INVESTIGATION REPORT OF FATAL ACCIDENT OF CESSNA-150 AIRCRAFT (AP-AZS) OF MULTAN FLYING CLUB OCCURRED ON 18 AUGUST 1989 AT MULTAN AIRPORT

BRIEF DESCRIPTION

1. On 18th August, 1989 at Multan Capt. Mohammad Munib who was working on adhoc basis as an instructor pilot with the Multan Flying Club, was detailed to fly a training sortie with Mr. Ghulam Mustafa Mugsi (a student pilot) on Cessna-150 aircraft (Registration No. AP-AZS). The planned take off was to be 1700 hours, however, due to reasons unknown the aircraft took off at 1845 hours from runway-36. Within a minute after AP-AZS was cleared to take off the pilot asked for a priority landing on runway 18 "due technical". He was cleared by the duty air traffic controller for runway-18. The pilot initially turned about 30° to the right (apparently to execute a shallower bank turn through 180°) and then started turning left to execute a landing. The aircraft while still in a banked attitude (having completed the turn through 180°), suddenly lost height and struck the ground in about 30° dive and 10° left bank attitude at a point about 6 feet to the right side of the prepared undershoot portion of runway-18 (see App. "A"). The point of impact is nearly 600 feet short of the beginning of the main runway. Both the pilots were immediately rescued in a seriously injured and unconscious state, from the cockpit, by the M.O.D.C. and A.S.F. guards on duty in the close vicinity of the crash site. The aircraft did catch fire but after the bodies of the pilots had been pulled out of the cockpit. Damage due to fire was negligible, because crash/fire tenders had already reached there and managed to extinguish the fire instantaneously. However, the aircraft got damaged beyond economical repair due to impact.

2. Both the pilots, succumbed to their injuries, later in the C.M.H. Multan.

HISTORY OF THE AIRCRAFT

TYPE OF AIRCRAFT	=	CESSNA-A150M
REGISTRATION MARK	=	AP-AZS
OWNER/OPERATOR	=	MULTAN FLYING CLUB
AIRFRAME CONSTRUCTOR'S NO.	=	A 1500704
YEAR OF CONSTRUCTION	=	1976
ENGINE TYPE	=	CONT. O-200
ENGINE CONSTRUCTOR'S NO.	=	25 R 404
ENGINE INSTALLED ON THE AIRCRAFT	=	ON 10TH MARCH 1985
ENGINE TOTAL HOURS SINCE NEW	=	1951:20 HOURS
C OF A CATEGORY	=	NORMAL
SUB-CATETORY	=	a, b, c.
C OF A VALIDITY	=	20TH MARCH 1990
C OF M LAST ISSUED	=	ON 13TH AUGUST 1989
C OF M VALIDITY	=	25HOURS OR ONE MONTH WHICHEVER FALLS EARLIER
AIRCRAFT FLOWN SINCE LAST C OF A	=	566:45 HOURS
AIRCRAFT FLOWN SINCE LAST C OF M	=	14:25 HOURS

A N A L Y S I S

1. On 18th August, 1989 at about 1000 hours aircraft Cessna-150 AP-AZS was refuelled, pre-flighted and declared serviceable by the Chief Engineer of the Multan Flying Club. On the preceding night the flying activity had continued till about 2200 hours, therefore, the aircraft was left unrefuelled on the tarmac till next morning. No flying was planned for the morning half, however, in the afternoon, on 18th August, 1989, Mr. Muhammad Munib an Assistant Flight Instructor who was working on adhoc basis with the Multan Flying Club, was scheduled to fly a training mission with Mr. Ghulam Mustafa Maqsi, a student pilot. Mr. Muhammad Munib had about 1000 hours of total flying experience including about 500 hours instructional. The student pilot had flown approx. 18:00 hours since he joined the club, and was reported to have had some difficulty in comprehending the instructions in the air. The student was to have practiced circuit work, during the day light hours only. Although including CFI, there were two more I.Ps. available in the club, Mr. Munir who not only had remained committed throughout the day in arranging reception etc. for his father who returned after performing HAJ and had flown over 6 hours, including night flying, on the preceding day yet he was detailed to fly two training mission of 1½ to 2 hours duration each in the afternoon. He took off at about 1845 hours instead of scheduled time i.e. 1700 hours. By all standard this mission should have been cancelled, had there been any responsible person to supervise the operations, because it was too early a stage for the student pilot to do night flying. C.F.I. Multan Flying Club had no plausiable explanation for this observation of the board. Firstly because he is never present to supervise the operational aspects particularly in the afternoon, Secondly there are no written instructions in the form of an operational manual/flight order book, a mandatory document for each flying club or a general aviation company which in addition to procedural guides contains limits-cum-restrictions about operations for the

