

ORIGINAL



CIVIL AVIATION AUTHORITY
PAKISTAN

AIRCRAFT INCIDENT INVESTIGATION

M/S PIAC BOEING-737 REG NO AP-BCE WHICH OCCURRED

ON 18TH JANUARY, 1999

AT

LAHORE AIRPORT



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FINAL REPORT
INCIDENT RELATING TO PIAC BOEING 737
PAKISTANI AP-BCE AT LAHORE AIRPORT
ON 18 JANUARY 1999

SYNOPSIS

On being notified of the incident to PIA B-737 AP-BCE at Lahore on 18th January 1999, SIB was tasked to carry out the investigation vide Director General Civil Aviation Authority Memorandum No.HQCAA/1901/238/SIB dated 27th January 1999 (Appendix 'A'). The investigation team was composed of Air Commodore (Retd) Jamal Hussain, President SIB (Investigator In-charge), Air Commodore Hashim Yamin, Chief Pilot Investigator (Ops. Investigator) and Sqn. Ldr. (Retd) Ahmed Bilal, Ops Engineer (Tech. Investigator). This report is being released under the authority of DG CAA.

Brief Resume. During a non-precision FMC approach for RW 18L at Lahore, the aircrew sighted the airfield slightly towards the left when they were about 1.33 KM from the runway beginning. The Captain, who was Pilot not flying (PNF) till then, took over the controls and attempted to line up with the runway and land. During the process, the aircraft overshot laterally towards the left and its right wing tip scraped the runway surface, its No 2 Engine cowling broke No 8-runway edge light and its left wheel went off the prepared surface to the left. The Captain manoeuvred the aircraft back on to the runway and completed the landing sequence without any further incident.

1. FACTUAL INFORMATION

1.1. History of the Flight

- 1.1.1. PK-381 Passenger Flight from Islamabad to Lahore, take off time was 0803 UTC.
- 1.1.2. Incident took place at Lahore Airfield during daytime at 0844UTC.
- 1.1.3. Flight preparation is a non-factor in this incident.

1.1.4. PK-381 was on a routine flight from Islamabad to Lahore. The flight was uneventful between take off from Islamabad until the R/W at Lahore was sighted. On arrival, ATC Lahore allotted R/W 36R. Visibility reported by Met was between 3 to 4 KM while Tower observation was 2 KM. Wind was calm. The Captain of the aircraft requested for R/W 18L which did not have ILS and the aircraft had to execute a non-precision approach. R/W 18L was approved by the ATC. PK-381 set up a non-precision approach for R/W 18L using FMC. Radial 004 was intercepted and the aircraft levelled off at 1100 ft AMSL (MDA). Visual contact with the R/W was established late, at about 1.33 KM. At this stage the aircraft was about 1000 feet to the right of the runway. The Captain continued with the approach rather than execute a missed approach. In the process the right wing tip and the right engine grazed the runway surface causing superficial damage. The aircraft completed the landing sequence without any further incident and taxied to the tarmac normally.

1.2. **Injuries to Persons** Nil.

1.3. **Damage to Aircraft**. Right Wing Tip damaged, Right Nav Light Cover broken, Retractable Landing Light broken, Right Flap Track Fairing Cone damaged, Right Wing Tip Tail Light Casing damaged, Leading Edge Slat No 6 eroded, Lower Cowl No 2 Engine eroded and Right Tip of Outboard Trailing Edge Flaps eroded. (Appendix B).

1.4. **Other Damage** No.8 R/W Left Edge Light broken.

1.5. **Personnel Information** (Appendices C1 and C2).

