AWB 29-2 Issue 1, Biological contamination hydraulic fluid systems

Biological contamination hydraulic fluid systems

AWB 29-2 Issue 1, 14 February 2003

1. Subject

Biological contamination of hydraulic reservoirs of systems which use mineral based hydraulic fluids.

2. Applicability

Primarily Piper PA-31 Series aircraft, but the conditions described in this bulletin are equally applicable to all aircraft that use mineral hydraulic fluid.

3. Purpose

To alert operators and maintainers to the possibility that biological contamination can occur in hydraulic systems which use mineral based hydraulic fluid. This contamination can render the system unserviceable without warning.

4. Background

A hydraulically operated PA31-350 undercarriage would not extend for landing under system power, and had to be lowered by the emergency hand-pump. Troubleshooting revealed the hydraulic reservoir power pack was contaminated by what appeared to be biological growth. The outlets from reservoir to the engine driven pumps were totally blocked.

5. Cause

At the time of writing this AWB, although the exact nature of the contamination is unknown, it is considered that the system was contaminated with microbiological matter. While it is not possible for biological contamination to occur in the mineral oil itself, it is certainly possible for microbiological growth to occur in a water phase in contact with the oil if significant water contamination has occurred and the storage conditions are favourable for growth (air / water entry point for spores, time the water is in contact

with the fluid and suitably warm temperatures).

Some models of PA 31 Series aircraft are equipped with a gravity filling point for the undercarriage hydraulic reservoir, just in front of the windscreen. It is suggested that this is a possible water entry point.

A potential problem can also arise where the hydraulic fluid is contaminated with another oil or fluid due to poor handling practices (use of non dedicated dispensing equipment). Incompatibility between the additives present in the hydraulic fluid and the contaminating liquid may have unpredictable results.

For example, the hydraulic fluid can be contaminated simply by using a container which had previously held a detergent type of aircraft piston engine oil. The detergent in the oil could emulsify any water present in the hydraulic system which would then increase the risk of microbiological activity due to a large increase in the oil / water interface surface area and reduce the ability of the hydraulic fluid to shed water that may have come in contact with the hydraulic fluid.

6. Recommendation

Hydraulic fluid circulating in a system with an infected reservoir can appear quite clear and normal.

The contamination appears to be able to build up in water at the bottom of the reservoir under the oil held below the emergency standpipe. This oil does not enter normal circulation. The contamination can, therefore, remain undetected up to the point where the outlets to the engine driven pumps become completely blocked.

It is recommended that the top of the reservoir be removed at the earliest opportunity, especially in hot/humid climates, and the interior of the reservoir visually inspected for contamination. All instances of contamination should be reported immediately to CASA.

7. Enquiries

Enquiries with regard to the content of Airworthiness Bulletins should be made via the direct link e-mail address included on the Airworthiness Bulletin web site, AirworthinessBulletin@casa.gov.au or in writing to Airworthiness Standards Branch, GPO Box 2005, Canberra, ACT, 2601