

No.HQCAA/1901/273/SIB



**CIVIL AVIATION AUTHORITY
PAKISTAN**

M/S DEPARTMENT OF PLANT PROTECTION

CESSNA 185F REG # AP-AYD

CRASHED NEAR PISHIN (QUETTA)

ON 19TH APRIL 2002

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FINAL REPORT

CESSNA-185F, REG. # AP-AYD, BELONGING TO THE DEPARTMENT OF PLANT PROTECTION, WHICH CRASHED NEAR PISHIN (QUETTA) ON 19 APRIL 2002

Authority: Director General Civil Aviation Authority Memorandum
No.HQCAA/1901/273/SIB dated 20 April 2002.

SYNOPSIS

On being notified about a crash at Pishin (Quetta) on 19th April 2002 of a Cessna-185F, Registration # AP-AYD, belonging to the Deptt of Plant Protection (DPP), Govt of Pakistan, a team comprising the following, was detailed to investigate the accident:

- a. Lt Col @ Saleem Khan - Investigator Incharge
- b. Engr Zahid Bhatti - Technical Member

Brief Resume: While on pesticide spray mission in Pishin (Quetta), a Cessna-185F, piloted by Capt. Khizer Hayat, took off from Pishin direction 24. He made a left hand turn after take off and crashed in a village only about 0.9 KMs after getting airborne. The aircraft structure and propeller were damaged extensively. The pilot survived with minor injuries.

1. FACTUAL INFORMATION:-

1.1 HISTORY OF FLIGHT:

- 1.1.1 Cessna 185F aircraft AP-AYD was positioned at Pishin for Orchard spray mission.
- 1.1.2 Capt. Khizar Hayat and Capt. J.A.Chouhan were the operational pilots on the day of the accident.
- 1.1.3 The spray area was Bostan / Kuchlak about 10NM South of Pishin.
- 1.1.4 It was the 5th spray sortie of the day and the third sortie of Capt. Khizar Hayat on the same aircraft.
- 1.1.5 The aircraft crash-landed in village Killi Abdullah, near Pishin runway during the 5th spray mission, soon after take off.

- 1.1.6 Every year Department of Plant Protection (DPP) performs Aerial spray missions on orchards in Baluchistan. In order to commence spray missions in Loralai, Pishin & Kanak; DPP had positioned two aircraft in Baluchistan. One was a Cessna 185F, Reg # AP-AYD and the other a Beaver DHC-2, Reg # AP-AMB.
- 1.1.7 Pishin runway elevation is about 5000 feet above mean sea level.
- 1.1.8 A normal take off with one barrel load of pesticide was performed.
- 1.1.9 One barrel of pesticide weights approximately 240 Kgs.
- 1.1.10 A left turn was initiated at about 30-40 feet above ground.
- 1.1.11 During this climbing turn after take off flaps were raised from 20 to 10 degrees and RPM adjusted to 2400.
- 1.1.12 The aircraft was rolled out of the turn from its take off heading (i.e 240°) to the left approximately to a southerly heading (i.e 180°).
- 1.1.13 Boost was maintained full throttle.
- 1.1.14 Change in engine noise and drop in RPM was observed.
- 1.1.15 RPM picked up immediately after an initial drop.
- 1.1.16 The next moment engine failure took place according to the pilot.
- 1.1.17 The aircraft, as per the pilot, was now over the built up area about 100 to 150 feet AGL.
- 1.1.18 Aircraft started loosing height.
- 1.1.19 Throttle was pumped to regain power but it did not help.
- 1.1.20 Full flaps were lowered to get a hop over the objects. Aircraft continued to sink, hit an obstacle and crash landed.

