The PIAC Flight Operations Manual SOP for A-300 para 3 mentions Captains standard briefing which states. "This is description in minimum but adequate detail of plan of action for take off. It presumes the use of standard procedures and includes a review of departure clearance, the standard instrument departure (SID) and noise abatement procedure, if required. Captain will decide who will conduct take off. Radios will be set accordingly as per relevant SID charts.

17.3.3. The crew briefing before take-off is extremely important as it refreshes the duty to be performed by each member of the crew during and after take-off. Should an

emergency arise during take-off each member of the crew knows precisely what action is required from him. All doubts are cleared. From the Cockpit Voice Recorder, it is evident that Captain's standard briefing before take off was not carried out at all. The Co-Pilot called out V and V and was expecting the aircraft to get airborne when the Captain called abort and brought back the power levers.

- 17.3.4. The Captain by not carrying out briefing before take off has violated SOP for A-300 in the Flight Operation Manual and thus Rule 272(4) of CAR 1978 has been violated.

17.4. AIRBUS SERVICE BULLETINS AND AIRWORTHINESS DIRECTIVE

- 17.4.1. The Airbus Service Bulletin (S.B.) No. A300-54-066(R), Appendix 'P' classified as mandatory vide French Airworthiness Directive (A.D.) No. 90-222-166 (b), item No. 1.12 (Appendix 'Q') high lights that pylon skin is prone to crack at forward attachment of the core cowling. The S.B. requires that if the crack propagates beyond 1 inch and two bolts of the middle attach fitting are also missing, the corrective action must be taken prior to next flight of the aircraft. This implies that operation of aircraft in the aforementioned condition is likely to result in failure of the cowling.

17.4.2. In this specific case two bolts of the middle hinge fitting had broken long before the occurrence, and pylon skin had also developed a crack which was 3" long. As such the situation forewarned in the Service Bulletin had taken place long before the actual occurrence and in fact every flight was making it worse. As such the pylon skin at forward attach point ultimately gave way. After the core cowling had come off its seat, the air flow further rupture the cowling and damaged the remaining two hinge fittings. As a result broken portion of the cowling fell off the aircraft.

17.4.3. The Airworthiness Directive No. 90-22-166 (B) calls for inspection of pylon skin at Rib No. 6 (forward attachment of core cowling) and that of 2nd core cowl fitting (middle attachment point) in accordance with Airbus S.B. No. A300-54-066 (R). The inspection is required to be repeated after every 750 hours. PIA had introduced card No. 540001-2 (Appendix 'R') to perform the aforementioned inspection during every alternate 'A' check which falls due after 700 hours. The Card was introduced by Development Engineering Division of PIA. Technical record section, which

falls under the Quality Control Division was responsible to schedule this card in every alternate 'A' check. But the card was not scheduled during the last alternate 'A' check dated 25th May 1991.

17.4.4. Had proper action, as required vide S.B. No. A300-54-066 (R), been taken during 'A' check dated 25th May 1991, the damage to cowling related parts could have been corrected at that stage and the incident could have been avoided. Thus the cowling failure is attributed to nonscheduling of Card No. 540001-2 on AP-BAX during 'A' check dated 25th May 1991.

17.4.5. The concerned persons of technical record section have mentioned in their statements that there was shortage of manpower. As such management had employed Daily Wage Staff in the section who missed Card No. 54001-2 while preparing the 'A' check package. The temporary staff cannot exhibit the level of responsibility as is done by a permanent employee, who is accountable to his employer till his retirement or even after that on account of pension benefits. As such proper staff should have been deployed to perform such an important task.

- 17.4.6. The work package prepared by temporary staff was not checked, to ensure that all the cards enlisted in master index were included in the package, prior to delivering the same to floor engineers.
- 17.4.7. The complete aircraft maintenance system is dependent on scheduling of relevant tasks within prescribed intervals. As such weaknesses in Technical record section adversely effect all areas of aircraft maintenance activity, including maintenance schedule, evaluation of modifications replacement of components etc. In view of the foregoing this section should not have been left at the mercy of Daily Wage Staff.
- 17.4.8. Possibility of damage to the cowling due to hitting of tyre pieces (No. 5 tyre had failed during the incident) was also examined but it could not be confirmed.
- 17.4.9. The cowling failure took place due to discrepancy of PIA technical record section. The system had a number of short comings as noted above. As such the persons responsible to manage these sections are to be blamed for these shortcomings.

