AAIB Bulletin No: 5/94 **Ref: EW/G94/01/07** **Category: 1.3**

Aircraft Type and Registration:	Rockwell Commander 112TC, G-BFPO
No & Type of Engines:	1 Lycoming IO-360-C1D6 piston engine
Year of Manufacture:	1976
Date & Time (UTC):	25 January 1994 at 1250 hrs
Location:	0.5 nm west of Shoreham Airport, Sussex
Type of Flight:	Private
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Nose landing gear collapsed, engine cowl damaged and firewall distorted
Commander's Licence:	Commercial Pilot's Licence with Instrument, Night and Flying Instructor Ratings
Commander's Age:	30 years
Commander's Flying Experience:	1,100 hours (of which 10 minutes were on type) Last 90 days - 45 hours Last 28 days - 15 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot, examination and testing by the maintenance organisation and aircraft examination by the AAIB

Flight History

The aircraft was engaged on an air test following a maintenance check for Certificate of Airworthiness renewal. It was flown by the Chief Flying Instructor (CFI) of a local flying training and maintenance company, who had not previously flown the type, and an engineer from the company was on board to record performance data. The engine had been satisfactorily ground run prior to release for the flight. Shortly before the flight the aircraft was refuelled to full tanks and the pilot carried out an extensive engine ground run, reportedly for at least 15 minutes and including running at full throttle. The aircraft then took off on Runway 21, in good weather shortly after the passage of a warm front. The reported ambient temperature at the surface was 11°C with a dewpoint temperature of 9°C. The pilot assessed the local relative humidity as approximately 85%. The reported wind was 18 kt from 240°M. On initially opening the throttle the engine response was described as slightly hesitant but RPM and fuel flow indications were normal and the pilot took off and commenced a timed climb. At approximately 350 feet agl the engine suffered major loss of power.

The pilot turned the aircraft right, away from a built-up area, and assessed that the engine had totally failed. He transmitted a 'MAYDAY' radio call, chose the only available field, immediately to the west of the airport, selected landing gear and flaps 'DOWN', set the powerplant controls to the 'SHUTDOWN' position and made an approach in a northerly direction. The touchdown was normal but, with a considerable unavoidable downwind component and with time to achieve only 12° flap, was at very high ground speed. During the ground run the pilot yawed the aircraft from side to side in order to increase the retardation rate and avoid running into a hedge at the field boundary. As the aircraft had almost stopped the nose landing gear leg collapsed rearwards. The aircraft pitched nose down onto the engine lower cowl and came to a halt after a 430 feet ground run. The pilot and the engineer vacated without difficulty and, after establishing that the aircraft was in a safe condition, the pilot re-entered and radioed that they were both unharmed.

Aircraft Examination

The aircraft was recovered to the airfield by the maintenance organisation involved. In the course of this operation the fuel tank and gascolator water drains were checked, with the aircraft in a nose-up attitude, with no trace of water found. The engine bay fuel system was found to contain normal quantities of fuel and the electric fuel pump was found to function normally. Checks revealed no fault with the magneto switch, air inlet ducting or fuel system pipework. Engine running on a ground test rig revealed no abnormalities.

The maintenance company noted that two recent cases had been experienced of sudden engine failure on helicopters with fuel injected reciprocating engines operating from the airfield that had been attributed to fuel control unit icing. It was suggested that impact tubes, approximately 1/8 inch in diameter, fitted in the air venturi to sense air pressure and operate a fuel metering diaphragm could possibly become blocked by ice and reduce fuel flow commensurate with the sensed airflow reduction, although it had not been possible to obtain firm evidence for this. It was postulated that this may have been the cause of G-BFPO's power loss. The pilot reported that at the point where the engine lost power he was in the process of reading the outside air temperature, which he recalls as 9°C, compared to the reported surface value of 11°C, and believes that this may have indicated that the aircraft had entered a local mass of cooler, and possibly more saturated air.