1.1.21 The pilot was evacuated to the hospital.

1.2 AIRCRAFT INFORMATION:

1.2.1 The aircraft (Cessna 185F) registration # AP-AYD was manufactured in 1975.

1.2.2 Its serial number designated by the manufacturer was 18502772.

1.2.3 The aircraft was fitted with continental IO-520D engine, serial # 572839.

1.2.4 The engine was installed on aircraft AP-AYD on 06-01-1992 after overhaul at 00 Hrs.

1.2.5 Engine time since overhaul was 392.05 Hrs.

1.2.6 The engine was fitted with a two bladed Mc Caulay propeller, serial # 751414 and was installed on AP-AYD on 30-09-2000 after overhaul.

1.2.7 The propeller had done 124.30 Hrs since its overhaul.

1.2.8 Total flight hours of the aircraft were 632:30 hrs.

1.2.9 The take off gross weight of the aircraft for this flight, with 200 liters of pesticide, was 3350 kgs.

1.2.10 The pesticide weighed 240 kgs.

1.3 AIRCRAFT HISTORY

1.3.1 The aircraft had flown 46.20 hrs since renewal of C of A.

1.3.2 The aircraft (AP-AYD) was damaged severely on 15-09-75 due to a hard landing at Athens Airport and extensive repair work was carried out by Olympic Airways. The repair station was FAA approved. The said accident took place at 07:50 flight hours of the aircraft.

1.3.3 On 26-10-78, the aircraft was grounded after an accident. The aircraft swung after landing resulting in the collapse of the undercarriage, outward twist of propeller and right wing damage. The accident occurred at 240:25 flight hrs and aircraft remained unserviceable up to January 92.

1.3.4 Third major incident occurred on 10-08-01 at 584:55 flight hrs. During landing roll, the aircraft swung again and received damages on right wing tips, micron airstrent, wheel assembly and leaf spring/axle, elevator and wing attachments. However, aircraft logbook does not indicate the said incident. Pilot also did not log it in the journey logbook. (Statement of Engineer Zahid Zaidi).

1.3.5 Shell Pakistan had supplied the fuel for the flight on 19 April 2002. The date of filling of the barrel was 05-04-2002 with validity up to 04-04-2003. For the mishap flight, refueling of aircraft was carried out from this barrel.

1.3.6 Last Check 1 (50 hrs inspection) was carried out on 05-04-2002 at Karachi and aircraft operated 25.45 hrs since Check-1 without any reported snag.

1.4 DAMAGE TO AIRCRAFT:

1.4.1 Both main landing gears collapsed.

1.4.2 Left wing including its spar sheared off from a point 7 feet 3 inches as measured from root to tip.

1.4.3 Control cables were broken.

1.4.4 Right wing was badly damaged and found bent upwards at two places.

1.4.5 Propeller blades were found bent backwards and dented.

1.4.6 Pesticide tank was detached from the belly area of fuselage and found damaged.

1.4.7 Propeller spinner was damaged.

1.4.8 Fuel tanks on both wings were damaged and fuel was completely drained out.

1.4.9 Horizontal & vertical stabilizers found damaged at tips.

1.4.10 Fuselage severely damaged at several places.

- 1.4.11 Rivets on rear bulkhead at B.S 108 found sheared off.
- 1.4.12 A portion of fuselage was found detached about 40% and was extensively damaged.
- 1.4.13 Right control yoke broken (co-pilot control).
- 1.4.14 Engine oil dip stick blocked inside.
- 1.4.15 Wind screen broken.
- 1.4.16 Transponder Antenna broken.
- 1.4.17 Spray shut off valve control broken.
- 1.4.18 Instrument panel found bent outwards at the middle. Aircraft instruments were found without apparent damage.
- 1.4.19 Left control yoke (Capt.'s control) found bent to the left.
- 1.4.20 Engine cowling lower portion found bent.

1.5 COLATERAL DAMAGE

- 1.5.1 Local electricity supply wire to a house at the accident site was found cut and wrapped around the propeller shaft of the aircraft.
- 1.5.2 Telephone cables were also broken and found wrapped around the aircraft.
- 1.5.3 A boundary wall of a house was found broken from the top.

