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FINAL REPORT ON ACCIDENT TO M/S ALCHEMIST AIRWAYS PVT. LTD. KING AIR C-90A AIRCRAFT VT-EQO NEAR KAIR VILLAGE, NAJAFGARH, NEW DELHI ON 24.05.2016

(Dinesh Kumar)	(Shilpy Satiya)	(Raje Bhatnagar)
Member	Member	Chairman

FOREWORD

In accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and Rule 3 of Aircraft (Investigation of Accidents and Incidents), Rules 2012, the sole objective of the investigation of an accident shall be the prevention of accidents and incidents and not to apportion blame or liability.

This document has been prepared based upon the evidences collected during the investigation, opinion obtained from the experts and laboratory examination of various components. Consequently, the use of this report for any purpose other than for the prevention of future accidents or incidents could lead to erroneous interpretations.

INDEX

GLOSSARY

AAIB	Aircraft Accident Investigation Bureau, India
AMSL	Above Mean Sea Level
ARC	Airworthiness Review Certificate
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
AUW	All Up Weight
C of A	Certificate of Airworthiness
CAR	Civil Aviation Requirements
COI	Committee of Inquiry
CPL	Commercial Pilot License
CVR	Cockpit Voice Recorder
DFDR	Digital Flight data Recorder
DGCA	Directorate General of Civil Aviation
DVOR	Doppler VOR
F/O	First Officer
FCOM	Flight Crew Operating Manual
FCTM	Flight Crew Training Manual
FRTOL	Flight Radio Telephone Operators License
hrs	Hours
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
LLZ	Localizer
MEL	Minimum Equipment List
MLG	Main Landing Gear
NDB	Non-Directional Beacon
NLG	Nose Landing Gear
Nm	Nautical Miles
PA	Passenger Address
PIC	Pilot in Command
QRH	Quick Reference Handbook
RESA	Runway End Safety Area
SB	Service Bulletin
SEP	Safety and Emergency Procedures Manual
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Range
UTC	Coordinated Universal Time

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1. Aircraft
   - Type : King Air C-90 A
   - Nationality : Indian
   - Registration : VT - EQO
2. Owner/ Operator : Alchemist Air Pvt. Ltd.
3. Pilot – in –Command : CPL holder on type
   Extent of injuries : Nil
4. First Officer : CPL Holder on type
   Extent of injuries : Nil
5. Place of Accident : Near Kair Village, Najafgarh, New Delhi
6. Date & Time of Accident : 24 May 2016 at 0907UTC (Approx.)
7. Last point of Departure : Patna
8. Point of intended landing : New Delhi
9. Type of operation : Ambulance Flight
9. Crew on Board : 2
   Extent of injuries : Nil
10. Passengers on Board : 05
    Extent of injuries : Nil
11. Phase of operation : Approach
12. Type of accident : Force Landing

(ALL TIMINGS IN THE REPORT ARE IN UTC)

SYNOPSIS:

On 24.05.2016, M/s Alchemist Air Pvt. Ltd King Air C-90A aircraft VT-EQO, was operating an air ambulance flight from Patna to Delhi.

The aircraft took off from Patna at around 0610 UTC and weather reported for Delhi was within the crew operating minima. When the aircraft was around 35 nm from Delhi, ATC cleared aircraft for runway 10. Thereafter at around 0852 UTC, the aircraft lost LH engine and the same was confirmed by checking the engine parameters. On the annunciator panel also, L Gen Fail light illuminated. There was no other warning light illuminated on the annunciator panel. ATC was informed about the engine failure. LH Engine was secured and again PIC tried to start the engine as per checklist. But Ng available was only 30% and engine did not restart.

At 0905 UTC, as the aircraft was on the base leg of RW 10 and at an altitude of around 3000 feet, RH engine also lost power. PIC carried out an emergency landing in an open field. Passengers were evacuated by the First Officer. There was no fire and injury to any person on board the aircraft.

The Ministry of Civil Aviation constituted a Committee of Inquiry to investigate into the cause of the accident under Rule 11 (1) of Aircraft (Investigation of Accidents and Accidents), Rules 2012 comprising Sh. Raje Bhatnagar, Assistant Director, Chairman, Ms. Shilpy Satiya, Air Safety Officer and Sh. Dinesh Kumar, Air Safety Officer as members vide order No. AV.15013/02/2016 –DG dated 15th June 2016.

1. FACTUAL INFORMATION

1.1 HISTORY OF THE FLIGHT

On 24.05.2016, M/s Alchemist Air Pvt. Ltd King Air C-90A aircraft VT-EQO, was involved in an accident while operating an air ambulance flight from Patna to Delhi under the command of CPL holder on type with duly qualified First Officer on type. There were five passengers and two crew members on board the aircraft. The aircraft suffered substantial damage. There was no injury to any person on board the aircraft. There was no fire after the accident. This was the second sector of the aircraft as an air ambulance.

Previous to the accidented flight, the aircraft VT-EQO had operated a flight Delhi – Patna with the same crew in the morning of 24.05.2016 at 0300 UTC. Before the flight at Delhi, fuel quantity was 1750 lb. Thereafter, refueling was carried out and a total of 450 lb fuel was uplifted. Total fuel onboard before the operation of flight was 2200 lb. The flight was uneventful and there was no snag reported by the PIC on the completion of the flight. Subsequently, the aircraft was scheduled for Patna - Delhi on 24.05.2016 at around 0610 UTC. At Patna, again fuel quantity was measured and refueling was carried out. A total of 350 lb was uplifted. At Patna, total fuel onboard before the operation of flight was 1900 lb.

The aircraft took off from Patna at around 0610 UTC and the enroute weather was fine and visibility reported for Delhi was 3.2 km. During this sector, aircraft cruised at FL120. At 0836 UTC, Delhi ATC gave permission to descend to FL 110. Subsequently, crew requested further descent to FL100 and the same was assigned by ATC. Later ATC found that the aircraft was flying 300 feet below than the assigned FL100. Thereafter, ATC requested crew to maintain FL100.Subsequently, crew followed the instructions and confirmed climbing. When the aircraft was around 35 nm from Delhi, Delhi ATC cleared landing for runway 10. Thereafter, at around 0852 UTC, the aircraft lost LH engine and the same was confirmed by checking the engine parameters. On the annunciator panel also, L Gen Fail light got illuminated. There was no other warning light illuminated on the annunciator panel. ATC was informed about the engine failure. LH Engine was secured and PIC again tried to start the LH engine as per the checklist. But Ng available was only 30% and engine did not start.

At 0905 UTC, as the aircraft was on the base leg of RW 10 and an altitude of around 3000 ft, RH engine also lost power. The crew had stated that, after aircraft lost both engines, they looked for a suitable place for landing as they were not able to land on the runway. There were houses on the left side and also straight ahead but on their right, there was an open field which was clear from obstructions. PIC turned right and tried to carry out an emergency landing in an open field. Aircraft touched down on its main landing gear and just a few seconds after touchdown, aircraft hit the road which was almost three feet high. This resulted in the collapse of both main landing gears. After the impact, aircraft floated in air for a few seconds and finally came to rest on its belly. After landing, PIC tried to give MAYDAY call, however, PIC was not able to transmit the call as the avionics of the aircraft was damaged due to the impact. After the crash, the aircraft door was opened by the First Officer and all passengers including patient were evacuated. DELHI FIC was intimated about the crash on landline. There was no injury to any of the occupants on board the aircraft. There was no post-accident fire.

1.2 INJURIES TO PERSONS

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
No injury	02	05	Nil

1.3 DAMAGE TO AIRCRAFT

The aircraft sustained substantial damage. The damages observed were as follows: -

1. LH & RH bottom cowling was found damaged.
2. RH upper aft cowling was found damaged.
3. RH, LH, MLG&NLG including doors and wheel well area were fully damaged.
4. LH & RH propellers were damaged.
5. LH side panel of engine on nacelle tank was damaged.
6. RH torque transducer was found broken.
7. Both wing light lenses were found broken.

