

ACCIDENT

Aircraft Type and Registration:	Rans S6-ES Coyote II, G-BYRS	
No & Type of Engines:	1 Rotax 582-48 piston engine	
Year of Manufacture:	2000	
Date & Time (UTC):	15 October 2010 at 1132 hrs	
Location:	Sandy Airfield, Bedfordshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Nose landing gear collapsed	
Commander's Licence:	National Private Pilot's Licence	
Commander's Age:	71 years	
Commander's Flying Experience:	152 hours (of which 117 were on type) Last 90 days - 6 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

During a check flight, the engine suffered a gearbox failure which caused a loss of drive to the propeller. The aircraft overturned in the subsequent forced landing in a field. Both occupants were uninjured.

History of the flight

The aircraft was undertaking a check flight from Sandy Airfield, Bedfordshire. The departure and climb to the overhead was without incident. Shortly after the pilot opened the throttle to commence a timed climb, the engine rpm rapidly increased and it appeared to him there was no drive to the propeller. He closed the throttle and commenced a left turn to return to the airfield. Once established in a glide he tried opening the throttle again, but the result was the same. A forced landing was made

in a field close to the airfield during which the nose landing gear collapsed, causing the aircraft to overturn.

Technical information

The pilot/owner reported that a strip inspection of the gearbox revealed that the secondary gear angular ring and the two retaining half rings had broken into several pieces (Figure 1). It is most likely that the failure of this retaining mechanism allowed the gear to move axially causing the overload dog-clutch to disengage, thereby removing drive to the propeller. The engine had completed 446 hours since new, but had been recently inspected. The gearbox had completed approximately 90 hours since an inspection and overhaul.

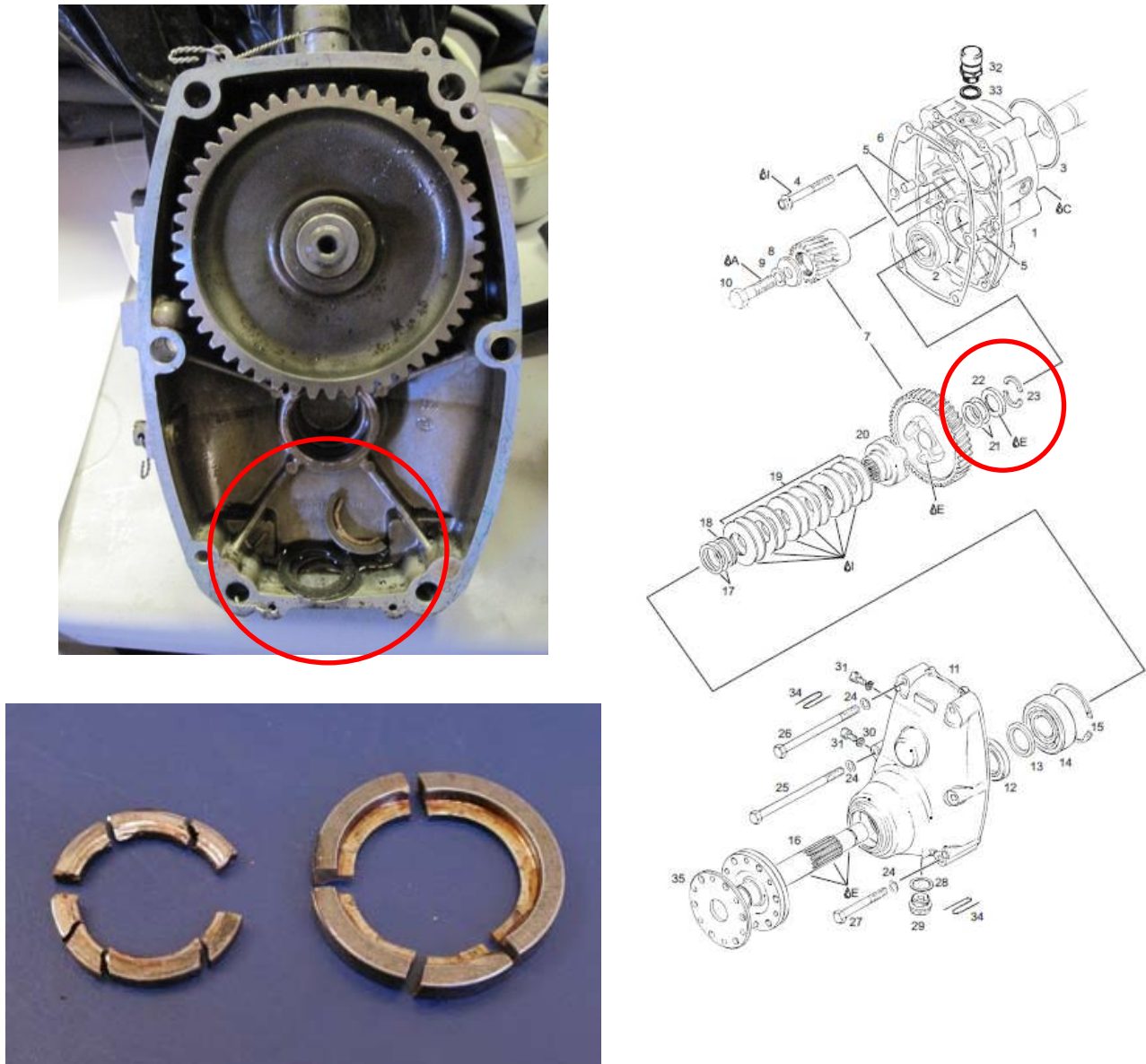


Figure 1
Failed gearbox components

Operational discussion

The pilot commented candidly that with the benefit of hindsight he would have most likely been able to land on the airfield had he turned right instead of left after the failure occurred.

Technical discussion

The condition of the half rings is assessed as part of the 100-hour gearbox inspection. Enquiries with various organisations familiar with the inspection and overhaul of this type of gearbox indicated that failures of the half rings are occasionally seen and in these previous cases the broken parts had usually remained in position. The failed parts have been returned to the manufacturer

for further analysis. Should any further significant and relevant information be obtained by AAIB, an addendum to this report will be published.

A similar gearbox failure, in which the propeller became detached, was reported in AAIB bulletin 2/2008, G-MZDA; the investigation was not able to determine the root cause of the half ring failure.

The 'B-type' gearbox fitted to this aircraft is designed for lightweight propellers and as such the manufacturer in the Installation Manual limits the maximum allowable propeller mass moment of inertia to 3,000 kg cm². The engine manufacturer's Service Information Letter, 11 UL 91 E, describes how to determine the actual mass moment of inertia of a given propeller, along with the maximum admissible figures for each type of gearbox, and contains the warning:

'Using propellers of a mass moment of inertia above the maximum admissible values indicated by ROTAX means reduced life time or damage of the gearbox.'

The propeller fitted to this aircraft was of a type and size approved by the LAA but its exact mass moment of inertia is not known. Similar propellers from the same manufacturer are known to exceed the maximum admissible values specified by ROTAX for the B-type gearbox. It is therefore possible that the propeller may have contributed to the failure. Given this possibility both the LAA and the BMAA intend to offer advice on the implications of propeller selection to owners of aircraft fitted with B-type gearboxes, so they can take appropriate action.