1.5.1. Captain Omar Aziz, P-38198, was the Pilot in Command of PK-381. His personal details are as follows: -

(i) Age : 41 years

(ii)	Licence	:	Valid ATPL # 659
(iii)	Rating	:	Valid B-737 rating
(iv)	Medical	:	Class-I
(v)	Flying	:	Total Command Hours – 3580
			Total Command Hours on type – 1704
			Grand Total : 11148 hours

1.5.2. His recent rest schedule versus flight duty time was as follows :-

- 1.5.2.1 16th January 1999. He operated PK-347, taking off from Lahore at 1303 hours (local time) making two stops at Multan and Rahimyar Khan respectively on this sector before reaching Karachi at 1630 hours. He was scheduled to be positioned at Lahore by the first available service (FAS) out of Karachi. The next flight to Lahore was scheduled to take off at 2000 hours. This flight got delayed and was subsequently cancelled. He reached the Hotel (in Karachi) at 2330 hours and went to bed at 0100 hours (morning of 17th January 1999).
- 1.5.2.2 17th January 1999. He woke up for 'Sehri' at 0500 hours after getting just four hours of sleep. After Sehri and prayers, he slept for another three hours. He was scheduled to fly non-operating to Lahore on PK-304, which was to take off at 1730 hours. This flight was also inordinately delayed and Captain Omar Aziz reached Lahore quite late. He had his meal at about 2100 hours and went to bed at 0100 hours (18th January 1999).
- 1.5.2.3 18th January 1999. On 18th January 1999 Captain Omar Aziz was detailed to fly PK-356 departing Lahore at 0800 hours. He was unable to wake up for Sehri and got up at pick up time, which was around 0630 hours. Despite missing 'Sehri' he elected to fast as he expected that it

probably was the last day of Ramzan and he did not want to give up the fast. The total sleep hours between 16 January and 18 January were 12 hours and 30 minutes.

1.5.3 First Officer Zulfiqar, P-52552, was the Co-pilot of PK-381. His personal details are as follows: -

(i)	Age	:	44 years
(ii)	Licence	:	Valid CPL # 1073
(iii)	Rating	:	Valid B-737 rating
(iv)	Medical	:	Class-I
(v)	Flying	:	Total Command Hours – 391
			Total Command Hours on type – Nil
			Grand Total 2987 hours

1.5.3. His recent rest schedule versus flight duty time was satisfactory.

1.6. Aircraft Information

1.6.1. Mishap aircraft had a Valid Airworthiness Certificate and as per available evidence, it was fully serviceable for the mission (Appendix D1)

1.6.2. Its Centre of Gravity was within limits. (Appendix D2).

1.6.3. Fuel used was Jet A-1.

1.7. Meteorological Information (Appendix E)

1.7.1. METAR OPLA

0800Z SW03 3KM SHZ SKC 14/08 1018.5

0900Z 36002 4KM SHZ SKC 15/09 1017.7

1000Z NW03 4KM SHZ SKC 16/09 1016.8

Visibility observation for RW 36 reported by Approach Controller was 2 KM.

1.8. Aids to Navigation

1.8.1. ILS – Serviceable and available for R/W 36R. ILS facility not available for R/W 18L/18R.

1.8.2. VOR DME - serviceable.

1.9. Communications. UHF and VHF serviceable. R/T Tape extracts placed as Appendix F.

1.10. Aerodrome Information

1.10.1. PAPI Serviceable.

1.10.2. Runway Approach Light - Serviceable. As per available evidence, these were at 100% intensity.

1.11. Flight Recorders

1.11.1. DFDR Data at Appendix G.

1.11.2. CVR data at Appendix H.

1.12. Wreckage and Impact Information For Final Flight and Ground Path refer Appendices J and K.

1.13. Medical and Pathological Information

1.13.1. Work-rest schedule of Capt. Omar Aziz. Refer paragraph 1.5.2.

1.13.2. Nourishment level. Refer paragraph 1.5.2.

1.13.3. Drug intake - Nil. Refer Medical Report at Appendix L1 and L2.

1.14. Fire Nil.

- 1.15. Survival Aspects N/A.
- 1.16. Tests and Research Nil.
- 1.17. Organisational and Management Information N/A
- 1.18. Additional Information Nil.
- 1.19. Useful or Effective Investigation Techniques Nil.