8. RH wing fairing, inboard flap (top & bottom), aft section wing were found damaged.
9. LH & RH boost pump panel and LH boost pump drain were found damaged.
10. LH wing section joint was damaged.
11. Belly section damages are as follows: -
    i. Aft of NLG wheel well was damaged.
    ii. Complete belly had dents.
    iii. Belly section near rear spar had holes.
    iv. Belly skin aft of rear spar was ruptured.
12. Belly section antennas were found damaged.
    i. Both ADF antennas.
    ii. VHF antennas.
    iii. Both transponder antenna.
13. LH inboard flap was found damaged.

1.4 OTHER DAMAGE

Nil

1.5 INFORMATION IN RESPECT OF INVOLVED PERSONNEL

1.5.1 Pilot – in – Command

Age	: 33 years
Licence	: CPL Holder
Date of issue	: 12/02/2009
Valid up to	: 11/02/2019
Category	: Aeroplane
Class	: Multi Engine Land
Endorsements as PIC	: Cessna 172, Piper Seneca B-200, C-90, PA-34
Date of Med. Exam.	: 21/09/2015
Med. Exam valid upto	: 23/09/2016
FRTO Licence No.	: Valid
Date of issue	: 14/01/2009
Total flying experience	: 2566:51 hours
Experience on type	: 914:00 hours
Experience as PIC on type	: 737:40 hours

Last flown on type	: 20/05/2016
Total flying experience during last 180 days	: 236:00hours
Total flying experience during last 90 days	: 94:20hours
Total flying experience during last 30 days	: 09:50 hours
Total flying experience during last 07 Days	: 03:10 hours
Total flying experience during last 24 Hours	: Nil

1.5.2 Co-Pilot

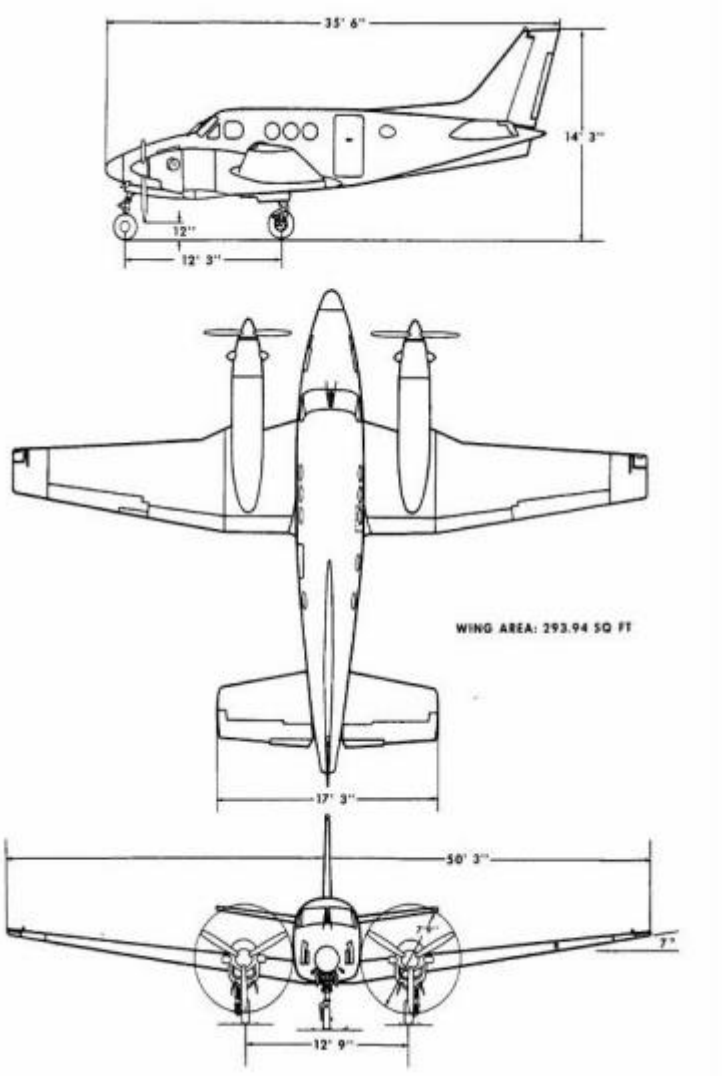
Age	: 30 years
License	: CPL Holder
Date of Issue	: 29/11/2012
Valid up to	: 28/11/2017
Category	: Aeroplane
Class	: Multi Engine Land
Endorsements as PIC	: Cessna 172, Piper Seneca PA-34, C-90
Date of Med. Exam.	: 17/03/2016
Med. Exam valid upto	: 16/03/2017
FRTO	: Valid
Total flying experience	: 954:30 hours
Experience on type	: 656:15 hours
Experience as PIC on type	: 68:00 Hours
Total flying experience during last 180 days	: 209:40 hours
Total flying experience during last 90 days	: 106:50hours
Total flying experience during last 30 days	: 23:05 hours
Total flying experience during last 07 Days	: 12:30 hours
Total flying experience during last 24 Hours	: NIL

Both pilots were not involved in any serious incident/ accident in the past. The licenses of both pilots and all their training records were current and valid. Both pilots had adequate rest prior to the accidented flight.

1.6 AIRCRAFT INFORMATION

Construction

The King Air C-90 is an all-metal, low-wing, twin-engine, turbo-propeller airplane with retractable landing gear. The airplane is equipped with conventional ailerons, elevators and rudder, for roll, pitches and yaw control respectively. The airplane is equipped with dual controls for the pilot and co-pilot. The ailerons and elevators are operated by control wheels interconnected by a T-bar. Flight instruments are arranged in a group directly in front of the pilot and the co-pilot. Complete pilot and co-pilot flight instrumentation is available, including dual navigation systems, two course selectors, dual gyro horizons and dual turn and slip indicators. The Aircraft length is 1082 cm, wingspan is 1532 cm and height of this aircraft is 434 cm.



The annunciator system consists of a warning/caution/advisory panel. The warning (red), caution (amber) and advisory (green) annunciators are centrally located in the glare shield. A red MASTER WARNING flasher, amber MASTER CAUTION flasher

is also a part of the system. If the fault requires immediate attention and reaction of the pilot, the appropriate red warning annunciator in the panel illuminates and the MASTER WARNING flasher begins to flash.

The C90A aircraft is powered by two Pratt and Whitney PT6A series engines. The PT6 is a free-turbine engine. It utilizes a three- stage axial compressor and a single stage centrifugal compressor. These compressors are driven by a single-stage reaction turbine. The power turbine drives the propeller shaft through a reduction gear box. The power turbine and the reaction turbine rotate independently of each other and there is no mechanical connection between the two.

Each engine is equipped with either a Hartzell or McCauley 3 or 4 blade propeller. These are full feathering, constant speed, reversing, variable pitch propellers mounted on the output shaft of the engine reduction gearbox. These are equipped with an auto-feathering system.

Beechcraft King Air C90A aircraft VT-EQO (MSN LJ-1153) had been manufactured in 1989. The aircraft was registered with DGCA under the ownership of M/s Alchemist Airways Pvt. Ltd. on 24.04.2007. The aircraft is registered under Category 'A' and the Certificate of Registration No. is 2433/4 dated 24.04.2007. The Certificate of Airworthiness Number 1927/2 was issued by DGCA on 15.04.2013.

At the time of accident, the ARC was valid. The Aircraft was operating under Non-Scheduled Operator's Permit No 09/2006 which was valid up to 08.11.2016.

The Aircraft was holding a valid Aero Mobile License No. A-007/001-RLO (NR) dated: 06.07.2007(Initial issued) & Renewal Certificate No L-14012/7/2007-RLO (NR)-556 was valid till 31.12.2016 at the time of incident. As on 23rd May 2016, the aircraft had logged 6766:28 Airframe Hours and 6490 landings.

