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Aircraft Type and Registration:	Piper Cherokee PA-28-140
Reg No.	EI-CGP
No. and Type of Engines:	One Lycoming 0-320-E30
Aircraft Serial Number:	28-26928
Year of Manufacture:	1970
Date and Time (UTC):	12 March 2000, 15.35 hours
Location:	Knocknacurra, Bandon, Co. Cork
Type of Flight:	Training
Persons on Board:	Pilot – One, Student - One
Injuries:	Pilot – None, Student - None
Nature of Damage:	Damage to engine
Commanders Licence:	Commercial Pilot's Licence
Commanders Age:	32 Years
Commanders Flying Experience:	1500 hours
Information Source:	Watch Manager, ATC Cork Airport. AAIU Field Investigation.

Synopsis

The aircraft took off from Cork Airport at 15.05. hours. The instructor intended to carry out a training exercise in the Bandon area. Whilst in a climb the instructor noticed a loss of power from the engine and that the engine oil pressure read zero. The engine then started to run roughly and as he declared an emergency, the propeller stopped. He then carried out a text book forced landing in a dry harrowed field with a run of about 100 metres. There were no injuries or damage to the aircraft as a result of the landing.

1. FACTUAL INFORMATION

1.1 History of the Flight

The aircraft took off from Cork Airport at 15.05 hours on 12th March 2000. The instructor intended to carry out a training exercise with his pupil in the Bandon Area. Whilst in a climb the instructor noticed that the engine was not developing full power. He went to advance the throttle but found it already set at max power. He then checked the oil pressure gauge and found that it read zero.

He observed that the oil temperature was normal. He contacted Cork Approach requesting a return to the airfield. He was told to contact Cork Tower, which he did, but at this point the engine started running very rough. He then declared an emergency. He was about to shut down the engine when the propeller stopped rotating. He picked a field to his right on which to land but just as he had joined a base leg for the field he noticed cattle in the field. He then decided to land in an adjacent harrowed field. The touchdown was made with full flap. The field was at a height of 442 ft above sea level. The dry surface of the ploughed field contributed to a short landing run. The aircraft was undamaged and both instructor and pupil exited the aircraft unaided. There was no fire.

1.2 Injuries to Persons

There were no injuries to any person as a result of this incident.

1.3 Damage to Aircraft

Apart from the resulting damage to the engine there was no damage to the aircraft.

1.4 Other damage

There was no other damage to property as a result of the incident.

1.5 Personnel Information

(a) The pilot of the aircraft has a current Irish commercial pilots licence.

(b) A Maintenance Contractor whose premises are at Waterford Airport, aprox. 50 miles from the operators base, carries out scheduled maintenance on the aircraft. The maintenance staff consists of one "A&C" Licensed Engineer (Inspector) and one apprentice mechanic.

1.6 Aircraft Information

The aircraft had come off an annual check on 10th March 2000 at the premises of the maintenance contractor. The Certificate of Release to Service was signed on the above date. The inspection was carried out at airframe total time of 12607 hours. The current Certificate of Airworthiness was valid from 7th March 2000 to 6th March 2001 in the Aerial Work category. Including a test flight of 25 minutes duration, the aircraft had flown a total of 8 hours 45 minutes since its release to service.

Following the incident the investigators visited the aircraft in situ in the company of the aircraft's registered owner. Pieces of the engine crankcase, along with parts of the crankshaft forward bearing and No.1 connecting rod big end bearing, were found lying on the bottom engine cowling. One of the engine oil bungs was missing whilst the other was in place and wire-locked.

The owner and members of the maintenance organisation disassembled the aircraft. The airframe was removed to the owner's premises whilst the engine was returned to the maintenance organisation.

1.6.1 Servicing History

The Maintenance Contractor carried out the Annual inspection of this aircraft in accordance with the LAMS/A/1999 Issue 1 approved schedule. Additional work was also carried out which included the removal and replacing of engine oil and the changing of the oil filter. An apprentice mechanic carried this out on the 14th February 2000. It was necessary to undo the wire locking and remove the crankcase oil bung to carryout this work. However, when the oil bung was replaced and the engine filled to the correct level the bung was not wire locked. The aircraft inspector said that all the other similar aircraft in the owner fleet had all quick-release oil bungs fitted which did not require the removal of the bung and did not require wire locking when replacing the oil during an oil change.