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sake of safety and efficiency etc. How could an ab-initio who had yet to complete and consolidate basic exercises, like circuit work etc; be expected to usefully spend two hours in the air at night. The flight plan and the A.T.C. tape extract bears testimony that the aircraft could not be cleared to operate in the circuit due to P.I.A. traffic and was only cleared to proceed to training area. This would have been futile and unnecessary waste of time and effort. The foregoing facts are a pointer towards the state of training environments and highly unmethodical approach to managing the flying discipline.

2. It could also be infered that since the time available was very short, the pilots may have even cut corners in pre-take off procedures viz-a-viz "mag" drop checks etc. what to talk of proper mission/exercise and emergency procedure briefings.

3. The aircraft AP-AZS had lined up in the beginning of runway-36 after PK-388 (Boeing 737 aircraft) took off at 1842 hours (see App. "Q"). At 1845 hours aircraft (Cessna-150) registration No. AP-AZS was cleared to take off. The surface wind was, south-westerly 3 Kts. and the temperature was 37°C. Immediately after getting airborne at 1846 hours the Capt. of the aircraft AP-AZS transmitted "request landing clearance due technical". Pilot's request was acceded to by the DATCO and the aircraft was cleared to land on runway-18. After this the pilot of the illfated aircraft neither acknowledged the D.A.T.C.O.'s permission to land back on runway-18, nor answered any of the two additional radio calls given by the DATCO (see App. "Q"). It could only mean that the nature of defect was serious enough to keep the pilot engrossed in handling the aircraft and also necessitated immediate landing; or he had gotten thoroughly confused.

4. The evidence adduced indicates that the aircraft, within a few seconds after take off, edged slightly to the right side of the runway in a climbing attitude, but looked to be stable, presumably the pilot turned away to create a lateral distance to be able to make a shallow bank turn-about. When the aircraft

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was cleared to take off (at 1845 hours) it was still holding on the take off point, it acknowledged the take off clearance call and then rolled, meaning thereby, that it took another 5 seconds before it commenced the ground role. Cessna-150 aircraft on the average requires 1000 ft. or 10 seconds to get airborne. Thus roughly speaking it lifted off at about 15 seconds after 1845 hours. Precisely 45 seconds after this point, viz-a-viz at 1846 hours, the pilot requested to land back "due technical" (under, almost similar weather temperature and wind conditions the take off was simulated in Cessna-152 at Lahore, the aircraft attained 350 ft. A.G.L. but with its engine operating at full rated power) and had already commenced a shallow turn to the left. Thus under no circumstances Cessna-150 aircraft which is comparatively under powered could have attained height more than 300 ft. A.G.L. within 45 seconds or even in one minute under the prevailing temperature conditions.

5. The eye witness (Witness No.9) confirms that the aircraft while turning appeared to be having normal engine noise and was in a steady turn to the left. Thus the engine was presumably generating full or partial power otherwise the aircraft could not have completed the turn through 200° with the height available, as such the decision on the part of the pilot to execute a 180° turn and recover on runway-18 seems justifiable to some extent and may not be condemned, although the height factor was not quite in accordance with the laid down procedure which states that "unless at minimum of 500 ft. A.G.L. do not attempt to make a turn about", but then that is for a situation where the engine quits completely.