1.6 INJURIES TO PERSONS:

- 1.6.1 Capt Khizar Hayat (PIC) received minor injuries and bruises.

1.7 AIRCREW INFORMATION:

1.7.1 PILOT'S FLYING EXPERIENCE

- 1.7.1.1 CPL holder and had the following flying experience:

- a. Total flying experience including PAF: 2037:45 Hrs.
- b. Total-in-command: 1968:05 Hrs.
- c. Total on Cessna 185F: 43:45 Hrs.

1.7.2 PILOT'S FLYING ACTIVITY

1.7.2.1 Employed in DPP since 1994.

1.7.2.2 Flown 163 hrs in 8 years i.e 1994 to 2002.

1.8 TRAINING

1.8.1 No written record could be produced by the Chief Pilot to show that pilots of DPP are subjected to planned and organized flying or ground training on a regular basis. There was no training plan available, either current or projected.

1.8.2 Since there was no training planned, no training files on individual pilots were maintained. As a result of this no record was available to show the past flying performance of the pilot of the mishap aircraft.

1.8.3 Lack of routine flying, training flying and ground schooling is cause of inadequate aircraft knowledge and Department's SOPs amongst the pilots.

1.8.4 Lack of routine and periodic training flying is also a cause of less than proficient handling of the aircraft, especially in an emergency.

1.9 METEOROLOGICAL INFORMATION:

1.9.1 On 19-04-2002, at the time of accident i.e. 1135 hrs LT, the weather at Pishin was clear. Visibility was normal, wind was calm and ambient temperature was 28⁰ C.

1.9.2 There was no weather warning.

1.10 AERODROME INFORMATION:

1.10.1 The aircraft was operating from Pishin runway made during the 2nd World War by the British.

Only 3000 feet of runway 24, i.e from the beginning of the runway to a point short of the intersection, was being utilized. The width of the runway is 150 feet.

1.11 FLIGHT RECORDER:

1.11.1 Flight recorder was not installed on the aircraft.

1.12 WRECKAGE AND IMPACT INFORMATION:

1.12.1 The wreckage of the aircraft was at one place except the left wing portion, which had sheared off and was lying about 100 feet short of the point where the aircraft finally came to rest. Although not disintegrated, the entire structure showed signs of extreme stress. The left wing spar had sheared off from a point about $\frac{1}{4}$ distance away span-wise from the wing root. One propeller blade was bent backwards from the center, while the other was bent backwards close to the tip. The fuselage was cracked just behind the crew compartment. There were prominent dark rubber marks around the fuselage, the wings area and around the engine compartment.

1.12.2 The wreckage was found lying due South and at a distance of about one kilometer from Pishin runway. The direction of the aircraft, where it finally came to rest, was approximately North East (about 050°).

2. TECHNICAL REPORT:

2.1 SNAG HISTORY:

2.1.1 Aircraft technical record did not indicate any snag or defect on engine or aircraft flight controls since renewal of certificate of airworthiness.

2.1.2 Since 11-04-2002 the aircraft was in operation for orchard spray missions in Baluchistan. Capt Khizer Hayat, Capt J.A. Chouhan & Capt Jamil Ahmad were the operational pilots and none of them reported any snag or defect on the engine or the airframe.

2.1.3 On 19-04-2002, Capt. Khizer Hayat & Capt. J.A. Chouhan were the operational pilots. They had

flown four sorties before the said accident. No abnormality was reported till the end of the fourth sortie.

2.2 TECHNICAL DEFECT INVESTIGATION:

2.2.1 In order to investigate the defect, engine 10-0520 D was removed from the aircraft AP-AYD and following was found:

2.2.1.1 During visual inspection, driven end head assembly at mounting bolt of alternator Serial # ES/0313/92 found broken. Therefore, before ground run, B.P.C of said component was carried out as per procedures and its characteristics were found satisfactory.

