**AAIU Report No. 1999/017**
**AAIU File No. 19980065**
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| **Aircraft Type and Registration:** | C150G EI-CDV |
| **No. and Type of Engines:** | One Teledyne Continental 0-200-A |
| **Aircraft Serial Number:** | 15066677 |
| **Year of Manufacture:** | 1967 |
| **Date and Time (UTC):** | 24 November 1998, 1520 hrs |
| **Location:** | Oldtown, Summerhill, Co. Meath |
| **Type of Flight:** | Training (Introductory) |
| **Persons on Board:** | Crew 1 Passenger 1 |
| **Injuries:** | Crew Nil Passenger Nil |
| **Nature of Damage:** | None reported |
| **Commanders Licence:** | Private Pilots Licence |
| **Commanders Age:** | 26 years |
| **Commanders Flying Experience:** | 600 hours (of which 330 were on type)<br>Last 28 days - 50 hours |
| **Information Source:** | Irish Aviation Authority.<br>AAIU Field Investigation |

## Notification

At 1545 hrs on 24th. November 1998, the AAIU received a call from the Irish Aviation Authority (IAA), advising that a Cessna 150 aircraft had made a precautionary landing in a field in the Kinnegad area. There were no injuries reported. An Inspector of Accidents visited the site at Oldtown, Summerhill, Co. Meath. The aircraft had no apparent damage and remained overnight on private property.

## Synopsis

The aircraft with one pilot and one passenger had taken off from Weston Airfield, at 1505 hrs on 24 November, 1998 and climbed to between 1200 and 1300 ft. Shortly after levelling off a partial engine power failure occurred and the pilot decided to execute a precautionary landing in a field in the Oldtown area of Co. Meath.

The aircraft made an approach from the Kilcock side, on a westerly heading, and touched down 60 metres after the hedge, followed by a ground roll of some 240 metres.

On the following day a licensed engineer from the maintenance organisation who maintained the aircraft ran the engine in situ and found evidence of rough running. The aircraft was inspected by a licensed engineer of the maintenance organisation, in the company of two AAIU Inspectors. Fault findings by the repair team and evaluation of the symptoms resulted in the removal of the engine's carburettor and its replacement by a serviceable unit from another engine. Following installation, checks on the fuel system, which included ground run and pre-flight inspection, the aircraft was allowed to take off, flown by a representative of the maintenance organisation. The aircraft returned to Weston.

The removed carburettor was stripped, and found to contain sediment in the carburettor bowl. Sediment was also seen around the mixture control metering valve. This sediment did not manifest itself in either filters of the fuel line nor in the fuel tanks. The sediment was left in the carburettor following its removal, and then dispatched for analysis. During the removal of the carburettor a minute quantity of water was evident around the throttle valve.

## Engine History

This engine was released after major overhaul on 22nd. May 1996, with a total time, since new, of 3692 hours. The carburettor was installed new during the engine overhaul. The engine was then installed in another Cessna 150M aircraft, registration EI-CML. On 8th. June 1997, after 848 hours since the overhaul, the engine was removed and sent to an authorised repair station. The engine was disassembled only enough to facilitate an inspection and repairs following ferrous metal found in the oil screen. Following assembly, the engine was run on a test stand and found to be ready for return to service. On 1st. August 1997, the engine was released from the repair station. It was re-inhibited in April 1998 and installed in EI-CDV on 8th September 1998.

## Aircraft History

This aircraft, first registered by the IAA in July 1991, was re-registered to the current operator at Weston in August 1998.

On 10th. April 1997, EI-CDV made its final in-service flight prior to an annual inspection and major re-work. The aircraft was paint stripped at Weston and on 2nd. July 1998, a 40 minute ferry flight was conducted in order to bring the aircraft to the maintenance organisations base. The annual inspection was carried out on this aircraft at 3691 hours and the original engine removed at this time.

Other work carried out included the removal of fuel tanks, floor pan zinc chromated, aircraft paint stripped and fully repainted. All engine and airframe hoses were renewed. The aircraft was test flown on 13th October 1998.

The aircraft completed a 50 hour inspection on 14 November 1998 at 3741 hours total time. The aircraft flew for a further 21 hours before the incident at Oldtown.

## Carburettor Sediment Analysis Findings

The main body of the carburettor was made of aluminium alloyed with copper.

The examination of the debris, which was removed from the float chamber and drain port of the carburettor, revealed a variety of particles many of which were bright red.