2. ANALYSIS

Technical Analysis

2.1 Defect History Reports. The aircraft had operated on nine sectors consecutively prior to the mishap flight without any pilot reported defects relevant to the accident. The only reported defect was related to NAV 2 digital display. The aircraft also underwent Check 'A' during these operations. Any un rectified defect, therefore, was not a cause of the accident.

2.2 Engine Performance. RPM and EGT are the main parameters, which determine the engine performance. These parameters were obtained from the digital flight data recorder readouts for last 2 minutes prior to touch down and till the IAS established at 44.8 knots on the landing roll. There were no abnormal variations in N1 and N2 of both the engines. The EGT also remained within the maximum allowed limit of 870° Centigrade. Engine performance was, therefore, not a factor in this incident.

2.3 Wheel Brake Performance. Brake pressure readouts from the DFDR show pressures going to maximum on both left and right wheel assemblies. This indicates that both the wheel brakes were operating normally at the time of landing. Moreover, the fact that the aircraft was brought under control without any difficulty also indicates that there was no abnormality in this system. Therefore, unserviceability of the wheel brakes was not a cause of this incident.

2.4 Aircraft Structural Integrity. The damage sustained by the aircraft was the result of impact with the runway and no evidence was found to suggest that the aircraft structure was damaged prior to the accident. Therefore, structural integrity of the aircraft was not a factor in this incident.

2.5 Mass and Balance. The Mass and Balance data was obtained from the load sheet prepared for the mishap flight prior to departure. Landing weight and centre of gravity position in relation to the mean aerodynamic chord are the critical factors in ascertaining proper loading of the aircraft in the landing phase. The landing weight limit for B-737 aircraft is 51709 KGs. The landing weight for the mishap aircraft was calculated to be 50655 KGs, based on the tip fuel of 1800 KGs, which is 1054 KGs, less than the maximum allowed limit. The centre of gravity position at zero fuel weight for the mishap aircraft was calculated to be 27% MAC as against the limit of 28%. Therefore, the mass and balance of the aircraft was not a factor in this incident.

Operational Analysis

2.6 Why did the Captain request for RW 18?

2.6.1 On arrival over Lahore, PK-381 was allotted RW 36R, which was the main instrument runway with ILS facility. Visibility report by Met was between 3 to 4 KM whereas tower reported 2-KM visibility. Surface wind was calm. The Captain requested for RW 18L. According to the Captain, his request for RW 18L was due to the following two factors: -

- 2.6.1.1 Approach and landing on RW 18L would be quicker than on RW 36R as the aircraft was approaching from the North. This would mean fuel economy, which would benefit the Corporation.
 - 2.6.1.2. The Captain wanted to give practice to his First Officer who was pilot flying (PF) on approach and landing on a non-instrument runway under marginal but permissible visibility condition.
- 2.6.2 The Captain's decision to request for RW 18L would have been correct under normal circumstances. At Lahore he failed to take cognisance of two important factors against selection of RW 18L, which were: -
- 2.6.2.1. Tower observation on visibility was 2 KM whereas minimum visibility for non-precision approach is 1.2 KM. At Lahore MDA was 1100 AMSL (400 feet AGL). Visual Descent Point (VDP), which is the distance from the Runway from where final descent for approach must commence to be able to maintain a 3°-glide slope, is 2.33 KM. Descent under non-precision approach cannot start till visual contact with the runway is established. Under the prevailing visibility condition, the aircraft would reach the VDP before the aircrew would acquire the runway visually. For more discussion on VDP, please refer to paragraph 2.13.
 - 2.6.2.2. The Captain's decision to fast and that too without Sehri was bound to affect his decision making ability and motor skill. Had he kept this factor in mind, he could have avoided taking an option requiring a very high degree of precision and sound judgement.