17.5.. REJECTED TAKE-OFF

17.5.1. The read out of the Cockpit Voice Recorder indicates that the pilot decided to reject take off after the aircraft attained V_1 & V_R speed. This decision as per the statement of the pilot was based on severe vibrations he experienced after V_1 . According to him the vibrations were so intense that it shook the instrument panel making it difficult for the pilot read the flight instruments. The CVR read out on the contrary shows a very cool and calm cockpit. There is no indication of any emergency taking place during the take off. The evidence indicates that around V_1 , the left rear outer tyre burst. A piece of tyre tread flew off came in contact with the No. 1 engine cowling inlet after being deflected from the wing leading edge. This caused damage to the front accoustic panels of the engine which ripped out due to strong air stream. All fan blades of the engine have soft body damage (rubber from tyre) as well as pieces of blades missing due to hard body impact probably by a shorn off bolt or a piece of metal from the accoustic panel ripping off may have resulted in strong vibrations. The pilots decision to reject take off at high speed cannot be questioned, however all available evidence indicates that the aircraft could have taken off.

17.5.2. In the case of a tyre failure or suspected tyre failure, the pilots decision is an extremely difficult one. TO asses the extent of the problem when positioned a considerable distance away from the probable source, surrounded by Cockpit noise and vibrations calls for guesswork aided only by experience. To make conclusion from the sensory input, and to keep track of the aircraft progress relative to its take-off speed is a difficult problem which is further compounded by extremely short time in which to decided whither to go or abort.

17.5.3. A study was conducted by the National Transportation Safety Board U.S.A. (N.T.S.B). The following are excerpts from their report as regard high speed rejected take-off:-

17.5.3.1. Evidence from investigations conducted from the late 1960s suggests that pilots faced with unusual or unique situations may perform high speed RTOs unnecessarily or may perform them improperly. The N.T.S.B. surveyed a sample of U.S. Based major and national operators to determine how they train their flight crew members to both recognize the need for and to execute high speed rejected take offs. As a result of

this special investigation, the N.T.S.B. has issued several recommendations to address the guidance and training flight crew members receive in recognizing the need to execute and in the performance of rejected take-offs.

- 17.5.3.2. Compounding the difficulty pilots may face in recognizing and reacting to unusual or unique cues is the brief time that elapses between the point at which a transport category turbojet airplane accelerates beyond 100 knots to the point at which it reaches V_1 , generally about 4 to 5 seconds. Should an anomaly occur during this time, the crew will have only a second or two to analyze the event and decide if circumstances warrant an RTO. Consequently, Pilots encountering unusual sounds or vibrations just before V_1 may believe it more prudent to reject the takeoff and keep the airplane on the ground than to continue the take-off.

17.5.3.3. Based on the findings in the study of Hi-speed rejected take offs, the N.T.S.B. besides other has made the following recommendations.

17.5.3.4. Operators to present to flightcrews the conditions upon which flight manual stopping performance is predicated and include information about those factors which adversely affect stopping performance.

17.5.3.5. Require that simulator training for flight crews the operators present, to the extent possible, the cues and cockpit warnings of occurrences other than engine failures that have frequently resulted in high speed rejected takeoffs.

17.5.3.6. Operators are required to inform pilots to adopt a policy to use the maximum brake capability of auto-brake systems, when installed on the airplane, for all takeoffs in which runway conditions warrant and where minimum stopping distances are available following a rejected take-off.

17.6. INDEPENDANT OBSERVERS

17.6.1. Accident Investigation continues to show that the aircrew failed to follow standard procedures. This situation should not arise if CAA appointed PIA check pilots honestly perform their tasks. CAA itself has been blocked from putting independant observers in the cockpit of PIA Flights. These independant observers would positively point out the short comings of the flight crew in abiding by standard procedures. If this were done there would be a sharp decline in accidents /incidents involving aircrew failure to follow the procedures. It may be mentioned here that the only occasions where CAA, gets into the cockpit is after the accident occurs when it is too late to take preventive measures. The present case of A-300 AP-BAX is a fine example.

18. FINDINGS

- 18.1. The aircraft A-300 AP-BAX was certificated, equipped refueled and properly loaded for the subject flight. The CG position and landing weight were within limits.
- 18.2. The aircraft A-300 AP-BAX was not airwothy for flight as during start up the EGT limits were exceeded on No. 1 engine. The engine should have been shut down and the aircraft handed over to the maintenance for rectification.