6. The fact that the pilot failed, not only to acknowledge the clearance to land on runway-18, he also did not respond to repeated calls by the A.T.C. testifies that he was faced with some thing very serious viz-a-viz loss of power, engine viberation, flight control malfunction etc. and remained engrossed in salvaging the situation, or he had become thoroughly

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confused. The student was too young to have assisted the instructor pilot in any way under the circumstances.

7. The hints and evidences from various eye witnesses, and the wreckage site helped the Board construct a pictorical diagram of the flight path that the aircraft supposedly described after take off and till it struck the ground (see App. "U "). While turning (back) left for runway 18, the I.P. who was occupying the right seat, must not only have had difficulty in keeping the runway in sight as the aircraft was almost over the runway (a very little lateral displacement to right of the runway could have been achieved because of time and height limitations) perforce have had to resort to steeper bank, yet the aircraft ended up to the West of the runway and had to continue turning through almost 200-230^{o} to come back towards the runway. It must have necessitated a bank of 30-45^{o}, thus increasing the chances of stalling the aircraft.

8. The eye witness (Witness No.9) who happened to be standing about 500 ft. away from the crash site made a very positive and categorical statement of having observed the aircraft to have suddenly dropped off from about 100 ft. A.G.L. and that the engine went quiet too. The VSI was observed to have stuck at 1700 f.p.m., suggesting that the aircraft came down very steeply with high rate of sink, and struck the ground but with hardly any forward momentum; for it neither had bounced up, skidded or toppled over, in line with the flight path or side ways etc., despite the fact that the ground is fairly hard and compacted. It looks as if the aircraft hit the ground and just sat there. The major part of the momentum, naturally had been absorbed by the nose wheel (which broke and was lying near the tail plane) and the main wheels, which had been bent backward and were protruding upwards behind the respective wings, particularly the left side one.

9. Critical examination of the wreckage site strongly

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suggested that the aircraft struck the ground in about 30^{o} dive, 10^{o} left bank. Extent of damage and the positions of various parts of the aircraft, control surfaces, instrument indications, engine controls and aircraft controls is given at App. "AA".

10. Pattern of damage to the propeller blades (App. " X ") very clearly and strongly suggests that the engine was not developing any power at the time of impact of aircraft on the ground, only one blade got bent into an almost "S" shape and the other one is nearly in its proper shape. Internal examination of engine parts i.e. piston and crank shaft etc. also corroborate this assumption. The fuel selector lever was found to be in the "closed" position, which the pilots presumably, selected to "closed" position a few seconds before the aircraft fell, (as it is part of procedural drill while forced landing to minimise fire hazard). As such the engine even if it was developing full or partial power must have got shutdown just before the aircraft hit the ground, because it takes approx. 5-7 seconds for the engine to stop after the fuel selector lever is selected to "closed" position. Most probably this is one major reason for the aircraft to have not caught fire, despite the fact that the fuel tanks were full of fuel and ignition system was live.

11. The aircraft (AP-AZS) was not equipped with shoulder harnesses, which is a mandatory item for all trainer aircraft (Airworthiness notice No. 49, issue No.3, dated 25th September, 1986 refers). Absence of shoulder harness (an important safety item in the opinion of the B.O.I. is one major contributory cause of the death of the pilots because at the time of impact, which was of considerable force resulted in bashing of the pilots' heads against the dash-board (the instrument panel). The impact was so forceful that even the right seat control column had got broken.

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12. There are two hydraulic drums (of aircraft arrester barrier) 3-4 feet high, installed (on both sides) in the beginning of runway-18 which are about 300-400 feet away from the impact point, therefore, it is quite possible that the pilot in order to avoid these obstacles tried to steeply turn the aircraft away to the left and thus unwittingly let the aircraft stall, (otherwise he could have put the aircraft on the fair weather strip which was quite suitable in every respect for this class of aircraft to land). As indicated on the wreckage diagram, the aircraft impacted the ground in a south easterly direction i.e. facing about 120°, thus either the pilot had intentionally continued to turn with a view to putting the aircraft on the prepared/pucca portion of the runway, or while endeavouring to avoid the aircraft arresting barrier drums, and unwarrily failed to keep the speed under control particularly after the aircraft fuel valve had been closed when the engine suddenly went dead and it added to hasten to deplete the aircraft speed thus the pilot lost control of the aircraft and it struck the ground in a fully stalled/ uncontrolable state.