The Beechcraft King Air C90A aircraft and its Engines are being maintained as per the maintenance programme consisting of calendar period/ flying Hours or Cycles based maintenance as per maintenance programme approved by Regional Airworthiness office vide DGCA Reference No DDG/NR/MG/054/2692 dated 15.12.2014.

Accordingly, the last major inspection Phase 1(200Hrs) check was carried out at 6758:18 Hrs/ 6478 Landings on 18.12.2015. Subsequently, all lower inspections (Preflight checks, Service Checks, Weekly Checks) were carried out as and when due before the incident.

The aircraft was last weighed on 15.03.2016 at Delhi, and the weight schedule was prepared and duly approved by the office of Director of Airworthiness, DGCA, Letter No A-7/VT-EQO/584 dated 02.05.2016. As per the approved weight schedule, the Empty weight of the aircraft is 3066.94 Kgs. **Maximum Usable fuel Quantity is 2573 Kgs.** Empty weight CG is 152.61Inch (388.32 cm) aft of datum. As there had not been any major modification affecting weight & balance since last weighing, hence the next weighing is due on 15.03.2021. Prior to the accident flight, the weight and balance of the aircraft was well within the operating limits.

The left Engine TYPE- PT6A-21; S/N- PCE-PE0111 had logged 3347:53 Hrs. and 3259 cycles and the right Engine TYPE- PT6A-21; S/N PCE-25326 had logged 6703:38 Hrs. and 6421cycles. There was no defect reported on the engines after the previous flight.

All concerned Airworthiness Directives, mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine had been complied with.

Transit Inspections were carried out as per approved Transit Inspection Schedules. All higher inspection schedules which include checks 1 inspection as per the manufacturer's guidelines as specified in Maintenance Program and are approved by the Continuing Airworthiness Manager (Post Holder for Continuous Airworthiness) were also being carried out.

Previous to the accident flight, the aircraft was last flown on 27.02.2016. Before this flight, the aircraft was grounded from 09.06.2015 to 30.11.2015. Thereafter on 01.12.2015, ARC of the aircraft lapsed which was renewed on 01.02.2016. During the period of grounding, Engine Ground run was carried out as per SOP.

1.7 METEOROLOGICAL INFORMATION

The following is the Met report of Delhi on the date of accident between0800 UTC to 0930 UTC.

Time (UTC)	Wind Dir	Wind Speed (kts)	Visibility (meter)	Weather	QHN
0800	170	08	3500	Hz	1002
0830	200	09	3200	Hz	1002
0900	120	03	3200	Hz	1001
0930	190	05	3200	Hz	1001

1.8 AIDS TO NAVIGATION

Aircraft is equipped with modern navigation aids viz. VOR, DME. At IGI airport, the VOR/DME, ILS landing facility and PAPI are available on either side of all three runways.

1.9 COMMUNICATIONS

There was always two way communications between the ATC and the aircraft.

1.10 AERODROME INFORMATION

The aircraft force landed in an open field.

1.11 FLIGHT RECORDERS

As per the Indian CAR (Civil Aviation Requirement), aircraft category is exempted for installation of flight recorder.

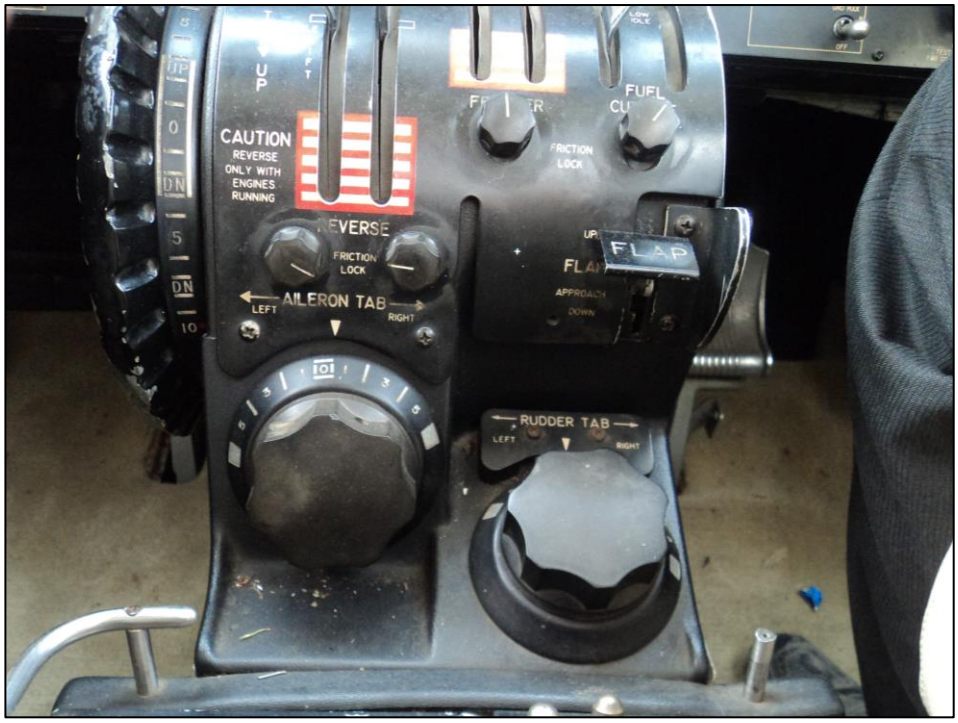
1.12 WRECKAGE AND IMPACT INFORMATION

During examination of the wreckage at site, it was observed that all landing gears collapsed and the aircraft was resting on its belly. The wreckage was confined to one place indicating that there was no in-flight disintegration of the aircraft.

Aircraft forced landed on its landing gear and travelled for about 350 ft as visible by the wheel marks. Thereafter, aircraft hit the road which is almost three feet high. Due to the impact with the road, both main landing gears of the aircraft were damaged.

After the impact with the road, aircraft bounced and floated in air for a few seconds before coming to final rest.

In the cockpit, the throttle levers were found in idle position. Fuel shutoff valve was found in “ON position”. Flaps were in “UP position”.



1.13 MEDICAL AND PATHOLOGICAL INFORMATION

Both pilots had undergone preflight medical check prior to the flight and the same was negative.

1.14 FIRE

There was no fire after the accident.

1.15 SURVIVAL ASPECTS

After both engines stopped responding, the crew decided for the emergency landing. Aircraft hit an elevated road after touchdown. Subsequently, the aircraft bounced 2-3 times on the other side of the road before coming to final rest position. However, the accident was survivable.

1.16 TESTS AND RESEARCH

NIL.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

Alchemist Airways Pvt. Ltd. was set up in 2006 to provide non scheduled air transport, under Non Schedule Operator's Permit Number 09/2006 issued by the DGCA, on 09/11/2006 . The organization has a fleet of two aircraft. Both are of the same variant Beechcraft King Air C90A. The main operating base is New Delhi.

M/s Alchemist Airways Pvt. Ltd. is having DGCA approval under CAR M (Reference: DDG(NR).MG.054) for management of the aircraft operated under its NSOP.

Alchemist Airways Pvt. Ltd. currently operates independently with the exception of maintenance support which is provided by the CAR 145 approved maintenance organization (Innovative Aviation Pvt. Ltd.)