2.7. Fasting and Flying

2.7.1. CAA Policy

2.7.1.1. Rule 41(3) of CAR 94 states: ‘ The holder of a medical assessment issued under this Part shall not exercise the privileges of his licence if he is aware that his capacity to efficiently perform his duties is likely to be impaired by a decrease in his medical fitness, or by a period of fasting.’ (Appendix M).

2.7.1.2. Para 6.3.2.15 of Chapter 6, Annex 1-Personnel Licensing states: "Cases of metabolic, nutritional or endocrine disorders likely to interfere with the safe exercise of the applicant's licence and rating privileges shall be assessed as unfit." (Appendix N).

2.7.1.3. Para 4 of Policy letter on fasting and flying, issued by Chief of Aviation Medicine of CAA Pakistan in March, 1991 states, "In view of above Hypoglycaemia manifestations due to fasting the pilots during duty schedules should possibly avoid flying with empty-stomach so that flight safety is not compromised." (Appendix O).

2.7.2. PIA Policy. PIA's Corporate Safety had issued a poster for their aircrew, which stated, " The holy month of Ramzan is almost upon us and a long standing issue, 'Fasting and Flying', again needs special consideration from all of us. We, the commercial pilots stand a lot deeper in the sea of our responsibilities, especially to the hundreds of passengers who have undying faith in our excellent reputation. Let us conclude by reminding that the RIGHTS OF PEOPLE according to the all Benevolent and Merciful, Almighty God, if violated by any human, CANNOT be forgiven by HIM." (Appendix P).

2.7.3. Armed Forces' (Pakistan) Policy. A fasting person is not permitted to fly. (Appendices Q1 to Q3).

2.7.4. As can be seen from the present policies, that while the Armed Forces of Pakistan categorically prohibit flying while fasting, all others leave the final decision of flying while fasting with the pilot. Fasting, as per the medical research results in 'Hypoglycaemia manifestations' which in the lay man's language means lowering of blood sugar level, adversely affecting a person's motor skill and judgement. This effect normally becomes more pronounced if it is combined with lack of rest especially after a lapse of about 12 hours from the last meal taken (Appendix R). Captain Omar Aziz had opted to fast and fly and that too without Sehri. His last meal taken was at 2300 hours on 17 January 1999 while the incident took place at about 1340 hours on 18 January 1999. Captain Omar had not eaten anything for more than 16 hours, which was likely to result in Hypoglycaemia, affecting a person's motor skill as well as his judgement. While one can understand Captain Omar's religious sentiments where he did not want to miss a fast, he should have displayed greater responsibility to the Corporation and to the passengers and opted either not to fly, or not to fast on that day, more so, when he had missed taking his 'Sehri'.

2.8 Why was the Runway Sighted Late? Tower observation of visibility was 2 KM, whereas the runway was sighted at about 1.33 KM. This slightly delayed pick up of the runway is fairly common and does not reflect any lack of attentiveness by the pilots. It is quite likely that the actual visibility may have been lower than the reported visibility.

2.9 Was the Captain's Decision to Land Out of the Approach Correct? The Captain established visual contact with the runway at 1.33KM. He was at 346 feet AGL at that point. To execute a landing from there would result in a glide slope angle in excess of 3°. He was also not properly aligned with the runway and needed to manoeuvre excessively at a very low altitude. Attempting a landing from his position would certainly result in a destabilised approach. It would have been more appropriate for the Captain to have elected to go around and attempt a landing from R/W 36R which had the ILS facility. The Captain's decision to land out of the approach was incorrect.

2.10 Physical Fitness of the Captain. The incident took place more than 16 hours after the Captain had eaten his last meal. Fatigue and low sugar level could have affected his decision making ability, judgement and motor skill. This resulted in his decision to continue with a destabilised approach and handle it in a manner, which resulted in scraping of the right wing and No. 2 engine nacelle on the runway surface. Continuous fasting during the month of Ramzan and observing fast on the 18th January, that too without Sehri, had, in all likelihood caused him to be hypoglycaemic.