2.2.1.2 Spark plug gaps on all spark plugs were checked and found within limits.

2.2.1.3 The engine was given crank manually in order to check the condition and operation of crank shaft, before giving it a ground run. Rotation was smooth and normal. The engine was declared fit for a ground run.

2.2.1.4 The investigation team reached the crash site a day after the crash. Both fuel and oil had drained out completely and absorbed in the ground. No oil or fuel sample could be collected for testing from the aircraft.

2.3 ENGINE GROUND RUN:

2.3.1 Engine was given ground run. Engine started smoothly and was checked at low & high RPM. Its operation was smooth. All parameters including oil pressure, oil temperature, CHT, fuel flow and suction were within limits. At full throttle RPM and manifold pressure were found within the required parameters. During ground run no defect was observed.

2.4 DISCUSSION ON ACCIDENT SEQUENCE.

2.4.1 The aircraft took off RW-24 in calm wind. The unstick speed for takeoff of this aircraft is 60 mph. At 30-40 feet a left turn was initiated.

Simultaneously, the flaps were raised from 20 degrees to 10 degrees and the RPM was adjusted from 2850 to 2400. Raising of flaps and adjustment of RPM was being done during a turn, while the aircraft was still at or below 100 feet from the ground. According to pilot's recorded interview, he was short of Village (Killi Abdullah) when he first experienced the change in engine noise and saw a drop in RPM. As suddenly as it occurred, the RPM picked up again. He was now closer to the village when the same thing happened again. This time the RPM started reducing and the engine packed up. The speed of the aircraft, according to the pilot, was 90 mph. Furthermore, the pilot stated that he tried to hold height but the aircraft kept sinking. By then the aircraft was over the village about 10 – 15 feet above the roof tops and still sinking. Sure of the fact that he would hit the huts under him, the pilot lowered full flaps to get a 'hop' over the huts. The sink rate increased and the aircraft hit a wall and crashed about 150 feet away from the wall. After the engine failure occurred the pilot tried to maintain height. With no power, the only way to maintain height was to raise the nose attitude. Raising the nose attitude caused the speed to drop. The pilot was not aware that he could jettison the under-slung pesticide drum, which would have reduced the aircraft weight and drag substantially. Without power, high weight due to the pesticide load and full flaps lowered, the aircraft was not able to sustain flight and was sinking. During this sink its wing hit a wall and sheered off.

2.5 PILOT ACTIONS IN VIOLATION OF DPP INSTRUCTIONS

- 2.5.1 After take off the pilot initiated a turn when he was about 30 – 40 feet AGL. This was in violation of the Department's SOP, which requires a straight climb to 300 feet AGL for loaded aircraft (Appendix 'H', para 4). During the turn the pilot raised flaps from 20 to 10 degrees and adjusted the RPM from 2850 to 2400. This was also in violation of the SOP, which does not allow raising of flaps during a turn (Appendix 'F2', para 2). The pilot went over the village in violation of DPP's instructions on the subject (Appendix 'H2').

2.6 PILOT KNOWLEDGE

2.6.1 The pilot was not aware that he could jettison the pesticide tank in an emergency (Appendix 'A5', Question/Answer 33b). He was also not aware of the fact that the pesticide tank was not baffled (Appendix 'A4', Question/Answer 24). In a non-baffled tank, which is half filled, the fluid movement during abrupt maneuvers can be very dangerous.

2.7 WRECKAGE ANALYSIS

2.7.1 The propeller blades were both bent backwards. This is indicative of a static propeller contacting the ground. There were no nicks or cuts on the tips, which would occur if a rotating propeller contacts the ground. The aircraft's forward momentum at the time of impact caused both the blades to bend backwards. It can, therefore, be said that the engine was not driving the propeller when the aircraft impacted the ground (Appendix 'R').