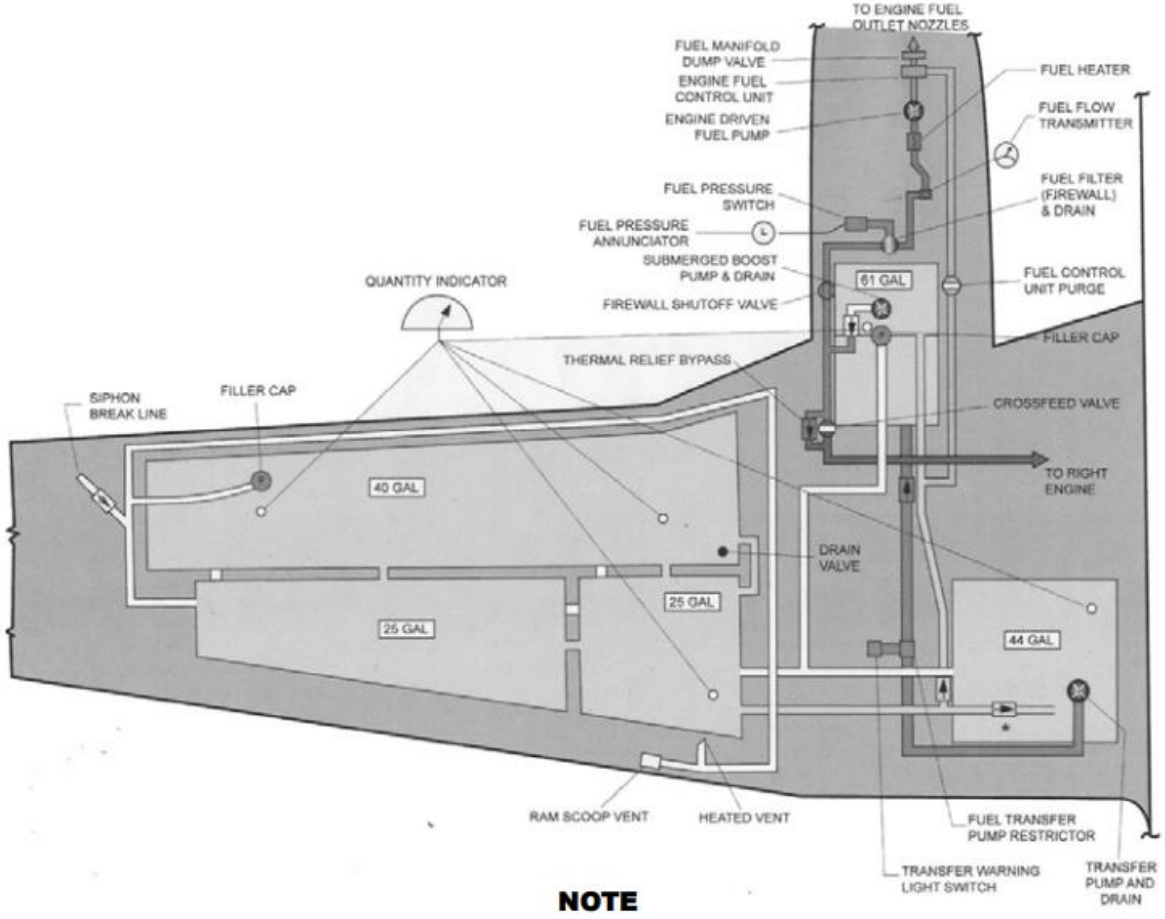
M/s AAPL's Continuing Airworthiness Management Capability is to manage the Continuing Airworthiness of aircraft maintained according to approved maintenance program for the aircraft.

1.18 ADDITIONAL INFORMATION

1.18.1 Fuel System

The fuel system is a 384 usable gallon system with each wing divided into a main fuel tank and a nacelle tank. Fuel for each engine is supplied from a nacelle tank and four interconnected wing tanks for a total of 192 gallons of usable fuel for each side with all tanks full. The outboard wing tanks supply to the center section wing tank by gravity flow. The nacelle tank draws its fuel supply from the center section tank. Since the center

section tank is lower than the other wing tanks and the nacelle tank, the fuel is transferred to the nacelle tank by fuel transfer pump in the low spot of the center section tank. Each system has two filler openings, one in the nacelle tank and one in the leading edge tank. A crossfeed valve in the left fuel system makes it possible to connect the two systems.



NOTE

A 44 gallon cell is located in the wing center section. The outboard wing panel contains two 25 gallon tanks. A 40 gallon tank in the wing leading edge brings the total fuel capacity to 195 gallons per side, however, the total usable fuel capacity of both tanks is 384 gallons. The fuel system also incorporates electrical boost and transfer pumps and an electrically operated crossfeed valve. Three modes of operation are available which are as follows: -

1. NORMAL OPERATION. Each engine receives fuel from its corresponding fuel cells and boost pump. The cross-feed valve control switch is in the AUTO position. The cross-feed valve is closed but is armed for automatic operation.

2. AUTOMATIC CROSSFEED OPERATION. In the event of a boost pump failure, standby boost pressure is obtained by supplying fuel to both engines, through the crossfeed valve, from one boost pump. A drop in output pressure from the failed pump is sensed by a pressure switch which automatically opens the crossfeed valve when the pressure drops below 5 psi.

3. SUCTION FEED. This mode of operation may be employed after a boost pump has failed and allows the use of fuel from tanks on the side with the failed pumps. Suction feed operation is obtained by moving the crossfeed valve control switch from the AUTO position to the OFF (valve closed) position. Vacuum created by the engine driven fuel pump lifts fuel from the nacelle fuel tank. Suction feed operation is restricted to 10 hours total time between engine overhaul periods. If the engine driven fuel pump is operated on suction feed beyond the 10 hour limit, overhaul or replacement of the pump is necessary.

Fuel level in the nacelle tank is automatically maintained at near full capacity during normal operation by a fuel transfer system whenever the fuel level in the nacelle tank drops by approximately 10 gallons. A transfer pump, located in each center section wing cell, pumps fuel from the wing tanks to the nacelle tank. The transfer pumps are controlled by float operated switches on the nacelle tank fuel quantity transmitters. A pressure switch, located in the fuel transfer line, will automatically turn off the transfer pump if a pressure of approximately 3.0 psi is not obtained within approximately 30 seconds after the pump is turned on or if the transfer pump pressure drops below 1 psi due to empty wing tanks or pump failure. A NO FUEL XFR warning light illuminates when the pump is automatically turned off. The NO FUEL XFR light is also illuminated when the transfer pump function switch is placed in the TEST position and will stay illuminated until sufficient pressure is created in the fuel transfer lines to open the pressure sensing switch. If the transfer pump fails, 28 gallons of fuel remains trapped and unusable in the wing because of wing dihedral and the location of the gravity feed line in the tank wall.

Fuel Pumps

Fuel is pumped to the engine by an electrically powered low pressure boost pump submerged in the nacelle tank. The purpose of this pump is to provide pressurized fuel to the high pressure engine driven fuel pump. The low pressure boost pump provides

lubrication and prevents cavitation of the high pressure fuel pump. It is not an emergency back up pump to the high pressure pump. The high pressure pump is engine driven and operates at approximately 800psi. This pump is protected against fuel contamination by an internal, 90-mesh strainer. Engine Driven Pump provides sufficient fuel pressure to insure a proper spray pattern of fuel in the combustion chamber. Failure of this pump results in an immediate engine flameout. The high pressure pump is not designed to suction feed fuel from the nacelle tank. Its function is to push fuel into the engine. If an engine driven high pressure pump is required to suction feed from the nacelle tank, severe pump damage will result. For this reason, operation with the FUEL PRESSURE annunciator on is limited to 10 hours between engine driven high pressure pump overhaul or replacement. Failure of the electric boost pump would illuminate the FUEL PRESSURE annunciator light. A pressure switch senses boost pump fuel pressure at the fuel filter. At less than 10 psi of pressure, a switch closes and actuates the red FUEL PRESSURE warning light in the annunciator panel. At this time, the system will begin to crossfeed automatically. The pilot may elect to close the crossfeed switch and continue the flight using the high pressure engine driven fuel pump or continue with the crossfeed operation.

The boost pumps are controlled by toggle switches on the fuel-control panel. The power source for the boost pumps is supplied from the left or right Generator Bus. The alternative source of power to the boost pumps is directly from the battery through the Hot Battery Bus.