2.11 Role of the First Officer. The First Officer was aware that the Captain had picked up the runway late and the approach had destabilised and yet he did not suggest discontinuation of the approach. It is the duty of the First Officer/Co pilot as per SOPs, to caution the Captain in case glide slope exceeds beyond one dot or if the rate of descent increases beyond 1000 feet per minute. In this particular approach, both the parameters had been violated yet the First Officer did not caution the Captain. He could not offer any explanation for this lapse. He also ignored the warnings of the GPWS. His performance as a First Officer was, therefore, not satisfactory.

2.12 Aircraft Characteristics. Boeing 737's engines' and wings' ground clearance is lesser as compared to the other aircraft in the PIA inventory. This clearance is reduced further when the aircraft is at high pitch angle because the wing is swept back and is located quite aft on the fuselage thus limiting freedom of manoeuvre close to the ground. Moreover, in this aircraft, yaw produces a large amount of roll with the spoilers deployed. These performance characteristics led to the scraping of wing tip and engine nacelle on the runway surface when the pilot attempted to realign the aircraft with the runway by excessive manoeuvring close to the ground.

2.13 Visual Descent Point

- 2.13.1 Most commercial aircraft maintain a 3° glide slope during the final phase of approach and landing. The permissible deviation from the 3° glide slope is 0.25° . When the glide slope deviates in excess of 0.25° , the approach is considered destabilised and the pilots are expected to carry out a missed approach. While carrying out an ILS instrument approach, ILS provides the guidance to the pilot to fly and maintain the recommended glide slope. However, when making a non-precision approach, the pilots have to commence their descent manually from a pre-calculated point so as to intercept and maintain the 3° glide slope. The point from which the descent has to be initiated in order to intercept the 3° glide slope is known as the Visual Descent Point (VDP). Calculation of VDP is a function of Minimum Descent Altitude (MDA). MDA is the minimum altitude to which the aircraft is permitted to descend and maintain as it approaches for landing in a non-precision approach until threshold of that runway, or approach lights, or other markings identifiable with the approach end of that runway are clearly visible to the pilots. (Appendix S). On establishing visual contact with the runway, the pilots are permitted to start the final descent to intercept the glide path. MDA is given in the Jeppesen approach plates for each airfield and runway whereas VDP is not mentioned in the charts and has to be calculated by the pilots for each non-precision approach. Descent below MDA in a non-precision approach is not permitted till the pilot establishes visual contact with the runway.
- 2.13.2 Commercial Airline Pilots are taught to calculate the VDP with reference to DME (wherever DME facility is available) while executing a non-precision approach. During the approach if the pilots fail to establish visual contact with the runway after reaching the VDP, they are expected to abandon the approach and execute a missed approach from the point designated in the approach charts (MAP). Attempting a landing after crossing the VDP is not recommended, as it will most likely result in the final approach angle exceeding 3° . VDP thus is an excellent guide for the pilots to decide whether to continue with the approach for

landing or prepare for execution of a missed approach procedure in case the runway is sighted after passing the VDP.

- 2.13.3 While PIA pilots are aware of VDP and its usage, PIA SOPs do not make it mandatory for their pilots to calculate and display the VDP on their landing charts for non-precision approaches. Calculation and display of VDP is not a common practice with the PIA aircrew, as such, Captain Omar and his First Officer did not pre-calculate their VDP while planning a non-precision approach for R/W 18L at Lahore. Had this been a mandatory requirement of the Corporation, Captain Omar would have calculated the VDP for the approach and known that VDP figure for the approach was 3.25 DME (2.33 KM from the threshold of R/W 18L). If they had been aware of this figure as a reference point, it would have helped them to arrive at the correct decision of discontinuing their approach when the runway was not sighted by 3.25 DME and was eventually seen at 2.25 DME. As Captain Omar did not have the VDP reference before him, he relied on his visual assessment, which proved to be wrong and which eventually caused the incident.