2.7.2 The technical report indicates that the drive shaft of the propeller was not broken, sheered or damaged. Had the propeller been rotating under power, any force applied on the propeller to stop its rotation would have caused the drive shaft to break. Again, it is inferred from this that the engine was not driving the propeller.

2.7.3 An electric wire was found wrapped around the propeller. This electric wire was cut at one end and snapped, i.e. pulled out from its attachment point, at the other end. A propeller moving under engine power would have cut this wire at several places and some nicks (marks) would have been evident on the leading edges of the propeller. The wreckage did not represent both these evidences. It is inferred from this that the propeller was initially wind milling without engine power till it engaged the electric wire, which stopped the propeller's rotation, when it got wrapped around the propeller shaft. This provides additional evidence of the engine having packed up resulting in the events of the crash sequence.

2.7.4 The bent telephone pole at the scene of the accident and the evidence of dark marks around the fuselage, wings and the cowlings were studied

carefully. Mental reconstruction of the telephone multi-cables and the flight path of the aircraft revealed that:

- a. The aircraft had got entangled in the two multi-cable telephone wires running across its flight path just beyond the point where the propeller cut the electric wire (which had wrapped around its propeller shaft).
- b. The aircraft then 'rode' these multi-cable telephone wires till its impact.
- c. As a result of this 'ride', the dark marks on the aircraft structure were formed.
- d. The direction in which the aircraft finally came to rest also resulted from the telephone multi-cables wrapping the aircraft. While weight and the momentum of the aircraft caused the telephone pole to bend in the direction of the final crashed position of aircraft nose, their wrapping around the aircraft caused the direction of the aircraft's flight to change from southerly to north easterly.
- e. This also accounts for a comparatively lower intensity of the final impact of the aircraft with ground. This is evidenced from the instruments being largely serviceable after the accident, a relatively less damaged instrument panel and finally the aircraft not disintegrating on impact.

2.7.5 It is therefore conclusive that the engine had packed up in the air, which caused the aircraft to crash.

2.8 OBSERVATIONS

2.8.1 During the course of the investigation the following observations were made:

- 2.8.1.1 No radio communication existed between the aircraft and the field ground control during spray operations (Appendix 'E'). Lack of radio communication between the ground personnel (in the field) and the aircraft on spray mission is an unsafe practice.

- 2.8.1.2 The pilot of the mishap aircraft had been inducted in DPP in 1994 and had flown 163 hrs till 2002. Flying 163 hrs in 8 years is low and reflects lack of training and less than proficient handling of the aircraft during emergency.
- 2.8.1.3 A number of Cessna fleet aircraft have been found remaining grounded for protracted periods. This is also the cause of inadequate flying practice (Appendix 'C6' to 'C9').
- 2.8.1.4 There were no Local Operating Procedures (Ops) developed for flying in Pishin area by DPP.
- 2.8.1.5 Administrative and management problems of the pilots were found, which were not being addressed. This is visible from the statements of the Chief Pilot (Appendix 'B') and Capt Chohan (Appendix 'D'). The pilots were generally found lacking motivation.
- 2.8.1.6 No written records were available to show that pilots are subjected to planned and organized flying or ground training.

3. CONCLUSION:

3.1 FINDINGS:

- 3.1.1 Department of Plant Protection (DPP) was carrying out pesticide spray missions in the orchards around Bolan area 10 NM South of Pishin, with Pishin runway as their base of operations.
- 3.1.2 Cessna 185F, Reg. # AP-AYD, was one of the aircraft of the DPP taking part in the operations.
- 3.1.3 Before the accident, the same aircraft i.e AP-AYD had successfully flown four sorties on the same day with different pilots on board.
- 3.1.4 Capt. Chohan and Capt. Khizer had alternately flown two sorties each on AP-AYD on 19 April 02

(the day of the accident) and there were no snags reported after any of the flights.