Fuel Transfer Pumps

A submerged fuel transfer pump, located in each center wing section cell, automatically maintains the fuel level in the nacelle fuel cells at or near full capacity. (61 Gals) Fuel is transferred automatically when the TRANSFER PUMP – OVERRIDE – AUTO – OFF switches are placed in AUTO, unless the nacelle tanks are full. Magnetic switches, incorporated in the nacelle fuel cell fuel quantity transmitter, control the operation of the transfer pumps. A pressure switch connected to the transfer line automatically turns the transfer pump off when the wing cells are empty or the pump fails. To allow time for the pressure to build- up when the pump is first turned on, a time delay relay keeps the pump energized for approximately 30 seconds. If the pressure does not build up within this period, the pump is automatically turned off. When the fuel transfer switches are turned on, the transfer pumps begin operation and continue operating until

the nacelle tank is filled and the high level switches of the fuel level transmitter close. This energizes the transfer pump relay and opens the transfer pump circuit, stopping the pump. When the fuel level in the nacelle tank decreases by approximately 10 gallons, a relay is energized starting the transfer pump and the cycle is repeated. If within 30 seconds the transfer pump fails to produce sufficient pressure to open the fuel pressure switch, the contacts of the time delay relay close. This provides a NO FUEL TRANSFER signal for the annunciator panel and energizes the transfer pump relay (these are electromagnetic relays) to stop the pump. The time delay relay is latched by a diode to prevent the transfer pump from being turned on. The time delay relay may be reset by placing the transfer pump in the OFF position for a time (normally about 60 seconds) sufficient for the relay to cool and the points to open. The function switch provides a means for testing either the left or right transfer system. Placing the transfer pump switch in the ON position starts the pump, except when the nacelle tank is full. Should a no-transfer condition exist, the LH TEST or RH TEST position of the function switch bypasses the time delay relay to give an immediate NO FUEL XFR indication on the annunciator panel. If the pump is not running, due to normal cycling, selection of the TEST position biases the transistor switch to start the pump. A momentary NO FUEL XFR indication denotes normal transfer. If the time delay relay has been actuated, the TEST selection will not start the pump.

The OVERRIDE positions of the transfer pump switches may be used in the event that either or both nacelle tanks' float switches fail to function. When in the OVERRIDE position, the transfer pumps run continuously. If the nacelle tanks become full, the excess will be returned to the wing center section tanks through the fuel vent lines. If the transfer pump fails to operate during flight, gravity feed will perform the transfer. When the nacelle tank level drops to approximately 150 pounds, or approximately 22 gallons (83.3 litres), the gravity port in the nacelle tank opens and gravity flow from the wing tank starts. All wing fuel, except approximately 188 pounds, (28 gallons, 106 litres) from each wing, will transfer during gravity feed.

Cross Feed

Cross feed is only to be conducted during single engine or boost pump failure operations. Each nacelle tank is connected to the opposite engine by a cross feed line.

Cross feed operation is controlled by a three position cross feed switch labeled OPEN, CLOSED or AUTO. In the event of a boost pump failure, standby boost pressure is obtained by supplying fuel to both engines, through the cross feed valve, from one boost pump. A drop in output pressure from the failed pump is sensed by a pressure switch which automatically opens the cross feed valve when the pressure drops below 5 psi.
When the cross feed valve is open, the FUEL CROSSFEED light on the annunciator panel will illuminate. The cross feed will not transfer fuel from one tank to another; its primary function is to supply fuel from one side to the opposite engine during an engine-out condition or a boost pump failure.
In the event of a boost pump failure during take off, the system will begin to cross feed automatically allowing the pilot to complete the take off without an increase in work load at a crucial time. After the takeoff is completed, or if the boost pump fails after takeoff, the cross feed switch may be closed and the flight continued, relying on the engine-driven high pressure pump. In some instances, the pilot may elect to continue the flight with the remaining boost pump and the crossfeed system in operation.

1.18.2 Medevac configuration

Initial date of issue for Certificate of Airworthiness of the aircraft is 23.03.1989. Later Certificate of Airworthiness number 1927 was issued by DGCA on 19.02.2004. The Certificate of Airworthiness was issued under category ‘Normal’ sub-division ‘Private’ with a seating capacity of six.

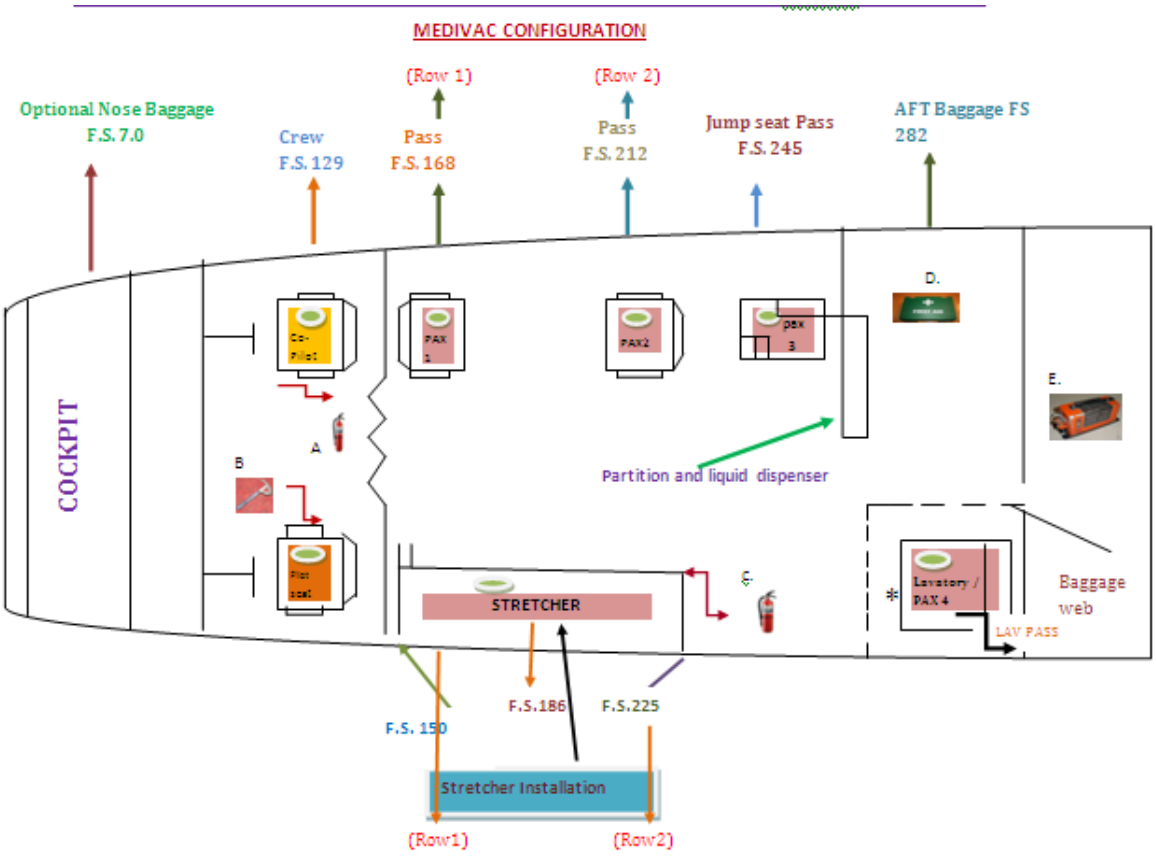
On 15.04.2013, aircraft was converted from Private to Passenger category and registered with Certificate of Airworthiness number 1927/2 which was valid upto 31.12.2014. As per the Weight Schedule which was approved on 04.08.2014 by DGCA, the seating capacity of the aircraft was eight (including two pilots) and MTOW approved was 4581 Kgs.

