

INVESTIGATION REPORT
INTO THE INCIDENT OF
FORCE LANDING OF
CESSNA - 150 AIRCRAFT

REGISTRATION NO. AP-BAC
OF PESHAWAR FLYING CLUB

ON 3RD MAY 1989.

AT BASSAL

FORCE LANDING OF CESSNA-150 AIRCRAFT AP-BAC
DATED 3RD MAY 1989 AT BASAL

SYNOPSIS:

Cessna-150 aircraft AP-BAC belonging to Peshawar Flying Club was on a training Navigation Sortie with Miss. Natasha Sami as Instructor Pilot and Brig.(Retd) Amir Gulistan Janjua, as Student Pilot. The Navigation mission was planned to be from Peshawar to Islamabad Airport and back via the approved ATS route. The aircraft departed Peshawar at 11:05 hours and climbed to 7500 with normal rate of climb/power setting. After about two to three minutes of crossing river Indus after first check point "Jabar", there was a partial power loss. The Instructor decided to make a precautionary landing at Basal airfield. Aircraft landed safely at 12:02 hours local time.

HISTORY OF THE FLIGHT:

The information regarding force landing of the aircraft was received through Chief Engineer, Peshawar Flying Club, at 12:30 hours. The Technical Investigator proceeded to Basal by road, which is about 95 KM from Islamabad, arriving Basal at about 15:30 hours. Cessna-150 aircraft AP-BAC was parked on one side of the strip. Also parked closely was Piper Aztec AP-BBY in which Capt. Tariq Afridi, Chief Engineer. Mr. Daud Malik, and aircraft Mechanic Mr. Jan Muhammad, all belonging to Peshawar Flying Club had arrived. Briefing in detail was obtained from Capt. Natasha Sami, CPL No. 1370 of the incident. During my discussion with Capt. Natasha Sami, I was told that power loss similar to the one reported on 29.5.1989 was observed which resulted in precautionary landing at Basal.

Injuries persons	-	none
Damage to aircraft	-	No damage sustained by aircraft
Other damage.	-	None

AIRCRAFT INFORMATION:

1.	1.1	Aircraft type & Manufacturer's Serial Number	-	Cessna-150M 150-78763
	1.2	Registration Marking	-	AP-BAC
	1.3	Engine type, Installation and Manufacturer's Serial Number.	-	Continental O-200A 275878-R
	1.4	Certificate of Registration		526(REV-I)
	1.5	Certificate of Airworthiness		478(REV-I)
	1.6	Certificate of Maintenance	-	2.5.89 at 10014-00 hours
	1.7	Date of Construction of Airframe	-	1977
	1.8	Owner	-	Peshawar Flying Club
	1.9	Weight permitted by C of A	-	1600 Lbs.

1.10	Weight at time of Accident	-	1546
1.11	C of G	-	Within limits
1.12	<u>AIRFRAME HISTORY:</u>		
1.12.1	Hours since New	-	10015:00 hours
1.12.2	Hours since 'C of A' inspection.	-	394:40 hours
1.12.3	Modifications	-	Upto date
1.13	<u>ENGINE HISTORY:</u>		
1.13.1	Hours since new	-	508:30 hours
1.13.2	Hours since 'C of A' inspection	-	394:40 hours
1.13.3	Modifications	-	Upto date
1.14	Accessory History	-	Satisfactory
1.15	Defects.	-	NIL

2. CREW INFORMATION:

2.1 PILOT-in-COMMAND (A.F.I.)

2.1.1	Name	-	Miss Natasha Sami
2.1.2	Date of birth	-	2nd June 1966
2.1.3	Where Trained	-	Peshawar Flying Club
2.1.4	Type of licence & No.	-	CPL No.1370
2.1.5	Aircraft type Ratings	-	Cessna-150,172, Piper Aztec,Cessna-421(P-2)
2.1.6	Aircraft type rating current.	-	All types
2.1.7	Medical date with status	-	Valid Upto Nov. 1989
2.1.8	Total in Command	-	740:00 hours
2.1.9	Total flying experience	-	770:00 "
2.1.10	Total in command on the type incident occurred.	-	500:00 "
2.1.11	Date of Joining the Club.	-	June 1988