- 3.1.5 The accident took place during the fifth sortie of the day on AP-AYD.
- 3.1.6 Capt. Khizer Hayat, PIC of the mishap aircraft, took off direction 24 from Pishin runway at about 1130 hours (Local Time) on 19 April 2002, with one drum of pesticide load i.e 240 Kgs in the pesticide container.
- 3.1.7 After take off (direction 240), the pilot initiated a left turn (southerly heading) at about 30/40 feet AGL, which was in violation of the Department's regulations.
- 3.1.8 During this (climbing) turn Capt Khizer raised the flaps from 20 to 10 degrees causing the aircraft to sink.
- 3.1.9 By this time the aircraft was about 100/150 feet AGL and approaching village Killi Abdullah located at a distance of 0.91 KM and has about 50 – 60 houses.
- 3.1.10 The village can easily be circumnavigated if pilots adhere to the SOP i.e climbing to 300 feet after take off before turning out of traffic.
- 3.1.11 Momentary RPM drop and change of engine noise was observed and engine picked up and then engine flamed out.
- 3.1.12 Low on height (about 100/150 feet AGL), with no power and sinking, Capt. Khizer raised the nose attitude to arrest the sink rate.
- 3.1.13 Seeing a high rate of sink and sensing obstructions in front, the pilot lowered full flaps to get a 'hop' over the built up area under him.
- 3.1.14 The aircraft kept sinking till the left wing hit a wall and caused the wing spar to shear off and came to a stop after about 100 feet.
- 3.1.15 The aircraft sustained substantial damage and was rendered beyond economical repairs.

3.1.16 PIC had flown about 163 hours, in 8 years since he joined the Department of Plant Protection in 1994

3.1.17 PIC was not aware that he could jettison the pesticide tank in case of an emergency.

3.1.18 Lack of routine flying ground training indicted that the PIC not aware of the SOPs and possessed less than adequate aircraft knowledge.

3.1.19 There were no Local Operating Procedures developed for operations in Pishin area.

3.1.20 Cessna aircraft serviceability rate is very low in the Department.

3.1.21 Pilots of DPP are not motivated.

3.2 CAUSES:

3.2.1 The aircraft crashed as a result of engine failure at low altitude, which was aggravated by incorrect and inappropriate pilot action.

3.2.2 Inadequate knowledge of aircraft handling characteristics and SOPs caused the aircraft to crash in a built up area, which resulted in the loss of an aircraft and damage to public property.

3.3 SYSTEMIC CAUSE:

3.3.1 Lack of regular and adequate ground and flying training causing a display of less than adequate proficiency by the pilot in handling the situation encountered by him.

4. RECOMMENDATIONS:

4.1 Organized, regular and recorded training be planned for all pilots of the Department of Plant Protection

4.2 Flight Standards to monitor flight training in DPP closely in AOC.

- 4.3 Local Operating Procedures of all field operations be formulated.
- 4.4 Aircraft engaged in flying operational missions in the field must be in two-way communication with the field base at all times.



ELECTRIC WIRE WRAPPED AROUND THE PROP.
INDICATIVE OF NOSE IMPACTING FIRST AT
ABOUT 45/50° AND BEFORE THE TAIL COMING
DOWN.