1.61.1 This particular aircraft also had, up until January 2000, a newer quick-release oil bung installed. However, this was found to be leaking at the time and was replaced by a solid bung and wire locked whilst a new quick-release bung was being ordered. During the subsequent engine inspection prior to aircraft release on the 10th March 2000 the fact that the old type bung was still in site was overlooked. This bung was not wire locked and was thus free to work loose with normal engine vibration and to drop down on to the engine cowlings, eventually falling from the aircraft.

1.7 <u>Meteorological information.</u>

Actual weather conditions at the time were: -	Wind:	260/04kts
	Visibility:	10km+
	Significant Weather:	Nil
	Cloud:	CAVOK

1.8 <u>Aids to Navigation</u>

Not applicable

1.9 <u>Communications</u>

Not applicable

1.10 Aerodrome Information.

Not applicable.

1.11 Flight Records

There were no recorders on board this aircraft and none were required.

1.12 Wreckage

There was no wreckage as a result of this incident.

1.13 Medical

Not applicable.

1.14 Fire

Not applicable.

1.15 Survival aspects

Both pilot and student exited the aircraft in the normal way unaided.

1.16 Tests and Research

Not applicable.

1.17 Organisational and management information

The maintenance organisation does not have maintenance approval under the JAR145 regulations. The approval to operate given by the IAA rests on the licence of the qualified aircraft inspector.

The aircraft was serviced in accordance with the LAMS/A/1999 Issue1 approved schedule. The licensed aircraft inspector has one apprentice mechanic and it was he who carried out the above work. The apprentice joined the company in March 1998 following employment in a different field and has received "on the job" training since that date. Although reported to be recommended by FAS (The Apprenticeship Board) he had no formal classroom instruction in that time and was not registered as an apprentice aircraft mechanic. The inspector reported that he was a good employee and very keen and enthusiastic about his work.

The company work sheets and the LAMS/A/1999 Issue1 maintenance schedule require that both the mechanic and the inspector sign for tasks carried out during the inspection. Although the worksheets were in order, and tasks fully signed by the inspector, there were no signatures representing the mechanic. The mechanic did however, keep a log of work carried out on the aircraft, complete with dates appropriate to that work.

2. Analysis

The cause of this incident was the departure of the oil sump bung in flight, allowing oil to be drained from the engine, followed by rough running and a rapid break-up of the front crankshaft bearing and its housing and No.1 connecting rod and its big end bearing.

The oil bung had been replaced following the replenishment of oil but had not been wire locked. It took 8 hours of flight for the bung to work loose finally departing the engine and allowing oil to exit the sump. Both the mechanic and inspector overlooked the inspection of the wirelocking following maintenance. The inspector was influenced by the fact that all other aircraft in the operator's fleet had newer quick-release bung, which did not require wirelocking.

3. Conclusions

3.1 The engine of this aircraft failed in flight due to oil starvation.

3.2 The inspection process following servicing was not carried out properly in that it failed to verify that wirelocking of engine components had been completed satisfactorily.

3.3 The oil bung, not being wirelocked, left the engine in flight allowing the draining of all engine oil and subsequent engine lubrication failure.

3.4 But for the expertise of the pilot in landing the aircraft safely this incident could have led to more serious damage to the aircraft and possible injury to the occupants.

3.5 The pilot is to be commended for his actions.

4. Safety Recommendations

4.1 It is recommended that the maintenance contractor put in place a duplicate inspection procedure for specific tasks such as wirelocking of fundamental engine components. **(SR 43 of 2000)**

4.2 The contractor, in conjunction with FAS, should arrange a formal training scheme for the apprentice, involving textbook instruction in order that he be qualified as a full aircraft mechanic. **(SR 44 of 2000)**

Note; The maintenance contractor informed the investigators that he has put an inspection procedure in place since this incident in order to avoid a re-occurrence of the above inspection failure.

Fragments from the front main bearing housing and No.1 connecting rod big end as found on lower engine cowling.