2.2 PILOT(TRAINEE)

2.2.1	Name	-	Brig.(Retd)Amir Gulistan Janjua.
2.2.2	Date of Birth	-	4th August, 1925.
2.2.3	Where trained	-	Rawalpindi Flying Club Peshawar Flying Club
2.2.4	Type of Licence & No.	-	1. Student Pilot's Licence No.615 2. F.R.T.O.L. 3. P.P.L. No.907/2
2.2.5	Aircraft type rating	-	Cessna-150
2.2.6	Aircraft type rating current.	-	Cessna-150
2.2.7	Medical date with status.	-	22-9-1988 for issue of PPL.
2.2.8	Total flying experience	-	131:55 hours
2.2.9	Total in Command	-	79:55 "

- 2.2.10 Total in Command on the type incident occurred. - 74:00 hours
- 2.2.11 Date of Joining the Club. - 24th September 1988
3. Type of fuel used - 100 LL
4. Meteorological information -
- i) Weather - Clear
 - ii) OAT at 7500 - 3°C
 - iii) Humidity - 46%
5. Flight Recorder - Not available
6. Fire - There was no fire prior to or after force landing.
7. Technical Investigation:
- a) General Observation:
The aircraft made a force landing at Basal field and sustained no damages.
 - b) Checks & Inspections on Aircraft:
The aircraft controls were checked and operated, moved in normal direction with satisfactory results.
 - c) Landing Gears:
Inspected and found in serviceable condition.
 - d) Power Plant:
A thorough inspection of the power plant and the fuel system was carried out which included the following:

General Inspection:
 - i) Opened cowling of the engine.
 - ii) Inspected all fuel and oil lines found normal.
 - iii) Checked oil level. - satisfactory.
 - iv) Checked oil filter for any metal particles, found satisfactory.
 - v) Checked oil viscosity - normal
 - vi) Checked operation of engine controls, found normal.
 - vii) Checked condition of spark plugs, found satisfactory.
 - viii) Fuel sample drained from fuel tank. Water bubbles observed.
 - ix) Strainer filter checked. Sedimentation observed.
 - ix) Carburetor filter checked found - satisfactory.
 - x) Propeller blades were examined for damage found satisfactory. The propeller was rotated by hand and observed normal rotation. There was no indication of internal damage to the engine.

Before carrying out power check. Sufficient fuel from the tank was drained to clear off any water contamination. Further more the strainer filter was thoroughly cleaned and reinstalled. After satisfying with the inspection, the engine was prepared for a ground run. Pre-start inspection was carried out and engine was started. No abnormality in engine starting was observed. The engine performance was found satisfactory and smooth. The engine power was checked in Take off and cruise power setting for considerable time, with no abnormality.

The aircraft was cleared for ferry flight. Captain Miss Natasha Sami was asked to climb overhead to level 8500 feet and to ensure for any indication of power loss before heading for Peshawar. The aircraft operated normal and made a safe landing at Peshawar.

Before the aircraft was released for normal flying the aircraft was subjected to a detailed inspection programme. Since Water bubbles were in the fuel tank and sedimentation in the strainer filter was observed, as such it was also felt necessary to scrutinize the maintenance schedule as well as the previous rectification carried out on similar defects reported earlier.

As regards the maintenance schedule it was observed that the strainer bowl is cleaned and refitted at every check-II, whereas instead of the strainer bowl, the filter element itself should be cleaned and refitted. This amendment in the Maintenance Schedule if incorporated, would reduce any chances of sedimentation in the filter element, if performed during every Check-I instead of Check-II. It may^{be} added that similar defects of partial power loss had been reported earlier on the same aircraft too and in each case the aircraft was subjected to thorough inspection, but nothing significant was observed by the concerned Engineers. For details of the work performed, reference may be made to Appendix - F.

The aircraft AP-BAC was again inspected at Peshawar on 17.5.89 and the following work performed before release of aircraft for normal flying:

- i) Carburetor checked, found satisfactory.
- ii) Carburetor filter checked found satisfactory.
- iii) All fuel filters cleaned, inspected and refitted.
- iv) Fuel lines blown with dry air.
- v) Fuel tanks dismantled, thoroughly cleaned, flushed and refitted.
- vi) Fuel cap seals observed to be slightly sagged. Same replaced. This sagness may cause ingress of water, if aircraft is parked in the open during rain.

