

# Commander 114B, G-RJCP

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Category: 1.3

<b>Aircraft Type and Registration:</b>	Commander 114B, GRJCP	
<b>No &amp; Type of Engines:</b>	1 Lycoming IO-540-T4B5 piston engine	
<b>Year of Manufacture:</b>	1993	
<b>Date &amp; Time (UTC):</b>	4 November 2002 at 1505 hrs	
<b>Location:</b>	4 nm from Dartmouth, (Field adjacent to Newcott Farm, Dittisham)	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 2	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Extensive, beyond economic repair	
<b>Commander's Licence:</b>	Private Pilots licence with Instrument Rating	
<b>Commander's Age:</b>	48 years	
<b>Commander's Flying Experience:</b>	605 hours (of which 64 were on type)	
	Last 90 days - 21 hours	
	Last 28 days - 6 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and subsequent enquires by the AAIB.	

## Synopsis

Some 15 minutes in to the flight, the pilot noticed a slight reduction in engine power. Almost immediately, a significant amount of blue smoke entered the cabin. As the visibility reduced, the pilot elected to make a forced landing, but before he could shut the engine down, it seized. Following this, the smoke dissipated but the aircraft suffered extensive damage as it landed in a field. Examination of the aircraft revealed clear evidence of loss of engine oil in flight, but despite a detailed strip examination of the engine, the origin of the leak was not established. Prior to flight, the pilot had checked the oil level and between 7 and 8 quarts were indicated on the dipstick.

## **History of Flight**

The intention of the flight was to practice instrument flying and the use of the ILS. During the previous night the aircraft had been parked in a hangar and when the aircraft was removed prior to the flight no signs of any oil leakage were noticed on the floor. The pre-flight checks were carried out with no problems with the aircraft or engine being apparent. This included a check of the engine oil quantity, which was indicating between 7 and 8 quarts on the dipstick. The aircraft was started, taxied and engine run up checks carried out, also all without any apparent problems. Following an uneventful take off and climb to 4,000 feet, the pilot checked the engine temperatures and pressures and found them to be in the normal range. Some 15 minutes into the flight he noticed a slight engine power loss and this was immediately followed by a significant amount of blue smoke entering the cabin from the right and centre at about windscreen height.

As the smoke increased in intensity, the visibility reduced within the cockpit and so the pilot elected to shut down the engine and carry out a forced landing. As he selected the engine mixture to idle cut off, a click, click noise was heard from the engine, which then seized. Once the engine had stopped the smoke in the cockpit dissipated. The pilot was now committed to a forced landing, and so he declared the emergency to Exeter Radar and selected an appropriate field. Exeter radar was able to provide wind speed and direction and had already identified the position of G-RJCP. A hedge boarded the downwind boundary of the selected field and the pilot's intention was to fly an approach at 45° to the hedge and then turn left through 45° to land well clear of it in the field. Whilst on the 45° approach leg the pilot felt he was too high and needed to lose height, and so he attempted to achieve this by selecting the landing gear down. However, he now found it increasingly difficult to maintain the required glide airspeed of 85 kt and so turned directly in to the field. Following the turn, and once the boundary hedge of the field had been cleared, the flaps were fully deployed but, with the aircraft now at about fifty feet above the ground, the rate of descent increased rapidly. In an attempt to regain airspeed and subsequently to arrest the rapid rate of descent, the pilot pushed the nose of the aircraft down. Just prior to the touchdown a flare was initiated, at which point the aircraft landed heavily. The landing gear absorbed most of the impact but then collapsed.

Once G-RJCP came to a halt the pilot and his passenger, who were wearing lap and diagonal harnesses, left the aircraft, unhurt, using doors which had already been unlatched during the final approach to the field.