3. CONCLUSIONS

Findings

- 3.1 On 18th January, 1999, Captain Omar Aziz, P. No. 38198 and First Officer Zulfiqar Ali, P. No. 52352 were scheduled to operate PK-381 from Islamabad to Lahore in Boeing 737-300 Registration No. AP-BCE.
- 3.2 Both the pilots had valid pilot licences and ratings.
- 3.3 The mishap aircraft was serviceable for the flight.
- 3.4 PK-381 took off from Islamabad at 1303 hours (local). Between 1300 hours to 1400 hours visibility reported over Lahore was 3-4 KM.
- 3.5 First Officer Zulfiqar was Pilot Flying for the sector.

- 3.6 On reaching Lahore the aircraft was cleared for landing on R/W 36R by Lahore Approach Control.
- 3.7 The Captain requested for clearance to carry out a landing on R/W 18L, which did not have ILS facility.
- 3.8 PK-381 was cleared for landing on R/W 18L by Lahore Approach Control.
- 3.9 After obtaining clearance for landing on R/W 18L, PK-381 intercepted radial 004° and descended to 3000 feet AMSL by 10 DME, as per the approach chart profile.
- 3.10 Once established on radial 004 at 10 DME, PK-381 descended to 1100 feet AMSL (MDA).
- 3.11 Flight Monitoring Computer (FMC) had been selected for the approach.
- 3.12 Up to this point, the flight was uneventful.
- 3.13 The Captain established visual contact with the runway at an approximate distance of 1.33 KM from the threshold of R/W 18L.
- 3.14 When visual contact was established, PK-381 was about 1000 feet to the right of R/W 18L-centre line.
- 3.15 On sighting of the runway, Captain Omar took over controls, disengaged the FMC and simultaneously initiated a left turn (bank) and descent to line up with the runway in an effort to effect a touch down at the beginning of R/W 18L.
- 3.16 During the manoeuvre, Ground Proximity Warning System (GPWS) was activated warning the pilots of the high sink rate.
- 3.17 GPWS warning was ignored and Captain Omar continued with the approach and manoeuvre.
- 3.18 As the aircraft was approaching the threshold, it overshot laterally to the left of the runway. The Captain reversed bank to the right in an effort to line up with the runway.
- 3.19 During the reversal, the right main gear contacted the runway left of the centreline at about 7° offset to the left from the runway heading.
- 3.20 This was followed by scraping of the right wing leading edge on the runway surface, No. 2 engine cowling contacting and breaking a runway light (No. 8 light on the left side) and the left wheel touching down on the unprepared surface to the left of the runway.
- 3.21 The Captain successfully brought the aircraft back on to the runway during the landing roll.

- 3.22 The aircraft was brought under control on the runway without any further incident.
- 3.23 After checking with the Cabin Crew that there was no damage in the passenger compartment or injury to any person, the Captain decided to taxi back to the parking bay.
- 3.24 After switch off and visual damage assessment the Captain made an entry in the Technical Logbook and reported the incident to Lahore ATC.
- 3.25 The Captain's recent work-rest schedule coupled with his fasting without Sehri had, in good likelihood, led to fatigue and hypoglycaemia resulting in degradation in his judgement and motor skill.
- 3.26 The Captain's request for R/W 18L, which did not have ILS facility when R/W 36R having ILS facility was available, under the prevailing visibility condition (3-4 KM), was inappropriate.
- 3.27 His decision to continue a destabilised approach and attempt to land even after the GPWS had sounded the alarm was incorrect.
- 3.28 His aircraft handling close to the ground was not satisfactory. He should have been aware of the low ground clearance of B737 wing/engine pods especially at high angle of attack and in a bank and avoided excessive manoeuvring close to the ground.
- 3.29 The First Officer failed to inform the Captain when the glide slope had increased beyond 3.25° and when the rate of descent increased beyond 1000 feet per minute. He also ignored the GPWS warning and did not remind the Captain that GPWS warning had sounded which indicates a destabilised approach.
- 3.30 Calculation of VDP and its usage is taught but not commonly practised by PIA pilots.
- 3.31 The Cockpit Crew had not calculated the VDP for the non-precision approach for R/W 18L at Lahore.
- 3.32 VDP for R/W 18L at Lahore for PK-381 was 3.25 DME whereas the runway was sighted at 2.25 DME.
- 3.33 While the present policy/regulation on flying and fasting, both of CAA and PIA highlights the dangers involved in flying while fasting, it leaves the final decision of flying while fasting with the pilots.
- 3.34 Flying while fasting is prohibited in the Armed Forces.
- 3.35 The aircraft sustained minor damage.
- 3.36 No one was injured in the incident.