- vii) Operation of fuel cock checked, found satisfactory.
- viii) Engine compression checked, found satisfactory.
- ix) Air filter element checked, found satisfactory.
- x) Oil consumption record checked, found within limits.
- xi) Oil filter and oil sample checked found satisfactory.
- xii) Spark plugs checked found satisfactory.
- xiii) Magnetos and harness checked found satisfactory.
- xiv) Power check carried out found satisfactory

Apparently nothing abnormal was observed with the aircraft, Cessna-150 AP-BAC. Upon satisfactory results of the inspection, the aircraft was released for normal flying. It may be worth while to mention here that prior to force landing at Basal, similar defect was reported on this aircraft on 29.4.1989 by Capt. Natasha Sami. Refer to Appendix- E for details of the work performed by the Engineer. It may be noted, that during the rectification, the tanks were flushed at that time because of suspected moisture. During discussion with the Maintenance Staff, it was observed, that at times, the refuelling is carried out in the morning, instead of at the end of the days flight. Under such condition, if the aircraft is parked with the empty tanks, the natural process of condensation will result in the accumulation of moisture inside the tanks, due low temperature at night. As such frequent flushing of tanks would in no way prevent water accumulation but instead the procedures and practices need to be reformed.

ANALYSIS / DISCUSSION:

After release of aircraft for normal flying the aircraft operated satisfactorily. But on 25.5.89 the partial power loss reported again on the aircraft Cessna-150 AP-BAC this time by Capt. Tariq Afridi, during training sortie in the training area. As such it was felt necessary to study not only the technical aspect but also if there was any operation discrepancy. Rough engine operation or power loss could be due to the following and each is discussed separately.

a) BLOCKAGE OF FUEL VENTING SYSTEM:

Fuel system venting is essential to system operation. Blockage of the venting system will result in a decreasing fuel flow and eventual engine failure. Venting system was checked and no blockage was observed.

b) SPARK PLUG FOULING:

A slight engine roughness in flight may be caused by one or more Spark plugs becoming fouled by carbon or lead deposits. Inspection of the spark plugs revealed no abnormality, as such this is not considered, as the likely cause.

c) MAGNETO MALFUNCTION:

A sudden engine roughness or misfiring is usually evidence of magneto problems. Inspection of magneto revealed no abnormality and therefore is not considered to be the likely cause.

d) LOW OIL PRESSURE:

If low oil pressure is accompanied by normal oil temperature, there is a possibility that oil pressure gauge or relief valve is malfunctioning. If a loss of oil pressure is accompanied by a rise in oil temperature an engine problem could be suspected. No abnormality in the above parameters was observed, as such this is not a factor in the power loss.

e) CARBURATOR ICE:

The cooling effect of fuel vaporization and the air pressure drop across the venturi (narrow portion) of the carburetor throat can chill intake air considerably. If the air is moist or any moisture is present in the fuel, the moisture may condense and accumulate in the carburetor and intake-duct in the form of frost or ice. Even a slight amount of ice can cause reduction in power and rough running of the engine, and a continued accumulation may lead to engine failure. In general, however, aircraft equipped with carburetor will have the following characteristics.

- i) Carburetor ice can occur without visible moisture and even when temperatures are more than 90 degrees F. The danger of carburetor ice is greatest in humid air, at outside air temperatures below 60 degrees F.
- ii) The indication of carburetor ice are, decreased engine RPM (with a fixed pitch propeller) or a decrease in manifold pressure (with a constant speed propeller).
- iii) Application of carburetor heat allows the warmth of the exhaust system to heat incoming carburetor air, but it may be ineffective if the engine has iced sufficiently to cause a large loss of power (in which case the primer might be used to supply fuel for combustion).

- iv) Carburetor ice is more likely to occur at low power settings and icing symptoms may not be detectable on extended descents.

In the carburetor heat system, pulling out on the carburetor heat control, opens the carburetor heat valve and lets the hot air pass through the carburetor where it melts the ice, mixes with the fuel, and continues on to the engine cylinders. Some loss of power will be noticed when using carburetor heat, because less oxygen is available to the fuel air mixture due to the fact that hot air is less dense than cold air.