In respect of the aircraft, first ARC was issued on 07.01.2013 which was valid upto 07.01.2014. The next ARC issued by DGCA was valid upto 01.12.2015, however, the last flight of the aircraft was on 09.06.2015 as logged in the airframe log book.

Aircraft was on ground upto 24.02.2016. Aircraft ARC was re-issued on 01.02.2016 by DGCA.

On 22.02.2016, permission was granted by DGCA to install stretcher kit and revised weight schedule was computed on 15.03.2016 which was approved on 02.05.2016. As per the approved LOPA, seating capacity was reduced to five passengers wherein two seats were replaced with one stretcher to uplift a patient whereas the other configuration was not altered.

The operator was permitted to carry out the operation under Aeromedical Transportation (AMT) on C90 type of aircraft subject to the conditions laid down in CAR.



LAYOUT OF PASSENGER ARRANGEMENT (LOPA) & EMERGENCY AND SAFETY EQUIPMENT LAYOUT FOR KING AIR C 90A AIRCRAFT VT-EQO

After conversion from passenger to Medevac, this accidented flight was the very first flight under AMT.

1.18.3 DGCA CAR Section 8 Series O Part II

As per DGCA CAR Section 8 Series O Part II, an aeroplane shall carry sufficient amount of usable fuel, to complete the planned flight safely and to allow for deviations from the planned operation. Para 4.3.6.3 of the CAR states that

“The pre-flight calculation of usable fuel required shall include: -

a) **Taxi fuel**, which shall be the amount of fuel expected to be consumed before take-off; taking into account local conditions at the departure aerodrome and auxiliary power unit (APU) fuel consumption;

b) **Trip fuel**, which shall be the amount of fuel required to enable the aeroplane to fly from take-off or the point of in-flight re-planning until landing at the destination aerodrome taking into account the operating conditions.

c) **Contingency fuel**, which shall be the amount of fuel required to compensate for unforeseen factors. It shall be 5 per cent of the planned trip fuel or of the fuel required from the point of inflight re-planning based on the consumption rate used to plan the trip fuel but in any case shall not be lower than the amount required to fly for five minutes at holding speed at 450 m (1500 ft) above the destination aerodrome in standard conditions; Note.— Unforeseen factors are those which could have an influence on the fuel consumption to the destination aerodrome, such as deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions, extended delays and deviations from planned routings and/or cruising levels.

d) **Destination alternate fuel**, which shall be: -

1) Where a destination alternate aerodrome is required, the amount of fuel required to enable the aeroplane to

a) Perform a missed approach at the destination aerodrome;

b) Climb to the expected cruising altitude;

c) Fly the expected routing;

d) Descend to the point where the expected approach is initiated; and

e) Conduct the approach and landing at the destination alternate aerodrome; or

2) where two destination alternate aerodromes are required, the amount of fuel, as calculated in 4.3.6.3 d) 1), required to enable the aeroplane to proceed to the destination alternate aerodrome which requires the greater amount of alternate fuel; or

3) where a flight is operated without a destination alternate aerodrome, the amount of fuel required to enable the aeroplane to fly for 15 minutes at holding speed at 450 m (1 500 ft) above destination aerodrome elevation in standard conditions; or

4) Where the aerodrome of intended landing is an isolated aerodrome:

1) for a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes plus 15 per cent of the flight time planned to be spent at cruising level, including final reserve fuel, or two hours, whichever is less; or

2) For a turbine engine aeroplane, the amount of fuel required to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel;

e) **Final reserve fuel**, which shall be the amount of fuel calculated using the estimated mass on arrival at the destination alternate aerodrome or the destination aerodrome, when no destination alternate aerodrome is required:

1) for a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the State of the Operator; or

2) for a turbine engine aeroplane, the amount of fuel required to fly for 30 minutes at holding speed at 450 m (1500 ft) above aerodrome elevation in standard conditions;

f) **Additional fuel**, which shall be the supplementary amount of fuel required if the minimum fuel calculated in accordance with 4.3.6.3 b), c), d) and e) is not sufficient to:

1) allow the aeroplane to descend as necessary and proceed to an alternate aerodrome in the event of engine failure or loss of pressurization, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route;

i) Fly for 15 minutes at holding speed at 450 m (1 500 ft) above aerodrome elevation in standard conditions; and

ii) Make an approach and landing;

2) allow an aeroplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by DGCA;

3) Meet additional requirements not covered above;

g) **Discretionary fuel**, which shall be the extra amount of fuel to be carried at the discretion of the pilot-in-command.

1.18.4 Operations Manual of M/s Alchemist

- Para 12.1.2 of Part A of the operations manual gives the fuel policy to be followed by the organisation.

7) Allow the aeroplane to descend as necessary and proceed to an alternate aerodrome in the event of engine failure or loss of pressurization, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route

a) Fly for 15 minutes at holding speed at 450 m (1 500 ft) above aerodrome elevation in standard conditions; and b) Make an approach and landing

b) Make an approach or landing

g) An aeroplane shall not take off or continue from the point of in-flight replanning unless the usable fuel on board meets the requirements in 121.1 a), b), c), d), e) and f) if required and shall not continue from the point of in-flight re planning unless the usable fuel on board meets the requirements in 12.1.2 b), c), d) e) and f) if required.

g) **Discretionary Fuel** Which shall be the extra amount of fuel to be carried at the discretion of the Pilot– in– Command

h) **Final Reserve Fuel** For King Air C90 aircraft ,Final reserve fuel should be **280 Lbs.**

12.1.2 Fuel Policy for Alchemist Airways Private Limited.

SL NO	FUEL REQUIREMENTS	KING AIR C90A
	Sector Fuel	
01	Trip Fuel	As per flight plan (refer AFM)
02	Alternate Fuel	Same as above
03	Contingency Fuel	a) for IFR 10% of trip fuel
		b) for VFR 5% of trip fuel
04	Taxi Fuel	60 Lbs
05	Approach Fuel at destination	100 Lbs
06	Overshoot Fuel	200Lbs
07	App./Land at alternate	100Lbs
08	Final Reserve fuel (45 Minutes)	280 Lbs
Note: Flight crew shall refer to AFM for actual fuel Calculation		

1.18.5 Fuel Planning Carried Out by Pilot

As per the PIC,

- Fuel consumption of both engines for the flight of 02 hrs is 800 lbs
- Taxi fuel required is 60 lbs
- Total fuel consumption is 860 lbs.
- Fuel quantity at the time of take off from Delhi was 2200 lbs
- Fuel left on landing at Patna was 1340 lbs
- Fuel consumption of both engines for the flight (Patna- Delhi) of 02.:30 hrs at FL120 is 1050 lbs.
- Total Fuel consumption for the landing at Delhi was (1050 lbs + 60lbs (taxi fuel) = 1110 lbs)
- Fuel uplifted at Patna 586 lbs
- Total fuel at the time of take off from Patna was 1926 lbs
- Fuel consumption for Alternate Aerodrome was 420 lbs
- Holding fuel required at the alternate was 300 lbs
- Total Fuel required for the landing at Delhi was (1110 lbs (destination fuel)+ 300 lbs (Holding fuel) + 420 lbs (fuel for alternate aerodrome) + 55 (5% contingency fuel) = 1885 lbs)

1.18.6 On Site Investigation

Aircraft was resting on its belly after the accident and was required to be lifted up with the help of crane so that the defueling could be carried out.

The cranes were arranged to lift the Aircraft for the purpose of draining residual fuel from the Aircraft. Committee of Inquiry reached the site in the morning of 26/05/2016 to monitor proper draining of fuel & take samples for lab investigation. The aircraft was lifted with the help of crane only in the evening. There was no indication of any spillage of fuel. The direction of the aircraft was in line with runway 10.