13. Notwithstanding the fact that had the pilot opted to land straight ahead even if very little open space/runway was left there were very good chances of safely putting the aircraft on ground in fields ahead. The second best option under the circumstances, for the Capt. of the aircraft was to elect to use the parallel taxiway (which is 500 feet to the right of the main runway) for recovery, instead of making a turn about for the main runway (which meant much tighter turn), it would have afforded him better chances of survival/safer recovery. This, very strongly points towards one of the weakest areas in the flying clubs/general aviation companies viz-a-viz lack of practicing of emergency procedures at critical stages of flight and building of professional confidence in the pilots.

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14. A little over 3 minutes prior to the take off of AP-AZS cessna aircraft, Boeing 737 aircraft (PK-388) took off on runway-36. A number of people opined that the cessna aircraft got entraped in the turbulent wind wake left behind by the Boeing aircraft. This was considered rather frivolous, firstly because the time interval between the take off of both aircraft (over 3 minutes), the outside air temperature ($37^{o}C$) and 3 Kts. of south westerly surface winds would not have let the vortices stay over the runway with the kind of intensity that could affect the cessna aircraft to an extent that it would go out of control. Secondly even if it is accepted for the sake of arguments, that the Boeing-737 aircraft left behind, over the runway, a strong turbulent vortices in which the cessna aircraft AP-AZS could get caught, then the aircraft should have flipped over and crashed on the runway without giving much of a chance to the pilot even to make a radio call and execute a wide and steady turn through more than 180^{o} etc. Thus, such like presumptions came from those who lacked knowledge and had little understanding of such like phenomena. However, such like conditions do occur in countries where extreme cold weather conditions prevail and when atmosphere is dense and wind conditions are calm. The time interval between two taking off aircraft is generally kept a minimum of 5 minutes, in those parts of the world.

15. The most important point which has remained unresolved is the possible technical fault that led the pilot to ask for priority landing immediately after take off. Flight control malfunction or abnormal engine performance could only be the defects which would necessitate such an action on the part of the pilot at critical stages of flight viz-a-viz take off and landing. One of the following could be presumed to have

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occurred immediately after getting airborne :-

(a) Sudden loss of engine/power/reduction in R.P.M. or;

(b) Rough running of the engine or;

(c) An abnormal noise from the engine or from the aircraft;

(d) Fire or smoke in the cockpit;

(e) Malfunctioning of flight control systems.

16. A critical stripdown inspection/examination of the flight control systems and the engine related system (air in take, fuel, ignition system and internal parts of the engine) were carried out but nothing abnormal could be observed that could have led to the loss of R.P.M. etc. The ignition system was evaluated critically too. Most of the ignition plugs stems were found broken due to impact. However, their electrodes were found in satisfactory state. But a malfunctioning of ignition plugs cannot be set aside altogether because even one set of plugs could cause loss of R.P.M./viberation etc. Both the magnetos were tested at the Deptt. of Plant Protection's facilities in Karachi and were found to be fully serviceable (see App. "K").

17. A close examination of control system showed that all the cables, pullys and connections at the critical points were found to be in-tact and control systems were in fully serviceable state.

18. No. 2 cylinder was observed to have some longitudinal gouging marks at 6 and 12^{o} clock position, seemingly some carbon that had deposited on the piston head had got detached and found its way into the cylinder. This could have caused a momentary rough running/abnormal noise from the engine that could have alarmed the pilot to abort the mission and necessitated the decision to land as soon as possible.

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19. Since the aircraft remained unrefuelled over night, that too in the open area, possibility of accumulation of moisture in the fuel tanks cannot be ruled out. Thus it is quite likely that no sooner the aircraft took off the water cantaminated fuel caused partial loss of power and or engine viberations at that critical stage of flight and became the root cause of the mishap that followed.