Application of carburetor heat causes an immediate small reduction in power. If ice is not present in the carburetor, the power reduction remains constant. When ice is present, application of carburetor heat causes a small reduction in power followed (within 10 to 20 secs) by an increase in power. If sufficient ice has accumulated application of carburetor heat may cause the engine rough running as the ice melts and is carried into the engine. In this case the engine will run rough until the ice has melted.

The carburetor heat control is used:

- i) Whenever loss of RPM or engine power is noticed during flight.
- ii) As a preventive measure against carburetor ice during prolonged descents and landing glides. The temperature of the air may drop as much as 70 F in passing through the carburetor due to the expansion of air and vaporization of fuel.

Scrutiny of the record pertaining to aircraft defects/ snag revealed that the snag of partial power loss had occurred many times before, on the same aircraft. Even change of engine last year did not help resolve the problem. In one case i.e. on 11.7.86 similar partial power loss was experienced by Capt. Tariq Afridi, CPL No.1171, resulting in precautionary landing at Basal airfield. Further more, the same phenomenon was observed by Capt. M.J. Akbar, CFI, Peshawar Flying Club on three different occasions i.e. in Summer 1978, in Summer 1979 and in Summer 1988 (refer Appendix - C). Especially in Summer 88 same discrepancy was observed on three subsequent flights. In each case the aircraft was thoroughly inspected by the Engineer concerned as well as the Airworthiness Branch, but no technical discrepancy was observed, which could have contributed in the reported partial power loss.

Apparently the aircraft Cessna-150 AP-BAC did not experience power loss due any Technical discrepancy. As discussed above, nothing abnormal was observed with the fuel venting system, spark plug, magnetos or any internal damage to the engine.

Referring to the ambient conditions, at level 7500 on page 3, it may be observed that the OAT as reported by Capt. Miss Natasha Sami, CPL No. 1370 was 3°C and the humidity on that day was 46% (Data from Met Department). As observed earlier, the fuel drained also contained water drop-lets.

From the above discussion on Carburetor icing and the factors listed in para above, it is highly suspected that the partial power loss was due to carburetor icing. Referring to the statement of Capt. Natasha Sami, CPL No. 1370 (Appendix - A), she states that "Just for checking, I closed the carburetor heat and the RPM dropped further to about 1700". This clearly indicates that the ice had accumulated in the carburetor and intake duct. Closure of the carb heat aggravated the problem. Had she kept the carburetor heat "ON" for a little longer period and having descended to a lower altitude, the problem could have been resolved without making any precautionary landing. More over she was probably unaware of the conditions, which could lead to carb icing, as it is not necessary to enter icing conditions to experience carburetor icing. Carburetor ice can occur without visible moisture and even when temperatures are more than 90°F.

FINDINGS:

1. Aircraft had valid Certificate of Airworthiness.
2. Aircraft had valid Weight Schedule.
3. Pilot Capt. Natasha Sami was holding valid Licence CPL No. 1370
4. Daily Inspection had been carried out by the Engineer, Mr. Daud A. Malik, AME-1055
5. Sedimentation was observed in the strainer filter.
6. Water Droplets were observed in the fuel, drained from the fuel tank.
7. Fuel strainer filter element cleaning is not included in Check-I of the Maintenance Schedule.
8. Aircraft refuelling, at times, is not done at the end of the days flight and the aircraft are left unrefuelled over night (in the open.)

CAUSE:

Partial power loss can be due to certain factors. Based upon the observation, by the Investigators and the aircraft inspection for any Technical discrepancy, our findings narrow down to phenomenon of carburetor icing. As per discussion on page 5 para analysis, it is concluded that the Capt. of aircraft was not fully aware of the fact that OAT 3°C and any humidity/moisture in fuel could lead to carburetor icing, as such no carburetor heat was used till partial power loss was observed and subsequently as a corrective measure.

RECOMMENDATIONS:

1. Cleaning of strainer filter element should be included in Check-I of the approved Maintenance Schedule of Cessna-150 AP-BAC. Peshawar Flying Club to raise necessary amendment.
 2. Aircraft should be parked during night with fuel tanks full, to minimize condensation / accumulation of moisture.
 3. Advisory circular to all operating crew may be issued on the conditions that can cause carburetor icing, the indications and the remedial measures to help salvage the situation.
 4. General Aviation Pilots education/indoctrination programme must cater for thorough knowledge of aero engine carburetor icing in full
- INVESTIGATOR INVEST ATOR INCHARGE