These deposits were analysed and found to contain compounds of aluminium and iron. The iron particles originally believed to be red paint flakes, were identified as oxides of iron in the form of rust. Close examination of the carburettor revealed that much of the ferrous corrosion was associated with the drainage port. Extensive bright red iron oxide lined the drainage port itself and the head of the sealing bolt was severely corroded. This suggested that the bolt and lining to the port were steel in composition. X-ray analysis revealed that the bolt threads had a coating of Cadmium. Poor or damaged Cadmium coating at the end of the bolt, which would have been exposed to the water in the bottom of the bowl may have led to corrosion of the bolt. The mixture of water and various chemical species from the fuel would provide an aggressive corrosive environment for the steel.

Other debris was identified primarily as being aluminium based. The source of this contamination was not determined in the course of the investigation. It is considered pertinent that the aircraft had been stripped of paint and flown to the refinishing location just prior to the problems encountered with the smooth running of the carburettor. The aluminium debris had no crystalline structure and was more amorphous in nature and this could have suggested that it originated from the paint removal process. However, no paint particles were identified during the examination.

Also found in the debris were the remains of a dead fly noted after the debris had been removed from the drain port. It could not be ascertained absolutely which compartment of the carburettor the insect came from or if in fact it came from the device at all. The insect subsequently disintegrated following its exposure to air.

## Carburetor Drain Plug Inspection

Maintenance for single engined aircraft, including the Model 150 type, manufactured between 1963 and 1968 were covered by the 100 Series Service Manual. After that date a separate servicing schedule was issued to cover the Model 150,172 and 182 types.

The aircraft manufacturers state that 100 Series Service Manual covering years '63 through '68 does not have the requirement for carburetor drain plug inspection. This requirement can be found, however, in later editions of the Model 150 Service Manual.

A periodic removal of this plug is recommended by the engine manufacturers representative, but this recommendation is not found in the Periodic Inspection and Maintenance Instructions covering the 0-200 type engine.

The engine manufacturers take the view that inspection of the carburetor drain is covered in the Aircraft Service manual under "fuel drains" and it is therefore the responsibility of the aircraft manufacturer to issue any instruction to inspect the drain.

## Analysis

The question of carburettor icing was considered in this case. However, the engine was run on the ground the following day and full power was not available from the engine due to rough running. Carburettor icing was not considered therefore, to be a contributory factor to the incident.

At 848 hours since overhaul, this engine was removed from another aircraft on 8th. June 1997, and sent to the repair station for repair. There is no evidence that any work was carried out to the carburettor at the repair station. During the 919 hours of operating, since installed as new, there were no reports of any malfunction with this carburettor. At least twelve months elapsed between the time the engine was run on the test stand (and released at the repair station), and the next engine run on EI-CDV.

A test flight took place on 13 October 1998, and the aircraft released to service. Apart from the ferry flight on 2nd. July 1998, lasting 40 minutes, the aircraft had been out of service from 10th. April 1997 to 13th. October 1998, a total of 18 months.

## Conclusions

It is difficult to identify the source of the aluminium and organic matter found in the carburettor. This is because the aircraft was grounded for a long period during re-work over 18 months, prior to its release to service on 13th. October 1998. The fuel tanks and aircraft hoses were removed during the re-work, and this may have subsequently allowed minute particles of foreign matter to build up in the carburettor. Also the engine had been removed from a different aircraft, sent for repair, released for service, inhibited and after some months installed in EI-CDV. No work is recorded as having been carried out on the carburettor during engine repair.

Both engine and airframe had separately been out of service for some considerable length of time, and then brought together during the final months of servicing. This very much increased the chances of allowing foreign matter to get into the fuel system. The presence of the insect found in the carburettor bowl debris suggests an airborne entry of the debris either to the fuel tank or the exposed carburettor.

The fact that the remains of the insect subsequently disintegrated suggests their preservation in the fuel prior to exposure to air.

Most of the rust came from the top of the drain plug. This would indicate that the plug and its surroundings had been in contact with water or with water laden air. It was evident that the plug had not been removed for some time in order to drain off water and/or sediment which collected in the carburettor bowl.

A combination of rust, particles of alumina and some organic material led to the blockage of fuel through the mixture control metering valve, thus causing the engine to run rough.

## Safety Recommendations

**1.** It is recommended that the aircraft manufacturers issue a service bulletin or other instruction to include the requirement for periodic carburetor drain plug inspection in aircraft manufactured between 1963 and 1968. **(SR 47 of 1999)**

**2.** It is recommended that the service bulletin issued by the aircraft manufacturer should also state that during this inspection the plug should be examined for wear and damage to the Cadmium plating and replaced if necessary. **(SR 48 of 1999).**

**3.** The engine manufacturers include the periodic removal of the carburetor inlet screen and its cleaning in their inspection schedule. It is recommended that they also include the inspection of the carburetor drain plug. **(SR 49 of 1999).**