FINAL POSITION OF CRASHED AIRCRAFT



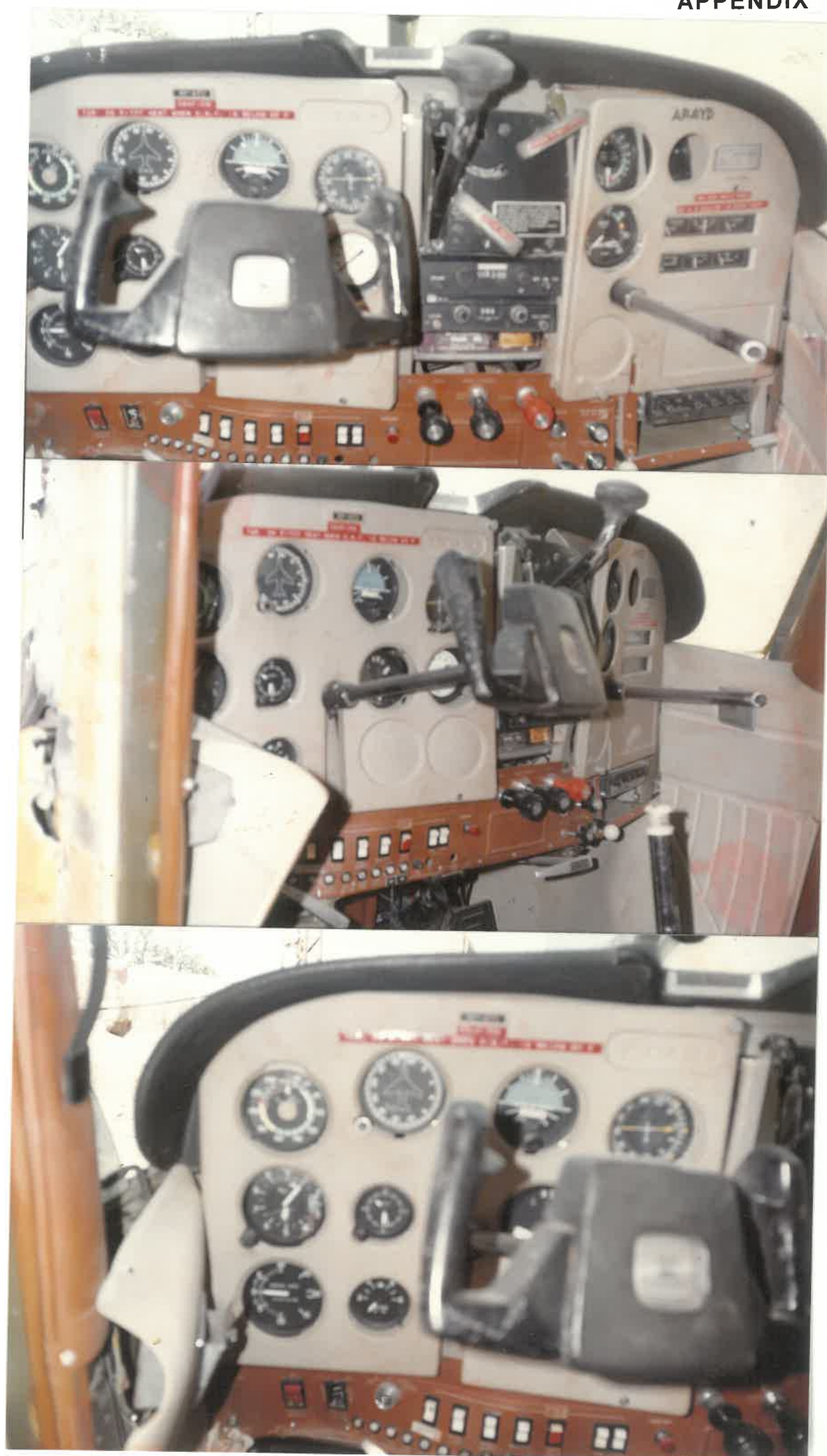
DAMAGED AIRCRAFT WITH DETACHED PESTICIDE TANK



CRACKED FUSELAGE



PORTION OF LEFT WING LYING ABOUT 110' AWAY FROM THE MAIN WRECKAGE. WRECKAGE NOT WIDE SPARED A STALLED A/C CRASH INDICATIVE.



AIRCRAFT INSTRUMENTS SEEN UNDATED



BROKEN TELEPHONE MULTICABLES

APPENDIX 'R7'



**BENT TELEPHONE POLE ON LEFT EDGE INDICATIVE OF 'PULL'
FORCE ON THE TELEPHONE MULTI-CABLE**