F I N D I N G S

The Board finds that :-

(a) Aircraft Cessna-150 registration No. AP-AZS was refuelled, pre-flighted and certified as serviceable at about 1000 hours on 18th August, 1989 by the Chief Engineer of the Multan Flying Club.

(b) It was scheduled for general flying training (day) mission, to be flown by Capt. Muhammad Munib, an I.P. (working on adhoc basis in the Multan Flying Club) with Mr. Ghulam Mustafa Magsi, a student pilot.

(c) The scheduled/planned (as per authorisation book) time of take off was to be 1700 hours.

(d) The aircraft got airborne at 1845 hours (local time) from runway-36 and within one minute after take off (at about 300-350 ft. A.G.L.); it requested for landing "due technical" on runway-18.

(e) The aircraft impacted the ground in about 30° nose down and 10° left bank attitude.

(f) The engine was not developing any power at the time of impact. However, the engine was running until a few seconds prior to hitting the ground; when the pilot intentionally selected the fuel lever to "CLOSED" position.

(g) The throttle lever, mixture lever and ignition switch, were in fully open, rich and on both positions respectively. However, the fuel selector lever was in the closed position.

(h) Safety shoulder harnesses were not installed in this aircraft.

(j) Capt. Mohammad Munib had valid commercial pilot licence and A.F.I. rating; and had more than 500 hours instructional flying experience to his credit.

(k) Captain Muhammad Munib, the Instructor Pilot-in-Command of the aircraft, and Mr. Ghulam Mustafa Magsi, the student pilot

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sustained multiple head and bodily injuries due to impact and had lost their consciousness before they were recovered from the cockpit by the A.S.F. and M.O.D.C. guards who happened to be on duty near the crash site.

(l) The Captain of the aircraft failed to handle the aircraft in a manner that would have ensured a safe landing. The aircraft while still in a steep bank stalled and crashed as a sequal to which both the pilots lost their lives and the aircraft got damaged beyond economical repair.

(m) Both the pilots died as a result of head injuries (App. "V&W ", the death certificate), within two hours of the accident; in C.M.H. Multan.

(n) Effective supervision both in operational as well as training side is lacking in many aspects in the Multan Flying Club.

(o) Day to day technical defects are not recorded in the journey log book and only entries concerning scheduled maintenance are recorded [contrary to C.A.R. 50 (A)].

(p) Adequate emphasis is not being laid on practicing/ simulation of critical emergencies.

(q) The aircraft remained parked in the open, unrefuelled, at night (for about 12 hours) contrary to standard operating procedures.

(r) Aircraft Cessna-150 AP-AZS was insured for third party only, (App. " F ").

(s) The aircraft engine (Continental 0-200 S.No. 25R404) had completed its scheduled life viz-a-viz 1800 hours and was on extended life period of 360 hours (manufacturer permits 20% extention in life but 50 hours at a time) out of which it had done 150 hours.

(t) The exact cause of the technical defect, that made the pilot-in-command to abort the mission and attempt landing the aircraft on priority basis; remains undetermined. However,

It is conjectured that the most probably cause could be a momentary abnormal noise produced by the dislodging of carbon deposit on the piston head of No.2 cylinder and finding its way into the cylinder; that had caused slight longitudinal gouging marks in No.2 cylinder. The piston rings too had excessive carbon deposit at its base and was not free to move in its groove/position. Also, possibility of accumulation of moisture in-fuel tank during night, when the aircraft remained unrefuelled, may have caused contamination of fuel and momentary loss of R.P.M. or engine viberations, at full power setting.

(u) The Emergency Locator Transmitter was found broken into two pieces and lying next to the aircraft wreckage. Apparently it had not been secured properly in the aircraft.

(v) Multan Flying Club does not have an Operations Manual, a mandatory document, to be prepared and kept updated by the C.F.I.

RECOMMENDATIONS

The Board recommends that :

(a) Managing Committee Multan Flying Club may arrange to make monetary compensation to the bereaved families of both, Capt. Mohammad Munib and student pilot Mr.Ghulam Mustafa Magsi.