## **Aircraft examination**

The damage G-RJCP was extensive. The heavy landing resulted in fractures of the main landing gear upper forgings and the nose landing gear was forced up into the engine. The flaps were damaged; the main spar had been displaced upwards causing significant distortion to the aircraft structure, including disruption of the seat rails. Distortion was also evident on the glareshield, with a large crease present above the centre of the instrument panel. The underside of the aircraft showed extensive staining from oil on its right side, and there was oil splatter on the underside of the right horizontal stabiliser. There was no oil leakage evident on the engine itself, or in the engine cowls, except for a small amount of splatter on the lower right side of the firewall. Damage to the propeller was limited to the blade that had been lowermost during the landing.

## **Engine description**

The engine fitted to G-RJCP was a Lycoming IO-540-T4B5 six-cylinder, horizontally opposed, fuel injected, air-cooled piston engine. Oil for the engine lubrication system is contained in a sump at the bottom of the engine. A pump draws the oil from this sump and supplies it under pressure, via an external air-cooled oil cooler to the oil filter, to various galleries within the engine crankcase, which supply it to the rotating parts of the engine. The oil then drains back to the sump. Oil contents are checked using a dipstick, which indicates the level of oil in the sump.

The exhaust muffler (silencer) on G-RJCP is located towards the front of the engine bay and collects the exhaust gasses from each of the cylinders via individual pipes. A single down pipe then ducts these gasses under the right side of the engine, beneath the air cooled oil cooler and finally discharges them into the slipstream just under the right side of the firewall between the cockpit and the engine bay. Heated air, for window demisting and cabin heat, is provided by ducting outside air around the exhaust muffler and then feeding this warmed air through ducting to the winscreen demister outlets, situated on the top of the cockpit panel glareshield, and various cabin heating adjustable vents.

## **Engine examination**

On inspection, it was readily apparent that the engine had a large hole in the top of the crankcase close to number four cylinder position, and so it was removed from the airframe to facilitate a strip examination at an engine overhaul facility, under the supervision of the AAIB. It had suffered a catastrophic failure, was totally seized and the large hole in the top of the crankcase above the number four cylinder had been caused by the number four connecting rod becoming detached from its piston and then being forced upwards. The engine generally exhibited signs of overheating, consistent with operating with a lack of oil, and this was evident on the crankshaft and the connecting rod big-end bearings for the number four, five and six cylinders. There was no significant evidence of oil in the engine, but a close examination of the sump revealed a hole that had been caused during the impact. However, the personnel that were present at the time of the aircraft recovery could not recall seeing any oil pooled under the aircraft. The oil galleries were all checked and found to be unobstructed; oil flowed freely when tested. The oil pump had seized but closer examination revealed that the excess heat had caused the pump drive to weld to a part of the crankcase. However, the drive had not sheared, indicating that it had been functional up to the point of engine seizure. The spark plugs were examined, but no sign of oil staining or burning was apparent. All gaskets and seals were examined for evidence of condition or oil leakage, but none was found.

Internal examination of the exhaust failed to reveal any evidence of oil in the down pipe exhaust outlet. However, there were signs of burnt oil externally on the down pipe immediately below the location of the air-cooled oil cooler. This oil had left marks in a rearwards direction, consistent with the likely airflow path in this section of the cowling, showing that the oil had contaminated the exhaust whilst the engine was under power. However, it could not be established if this contamination had occurred on this flight. Due to a previous incident in which the oil cooler had failed on this aircraft, the replacement oil cooler fitted to G-RJCP was pressure and flow tested but no faults were found. In addition the hoses feeding oil to and from the oil cooler were tested, and found to be serviceable, and the hose connections had been checked at the accident site and were found to be tight.

The previous problem with the oil cooler occurred on 24 September 2002. In this incident oil was seen dripping from the engine bay. During a subsequent ground run, the oil cooler failed, and blew oil over the engine and aircraft. The replacement oil cooler had flown for some 10 hours since this event.

Despite extensive examination of the engine and the aircraft the cause of the oil loss in flight was not established.