Defueling was started late in the evening. First fuel was drained from port centre fuel tank and some amount of fuel drained was stored in drums. While the defueling was to start from the starboard fuel tank, it was observed that two persons came in the cordoned area with 02 blue drums. Both drums were sealed and were full of ATF. No extra drums were available at the crash site. Upon enquiry, both the maintenance organisation and the operator refused to admit that the ATF was brought to the accident site by them.

Chairman, Committee of Inquiry was informed immediately over phone by the Members of Committee of Inquiry, present at the site for investigation. There was no empty container available for draining except those full containers. These containers were therefore emptied, and fuel drained from starboard side centre tank. Above creates a doubt that it was for topping up fuel in the aircraft.

Though 185 litres of fuel was drained from the tanks, the evidence is repudiated in view of the above observation and process of elimination (discussed in analysis). However it is pertinent to mention that through out , the crash site was cordoned by Delhi Police. Only AAIB Investigators and personnel of operator authorised by AAIB were allowed access to the aircraft.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES

NIL

2 ANALYSIS

2.1 SERVICEABILITY OF THE AIRCRAFT

The Aircraft was maintained by DGCA approved Maintenance and Repair Organisation (MRO) as per the approved maintenance schedule. The aircraft had a valid Certificate of Airworthiness. The flight release was issued by AME and the aircraft was airworthy for the flight. There were no snags reported/ unattended prior to this flight. There were no pending inspections or maintenance on the aircraft or the engines as on the day of accident. The pilot had not reported any problem with the aircraft.

From the above, it is inferred that the serviceability of the aircraft is not a factor to the accident.

2.2 WEATHER

When the aircraft got airborne, visibility was 5 km and winds were 210/06 knots. There were scattered clouds at 1500 feet with rain. QNH reported was 1008. During the last approach, there were clouds reported at 1500 feet and visibility was 5 km in drizzle. The winds were 260/08 knots. Weather has not contributed to the Accident.

2.3 FUEL PLANNING

As per the figures available to the Inquiry committee, while carrying out Fuel Planning, PIC has calculated fuel for the sectors Delhi-Patna-Delhi based on the fuel consumption as given in the POH and the fuel policy of organization as given in Para 12.1.2 of Part A of the operations manual.

There is no way to cross check the fuel actually consumed in the sector Patna-Delhi but to believe what the PIC has submitted.

Prior to the accident flight, the aircraft had operated sectors Jaipur-Patnagar-Jaipur. The various timings and fuel consumed has been entered in the log book. Fuel consumption for these sectors is as given below: -

1. Flight on 27.02.2016, Sector Jaipur – Pantnagar
   Total fuel before operating the sector : 2400 Lbs
   Duration of flight (Chocks OFF to ON) : 1:15 hours

2. Flight on 27.02.2016, Sector Pantnagar – Jaipur
   Duration of flight (Chocks OFF to ON) : 1:15 hours
   Fuel left after the sector : 1100 Lbs

3. Fuel consumed during both sorties : 1300 Lbs
   (2400 Lbs - 1100 Lbs)
   Total time : 2:30 hours
   Average fuel consumption per hour : 1300/2.5= 520 lbs/hr

Hence, it can be concluded that, the figures used by PIC for per hour fuel consumption were as POH but were on the lower side, as the actual fuel consumption of the Aircraft was higher. This resulted in erroneous fuel planning on part of PIC.

The actual fuel consumption of the Aircraft was high due to aging and wind conditions. There was no system in the organization to access the actual fuel consumption of the Aircraft.

- As stated in the Organisation's Operation Manual Sub Part "b" of Para 12.1.3 of Part "A" of Chapter 12 "A data-driven method that includes a fuel consumption monitoring programme" was found missing in the organization.

12.1.3 Notwithstanding the provisions in 12.1.1 a), b), c), d), and f); DGCA may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve variations to the pre-flight fuel calculation of taxi fuel, trip fuel, contingency fuel, destination alternate fuel, and additional fuel. The specific safety risk assessment shall include at least the:

a) Flight fuel calculations;

b) Capabilities of the operator to include:

i) A data-driven method that includes a fuel consumption monitoring programme; and/or

ii) The advanced use of alternate aerodromes;

c) Specific mitigation measures

12.1.4 In-flight fuel management

a) The pilot-in-command shall continually ensure that the amount of usable fuel remaining on board is not less than the fuel required to proceed to an aerodrome where a safe landing can be made with the planned final reserve fuel remaining upon landing.

b) The pilot-in-command shall request delay information from ATC when unanticipated circumstances may result in landing at the destination aerodrome with less than the final reserve fuel plus any fuel required to proceed to an alternate aerodrome or the fuel required to operate to an isolated aerodrome.

c) The pilot-in-command shall advise ATC of a minimum fuel state by declaring MINIMUM FUEL when, having committed to land at a specific aerodrome, the pilot calculates that any change to the existing clearance to that aerodrome may result in landing with less than planned final reserve fuel.

Note 1. — The declaration of MINIMUM FUEL informs ATC that all planned aerodrome options have been reduced to a specific

The manufacturer advises that the variation of fuel consumption with aircraft weight is small, but the effects of ageing engines and the airframe condition could increase consumption significantly.

Certain Civil Aviation Authorities prescribe higher fuel consumption rates due to aging. For example, General Aviation Safety Sense Leaflet 1C 'Good Airmanship Guide', published by the CAA, UK recommends that the AFM fuel consumption figures should be increased by 20% to allow for in-service wear. Para 13 of the same as given below states that :-

FUEL PLANNING

a) *Always plan to land by the time the tanks are down to the greater of ¼ tank or 45 minutes' cruise flight, but don't rely solely on gauge(s) which may be unreliable. Remember, head-winds may be stronger than forecast and will reduce range.*

b) *Understand the operation and limitations of the fuel system, gauges, pumps, unusable fuel etc.*

c) *Don't assume you can achieve the Handbook/Manual fuel consumption. As a rule of thumb, due to service and wear, expect to use 20% more fuel than the 'book' figures.*

Pertinent to mention that Actual fuel consumption, in comparison with the POH figure also significantly depends on the Flight Level, direction of wind, climatic conditions and engine and airframe condition.

Thus, Improper Fuel Planning was a factor in the accident. Also the absence of a procedure for assessing realistic fuel consumption rate of an aged aircraft is a also cause of concern.

- The findings of Internal and External Audits/Surveillance inspections of the organization did not reveal any Non-Compliance against these fuel calculation requirements laid down in the organisations's Operations Manual

- The requirement of in-flight fuel check and in-flight re-planning, as laid down in the Part "A" of Chapter 17 was also not found to exist in the organization.

NOT APPLICABLE

c) RNAV

NOT APPLICABLE

d) In-flight re-planning

In flight fuel checks should be performed at each reporting point, or every 30 minutes if there are no reporting points, and the results recorded on the company flight plan.

When the flight crew observes that the expected fuel on arrival is less than the alternate fuel (if an alternate is required) plus the final reserve fuel (holding fuel), the Commander shall decide whether to plan for a refueling stop, divert or to re-plan the flight according to new information.

When in-flight re-planning is performed, the company flight plan must be amended accordingly. The Commander must ensure that the useable fuel on board at the decision point is not less than the sum of fuel required.

The Commander shall make the proper notifications to ATC regarding the re-planning.

e) Procedures in the event of system degradation

In case of scarcity of navigation aids and alternate aerodromes in the operational area, it is incumbent upon the pilots to maintain at all times accurate positional awareness.

In the event of system failure or an emergency, procedures in the emergency checklist in each aircraft will be followed. Further information concerning the emergency checklist can also be found in the respective aircraft's AFM.

Information concerning communications in case of an emergency as well as information concerning SAR agencies can be found in the Route Manual. In such an event ATS will be informed also of the presence of dangerous goods on board the aircraft.

- The requirement of in-flight fuel Calculation in case of Power Plant Failure as laid down in para 12.1.6.1 of Part "A" of Chapter 12 was not mentioned in the Fuel calculation submitted by the PIC.