(b) Comprehensive insurance may be made compulsory for all aircraft engaged in training and charter services.

(c) "C of A" may not be issued to all those aircraft which do not have safety shoulder harness installed, at least for the pilot seats.

(d) All supervisors must re-emphasis the importance of recording of all defects (whatever may be the degree of their seriousness) in the aircraft journey log books.

(e) It must be re-emphasised on all operators, not to make 180^{o} turn back for the runway unless well above 500 feet A.G.L. and prefer landing straight ahead, if the engine power gets degraded to a point which can not ensure sustaining of height.

(f) Emergency procedures such as, engine failure, fire, and or controlability problems, particularly at critical stages for flight viz-a-viz take off and landing phases, must be practiced more regularly and methodically, during the training period.

(g) While engine is operated on 20% extended life of its recommended overhaul period, the instructions contained in Airworthiness Notice No. 43 must be strictly followed. Further, it is recommended that :-

i) Spectrographic oil analysis may be performed prior to first 50 hours extension of its overhaul period.

ii) Cylinder leakage check may be conducted with the help of appropriately calibrated "differential pressure gauge".

iii) Engine

iii) Engine power check may be performed by conducting test flight and evaluating "rate of climb" performance. The test flight of a reasonable time period duration shall also determine throttle response and smoothness of operation.

iv) Oil consumption record must be properly maintained.

(h) The aircraft fuel tanks must be topped-up prior to overnight parking of aircraft in order to avoid any possibility of fuel contamination due to condensation phenomenon.

(j) The Emergency Locator Transmitter was found dislocated from its base in broken condition. As such, the basic purpose for its installation is totally foiled. It is, therefore, recommended that ELT must be properly secured on appropriately located and adequately strong plateform in order to withstand impact forces.

(k) Airworthiness Branch of CAA must carry out a one time evaluation of maintenance standards (maintenance facilities and competence of the maintenance/engineering staff) of all flying clubs/general aviation companies and the aircraft owners in private category.

(l) C.A.A. must introduce an annual visit-cum-inspection by a team headed by the Chief Inspector, of all flying clubs, general aviation companies, government or semi government fleets including aircraft belonging to C.A.A. with a view to evaluating their maintenance and operational standards.

(m) The managing committee of Multan Flying Club may be asked to review the work environments and replacing of the incumbent C.F.I., for the reason that this accident is a pointer towards serious supervisory lapses.

(n) Employment of instructor pilots by flying training units/companies on adhoc basis must not be allowed, for the sake of safety and standardisation; unless specifically cleared by C.A.A.

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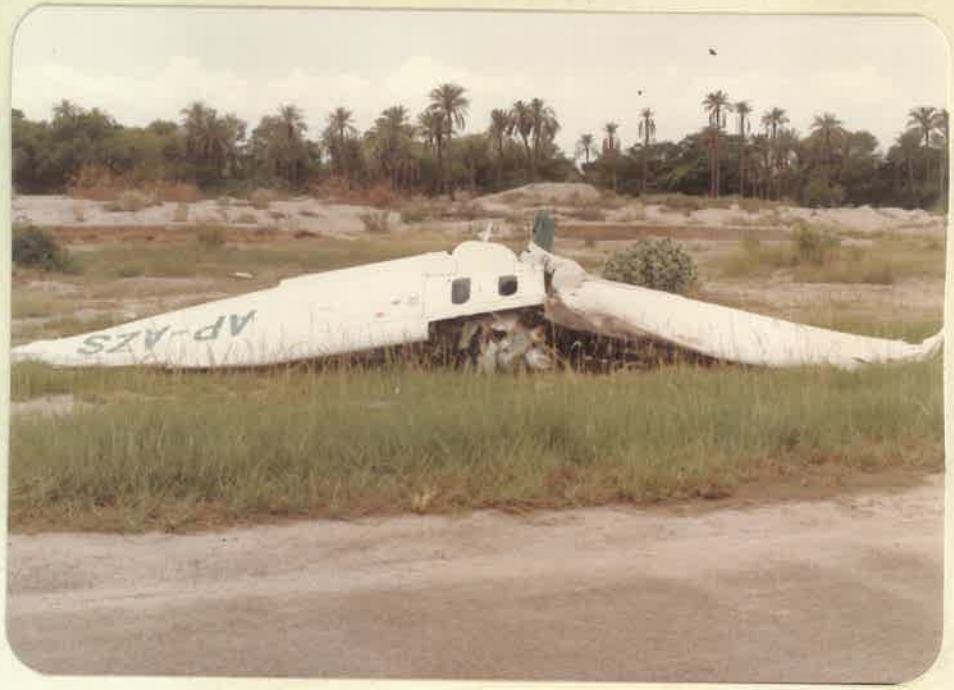
(o) In order to avoid wake/turbulant wind conditions caused by high powered aircraft, it is recommended that clear "3" & "2" minutes time separation may be ensured by ATC for the "take-off" and landing respectively, for General Aviation aircraft behind air-carrier jet aircraft.