Cause(s)

3.37 THE CAPTAIN'S DECISION TO LAND FROM AN APPROACH, WHICH HAD BEEN DESTABILISED.

"As the runway was sighted late and the aircraft was offset to the right, attempting a landing from that position required a final approach angle steeper than 3° glide slope and entailed excessive manoeuvring very close to the ground. GPWS had warned the pilots that their approach was steep and they had exceeded the permissible rate of descent. The high rate of sink along with high nose attitude and a right bank of 13° very close to the ground led to an uncontrolled touch down and scraping of right wing tip and No. 2 engine nacelle with runway surface/runway edge light. Low nutritional level of the Captain because he had not eaten anything for the past 16 hours (he was fasting without Sehri) impaired his judgement and motor skill and was a contributory factor".

3.38 NON PERFORMANCE OF HIS DUTIES BY THE FIRST OFFICER

"When the Captain is executing the landing, the First Officer is to monitor the approach/parameters and caution the Captain if any of the parameters are exceeded. In this incident, the First Officer failed to observe and warn the Captain when glide slope exceeded 3°. He did not react when the rate of descent went beyond 1000 feet and even when the GPWS had sounded the alarm."

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4. SAFETY RECOMMENDATIONS

- 4.1 Captain Omar and First Officer Zulfiqar be given necessary corrective training and practice on non-precision approaches, with special emphasis on recognition and initiation of correct action if an approach is destabilised.
- 4.2 First Officer Zulfiqar be given extra training regarding his duties as First Officer especially during the critical phases of take off and landing.
- 4.3 All 737 operators be made aware of the low ground clearance of B-737 wing/engine pods and the need to operate within the permissible parameters during take off and landing.
- 4.4 Airline SOPs should include calculation and display of VDP⁺ in Take Off and Landing Data (TOLD) card for all non-precision approaches on runways equipped with VOR/DME.
- 4.5 Airlines should create greater awareness amongst their aircrew through an indoctrination programme on the adverse effects of hypoglycaemia on Flight Safety, following fasting.
- 4.6 Because of the religious sensitivity of the subject of fasting, the present CAA Regulation on flying while fasting is to continue. The policy states: ‘ The holder of a medical assessment issued under this part shall not exercise the privileges of his licence if he is aware that his capacity to efficiently perform his duties is likely to be impaired by a decrease in his medical fitness, or by a period of fasting.’
- 4.7 Some additional recommendations on the subject are as under: -
 - 4.7.1 Flying while fasting without Sehri be prohibited.
 - 4.7.2 All airlines to carry out an in-depth study on the issue of fasting and flying, specifically to examine if a prohibition on flying while fasting will adversely

affect their scheduling and give their report/recommendations to SIB by 30th September, 1999.

4.7.3 SIB is to continue its effort to get inputs on fasting while flying from Airlines of other Muslim nations like Saudi Arabia, Iran, Gulf, Malaysia and Indonesia.

4.8 Installation of strobe lights at Lahore 18L/18R and other runways where ILS does not exist be studied by ATS branch. Strobe lights can help in early sighting of the runway during marginal visibility conditions.