- 18.3. The Pilot-in-Command showed extremely casual and unpropofessional attitude by not monitoring the EGT during start up as per procedures laid down in FCOM for A-300 type of aircraft. This constitutes violation of rule 251(9) of Civil Aviation Rules 1978.
- 18.4. The Pilot-in-Command deliberately taxied out an unserviceable aircrat with an intention of flight thus jeopardizing the lives of passengers and crew on board the aircraft. This constitutes violation of Rule 50 (a), Rule 140 (4) and Rule 155 of Civil Aviation Rules 1978.
- 18.5. Non standard phraseologies are being used on the intercom amongst the crew.
- 18.6. The Pilot-in-Command deliberately gave incorrect time of the EGT limits exeeded to the Ground Engineer and the maintenance control.
- 18.7. The Pilot-in-Command did not conduct pre take-off briefing thereby violating procedures laid down in SOP for A-300 type of aircraft. This also constitutes violation of rule 251(9) of Civil Aviation Rules 1978.
- 18.8. The Cockpit Voice Recorder analysis shows that pilot aborted take off after the aircraft attained V_R speed.

- 18.9. All evidences indicate that the aircraft could have taken off safely without any directional control problem contrary to the statement of the pilot.
- 18.10. The Cockpit Voice Recorder shows an absolute calm cockpit suggesting that the emergency did not require an abort.
- 18.11. Emergency evacuation was ordered by the Captain after much delay. Only two slides were used L₁ and R₁ for evacuation.
- 18.12. The crash fire tenders reached the scene of accident immediately. Some of the fire crew were not in uniforms which created confusion during the emergency evacuation.
- 18.13. No. 5 tyre (left hand outer rear) had burst during the take-off.
- 18.14. Upper one third of Left hand core cowling had ruptured and fell off the aircraft.
- 18.15. The two halves of the core cowling were found latched at bottom (all three points).
- 18.16. Pylon mounted bracket of Forward upper hinge fitting (L.H) had been detached from Pylon, rupturing Pylon skin, and was found on the runway along with mating portion of the cowling.

- 18.17. There was an old crack of about 3" length at the location from where pylon skin had ruptured.
- 18.18. The bottom two bolts of the middle hinge fitting were found broken. This was a fresh failure. However heads of two side bolts were missing and pylon condition indicated that these bolts had broken since long.
- 18.19. The mounting bracket for middle hinge shows extensive oxidation. This indicates that due to loss of side bolts there had been substantial clearance between pylon and the bracket, where moisture had entered.
- 18.20. Elongation of bottom holes on the middle hinge mounting bracket indicates that after loss of side bolts the middle hinge mounting bracket had shifted from its original position thus disturbing load distribution on other hinge fittings.
- 18.21. Rear hinge fitting was found installed on the pylon but it was broken due to pulling force exerted by the broken cowling.
- 18.22. The 'T' fitting, through which core cowl forward attach fitting is mounted on pylon structure, was found broken.
- 18.23. Maintenance card No. 540001-2 under which pylon skin at Rib 6 (forward attachment of core cowling) and second core cowl fitting are inspected (during alternate 'A' check) in accordance with Airbus

Service Bulletin No. A300-54-066(R) (AD No. 90-222-116(B) was not scheduled by technical record section during A-02 check of this aircraft dated 25th May 1991.

18.24. Card No. 540001-2 (covering compliance with AD No. 90-222-116(B) scheduled in previous checks is not readable. As such the AMEs performing the inspection can not make proper decision as required by the Service Bulletin.

18.25. Development engineering section of PIAC maintains records pertaining to compliance with mandatory modifications (including Airworthiness directives Service Bulletins etc). But in case of mandatory modifications requiring repeat inspections, the compliance status of effected aircraft is not fed back to Development Engineering section. As a result, compliance with such requirements is not properly monitored.

18.26. Development engineering section which is responsible for preparation of maintenance schedule does not get a positive feed back regarding Master index card to include all the required tasks.

18.27. In general following shortcomings were noticed in maintenance work sheets/cards.

18.27.1. Registration number of aircraft was not recorded on many work sheets/cards.

- 18.27.2. Serial number of the periodic check was not indicated.
 - 18.27.3. Serial numbering of papers for a maintenance check cards/package was not reliable.
 - 18.27.4. Quality of printing/copying of maintenance cards was poor and a number of cards were not readable.
 - 18.27.5. The cards were not segregated according to the category of AME licence/approval under which the same were to be certified.
- 18.28. There was shortage of manpower in Technical record section on retirement/prolonged sickness of senior persons the management did not replenish the manpower. 'Daily Wage' staff was employed in the section who had been preparing maintenance check packages. Regular staff was not cross checking if the check package cards prepared by the temporary staff were in accordance with the prescribed bill of work.
- 18.29. Line Maintenance II section performs 'A' Check and other periodic checks on the aircraft maintained by them by No. Quality Control coverage is provided for these checks.