Whichever is less

12.1.6.1 Power Plant Failure Calculations

For flights to a destination where required altitude may not be maintained on the route selected in case of a power plant failure, additional fuel to allow for diversion must be carried.

12.1.6.2 Fuel Order

A fuelling order or Fuel Requisition shall be issued for each flight. This requirement is satisfied by any written document remaining at the airport concerning the fuel uplift.
Fuel uplift for each leg flown shall also be recorded in the technical logbook. If no fuel has been uplifted, this will also be recorded in the technical logbook.

AAPL will retain fuel logs for minimum of 1 Year.

12.1.6.3 Oil

For each of the aircraft engines, there shall be sufficient oil quantity. The oil quantity shall be suitably related to the total fuel capacity, such that within the planned flight period, there will is no possibility that the consumed oil will bring the oil reserves below the minimum level for a continued safe flight.

12.1.6.4 ELECTRONIC FLIGHT BAG (EFB) – Alchemist airways does not have any EFB equipment

2.4 CIRCUMSTANCES LEADING TO THE ACCIDENT

The aircraft was on ground for 8 months from June 2015 to January 2016. During this period, it was converted into a Medevac Configuration. Last ARC was issued on 1st February 2016. After issue of ARC, the aircraft carried out test flight for about 20 minutes on 20.2.2016. Thereafter till 24.5.2016, the aircraft flew for 08:30 hrs.

On the day of accident, the aircraft took off from Delhi for Patna with a total fuel on board as 2200 lbs. The cruising altitude was FL 150, though as per POH the cruising level can be up to 30,000 feet and normally the aircraft flies at FL 25,000. The flight at lower levels consumes more fuel.

From Patna the aircraft took off for Delhi with 05 passengers on board including the patient. Total fuel as per PIC available for the sector was 1926 lbs. During this sector, the aircraft cruised at FL 120 which resulted in higher fuel consumption and further Strong head winds was an added factor for higher fuel consumption

When the aircraft was around 35 NM from Delhi, the ATC cleared the aircraft for runway for approach and landing on runway 10. About the same time, left engine flamed out. The Left Generator Fail light also got illuminated on the annunciator panel. As per the PIC, there was no other warning on the annunciator panel. Crew informed Delhi ATC about the engine failure and emergency services were requested after arrival at Delhi. Meanwhile the crew secured the LH Engine and again tried to start the LH engine as per checklist. Crew was not able to restart the engine.

Subsequently, when the aircraft was on the base leg of runway 10 at around 3000 ft, the pilot reported that RH engine of aircraft also lost power. Crew decided for a forced landing in a field as the runway 10 was beyond the reach of unpowered aircraft. Crew searched for a field which was clear from obstructions. During landing, initially the aircraft main landing gear touched down on soft ground and aircraft rolled for some distance before it impacted with a village road of about 3 feet height. Due to impact with the road, nose landing gear collapsed and aircraft bounced on the other side of the road for 2-3 times. The aircraft came to rest on its belly. After the accident, the aircraft door was opened by the First Officer and all the Passengers including patient were evacuated.

3 CONCLUSIONS

3.1 FINDINGS

1. The Certificate of Airworthiness and the Certificate of Registration of the aircraft was valid on the date of accident.
2. The certificate of flight release was valid on the day of accident.
3. Both the Pilots were type rated and appropriately qualified to operate the flight.
4. All the concerned Airworthiness Directive, Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine were found complied with.
5. Aircraft was on ground from 09.06.2015 to 24.02.2016 till the ARC was re-issued by DGCA.
6. On 19.05.2016, aircraft was converted into Medivac from normal passenger category and accident flight was the first flight under AMT.
7. Weather was reported fine during Delhi-Patna sector as well as for Patna- Delhi sector.
8. Crew was flying 300 feet lower than the assigned FL100.
9. At 0852 UTC, when the aircraft was about 20NM North-East of DPN, one engine was lost and crew requested for priority landing. Priority landing was approved by the controller.
10. While communicating to ATC, PIC stated that he has lost one engine where as it was Port or starboard engine, the same was not communicated to ATC
11. ATC advised to expect runway 10 and aircraft was vectored accordingly by the approach radar controller.
12. Initially heading 265 was given and then for direct routing, heading 240 was assigned to reduce the distance required for approach.
13. When the aircraft was about 10NM from touchdown both the engines lost power.
14. Aircraft was about 9.5 NM west of DPN when the VHF contact was lost and aircraft disappeared from the CCWS at 0907 UTC.
15. Pilot decided for emergency landing near Kair village in an open field with no obstruction.
16. Aircraft crashed landed on ground with main landing gears extended.
17. All the blades of both sides of propeller were found bent in the backward direction due to impact with ground.
18. The aircraft sustained substantial damage.

19. During fuel drainage it was observed that 100 ltrs was drained from starboard tank and 85 ltrs from port tank.
20. On the sector page of the day of accident, the fuel uplifted was not jotted at Patna, however IOC vouchers indicated fuel uplift as 586 lbs at Patna.
21. The actual fuel consumption of the Aircraft was much higher than as per the computation made by the Flight crew based on PH.
22. The crew calculated rates of fuel consumption as per Pilot's Operating Handbook. The performance information provided in the POH is based on a new aircraft at a designated take-off weight. There are fuel penalties due to wind direction, OAT, Flight level and condition of Airframe and engine.
23. The fuel actually consumed by a 27-year-old aircraft, as in the case of VT-EQO(1989 Manufacture), was likely to be considerably higher. There was no procedure established in the Organisation and available with the crew to assess actual fuel consumption of any aircraft, including VT-EQO, based on the data available of the actual fuel uplifted against hours flown to facilitate realistic assessment of fuel requirement for flights.
24. The absence of a procedure to estimate the difference between actual fuel consumption of an aged aircraft and that given in the performance charts of the Pilot's Operating Handbook was a factor responsible for incorrect Fuel Planning and assessment for the task planned for the day.
25. The fuel Consumption is calculated by including the taxi time in the flight time(Chocks Off to Chocks On. Where as the fuel consumed during Taxi is very less and at busy Airports the Taxi time is very high.
26. Therefore, absence of a procedure for assessing realistic fuel consumption rate of an aged aircraft is also a cause of concern.
27. The requirements stipulated in Part A of Chapter 12 *"SPECIFIC INSTRUCTIONS FOR THE COMPUTATION OF THE QUANTITIES OF FUEL AND OIL TO BE CARRIED HAVING REGARD TO ALL CIRCUMSTANCES OF THE OPERATION INCLUDING THE POSSIBILITY OF THE FAILURE OF ONE OR MORE POWER PLANTS WHILE EN ROUTE"* of the Organisation Operations Manual was not adhered to.
28. An extra amount of fuel was also found to be brought by two individuals at the crash site and operator/maintenance agency had not claimed the responsibility of

this unaccounted fuel. However, the maintenance and operator's personnel were witness to it.

29. .Aircraft departed from Delhi on the same day and during return flight patient was uplifted from the Patna

30. Strong High head wind was encountered by the pilot during Patna-Delhi sector.

31. .Post flight BA test was carried out for crew members and none of the crew members were found under the influence of alcohol.

3.2 Probable cause of the accident:

"Improper Fuel Planning led to fuel starvation of the engines resulting in inflight engine shutdown, which caused forced landing of aircraft in a paddy field".

Contributory factor was: -

"Absence of system to evaluate the variation between the Actual Fuel Consumption and Fuel Consumption Computed as per POH".

4. SAFETY RECOMMENDATIONS

During Inspections/Audits, emphasis may be given for satisfactory functioning of the system within the organization, to evaluate the Actual Fuel Consumption of the aircraft as per SOPs laid down in the organisation's Operation manual .

(Dinesh Kumar)	(Shilpy Satiya)	(Raje Bhatnagar)
Member	Member	Chairman

Date: 22.08.2019

Place: New Delhi