(Engr. ZAFARULLAH KHAN)
Senior Airworthiness Surveyor,
Investigator,
CAA, Lahore Airport.

Date: 4 NOV. 89

(RASHID A. CHAUDHRY)
Group Captain (Retd)
General Manager
General Aviation
Investigator Incharge
CAA, Lahore Airport.

Date: 4 NOV. 89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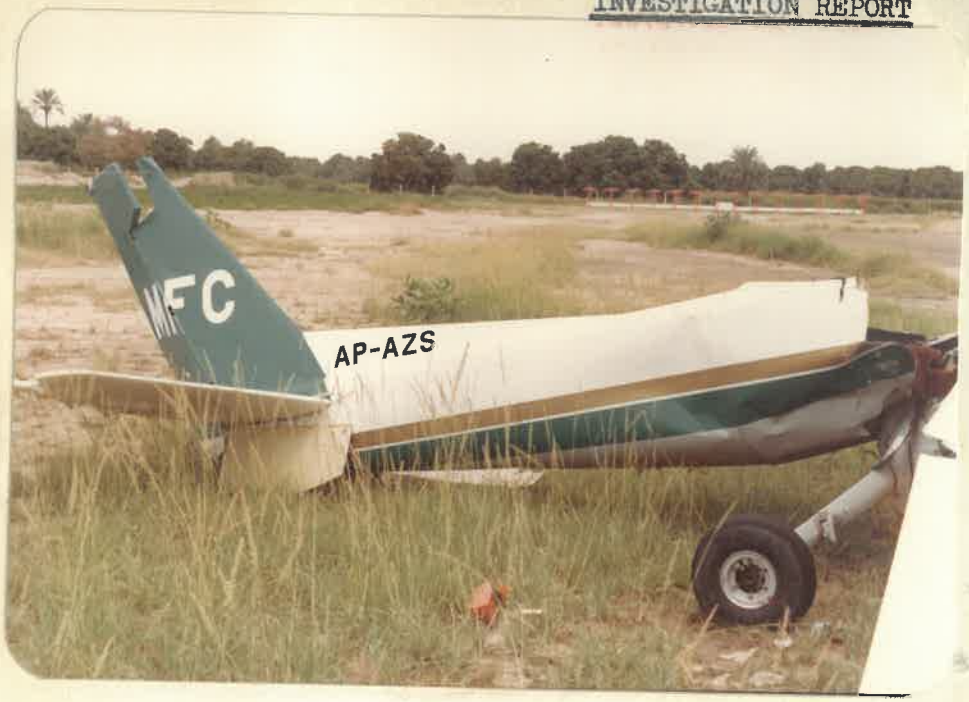
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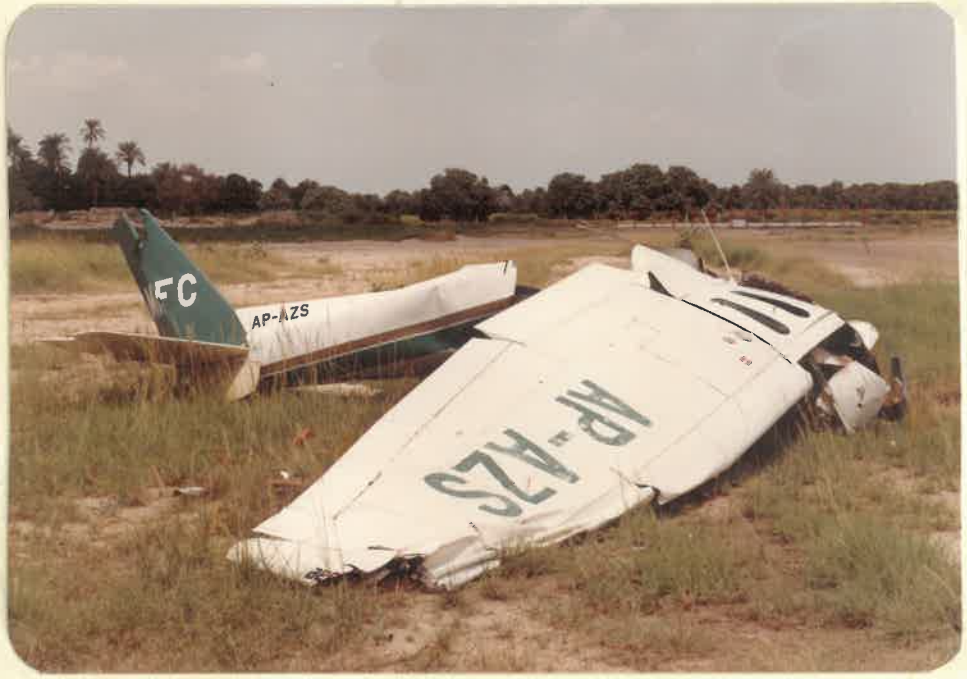
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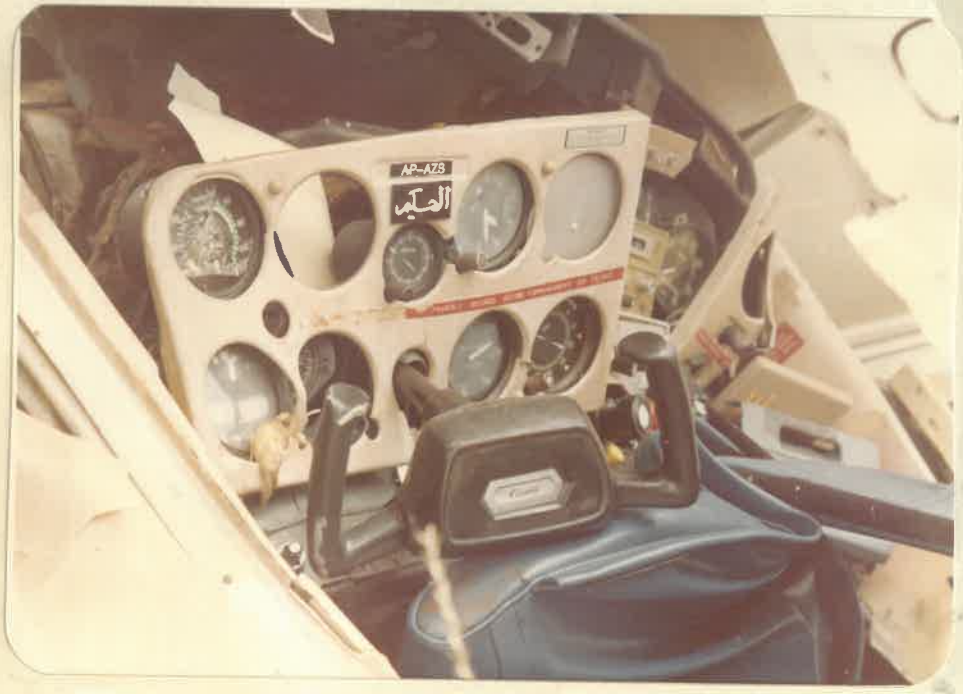
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