18.30. During scrutiny of details regarding training of maintenance personnel, it was revealed that the Aircraft Maintenance Engineers are not provided refresher courses to update their knowledge. Moreover, technicians are deployed for aircraft maintenance without imparting any formal training.

18.31. The Accident/Incident inquiries continue to show that majority of accidents are occurring due to aircrew not following standard procedures.

19. **CAUSE**

19.1. Primary cause of the incident being, failure on the part of PIAC maintenance to carry out action required vide Airbus Service Bulletin S.B. No. A-300-54-066(R) and Airworthiness Directive No. 90-222-166(B) which required inspection of the Engine cowling on every alternate 'A' check to ensure continuing Airworthiness.

19.2. The Secondary cause being failure to stop on the runway after high speed rejected take off.

20. **RECOMMENDATIONS**

20.1. PIA should re-organize its Technical record section. Adequate personnel be posted in the section to meet normal requirements as well as leave and training reserves should also be provisioned in the establishment.

- 20.2. Temporary/Daily Wage/Contract personnel should not be posted in this section. Infact Aircraft Maintenance Engineers be posted in the section to cross check the job performed by non technical personnel.
- 20.3. Responsibility of the persons performing different functions relating to Technical records should immediately be specified in writing.
- 20.4. Written procedures must be introduced for the functions related to Technical record personnel. Infact this is required for the jobs performed by entire Engineers & Maintenance Department. However, this job should immediately be completed for Technical Record Section.
- 20.5. Master index for periodic checks should be controlled through computer and it would be more appropriate if this function is perfomed by Development Engineering section who are responsible for preparing maintenance schedule and adding different tasks in individual checks, Moreover all Master index should be periodically reviewed for currency.
- 20.6. No aircraft should be released after periodic checks or even after lower checks until all the due jobs have been completed and certified by appropriately qualified persons. The final clearance should be done by one incumbent in a shift and PIA Management should specify the functionary who will be responsible for final release of aircraft.

- 20.7. The cards introduced for compliance of mandatory modifications should have different colour coding and on the top the word letters 'A.D' should be printed on each card.
- 20.8. Quality Control Section of PIA Engineering should monitor maintenance activities performed in line maintenance section. Specially work performed during periodic checks should be closely monitored.
- 20.9. PIA should review all maintenance cards to check clarity of information contained in the same. The cards of a periodic check should be segregated according to the categories of AME which they are certified. Registration number of aircraft should be indicated on each card. All cards of a periodic check should be given proper serial number.
- 20.10. The Aircraft Maintenance Engineers should be provided refresher courses to keep them current on aircraft systems latest modifications current defects/developments etc.
- 20.11. Until a person is trained on basic maintenance practices and has obtained training on specific equipment, he should not be deployed in the capacity of aircraft technician.
- 20.12. Action under the C.A.R. 1978 be taken against Mr. S.N.A. Naqvi, Manager Tech. Record Section and Mr. Mohsin Ali Meerza, the then Chief Engineer Quality

Control being overall incharge, for non compliance with French A.D. No. 90-222-116(B) (Item No. 1.12) due to discrepancies in Technical Record Section.

- 20.13. PIAC should include in its training programme to present to its flight crew the conditions upon which flight manual stopping performance is predicated and include information about those factors which adversely affect stopping performance.
- 20.14. PIAC to ensure that during simulator training of flight crews, to the extent possible present, the crews with cockpit warnings of occurrences other than engine failures that have frequently resulted in high speed rejected take offs.
- 20.15. PIAC should inform all pilots to adopt a policy to use the maximum brake capability of auto brake systems, when installed on the airplane, for all take offs in which runway conditions warrant and where minimum stopping distances are available following a rejected take off.
- 20.16. Action may be take against the Pilot-in-Command Capt. Aqeel Ahmed Hashmi for failing to follow the correct procedure for hot start as laid down in Flight Crew Operators Manual. He deliberately falsified his statement to the maintenance staff regarding over temperature conditions during start up of No. 1 engine. He thus taxied out deliberately with an unserviceable aircraft and jeopardized the lives of all the passengers and the crew on board Captain Aqeel

Ahmed Hashmi was in violation of Rules 50(a) 140(4), 155 and Rule 251(9) of Civil Aviation Rules 1978.

20.17. The Ministry of Defence must issue orders to PIAC to allow observers nominated by DG CAA to fly in the cockpit which is a requirement of rule 267(3) of Civil Aviation Rules 1978.

20.18. PIAC may be asked to given a target date by which the recommendations concerning their Organisation would be implemented.