

TITLE	Thermostat Cooling system.
CLASSIFICATION	P&M Aviation have classified this bulletin as Advisory.
COMPLIANCE	Advisory.
APPLICABILITY	Thermostat equipped liquid cooled Rotax 912/912S engines.

INTRODUCTION

A few P&M flexwing aircraft with thermostat equipped Rotax 912/912S engines (Modification no. M244) have exhibited cooling problems with 100% ethylene glycol (concentrated automotive anti freeze) coolant. Evans "waterless" coolant has been found by us to give similar characteristics and we do not recommend it.

The symptoms are that the engine approaches the CHT limit (135C for the 912S, 150C for the 912) and coolant pipes get hot whilst the radiator remains cool. When tested in boiling water, on each occasion the thermostat opened correctly. Two aircraft exhibited the symptoms immediately, the other after 20 hours normal operation.

The problem may be caused by the higher viscosity of the concentrated coolant preventing the thermostat bleed hole from purging an air lock in the thermostat body.

On each occasion, changing to a 50/50 antifreeze/water mix and re-marking the maximum CHT at 120C (1.2bar pressure cap) or 115C (0.9 bar cap) solved the problem. On each occasion the system then operated at the thermostatically controlled temperature of approximately 85C.

Rotax recommend coolant temperature in addition to CHT monitoring when using 50/50 mix, however we have found the only way to get the coolant temperature to exceed the CHT is by protracted ground running with little airflow through the radiator. In normal operation the CHT tends to run 10C hotter than the coolant temperature. Provided the CHT limits are re-marked as above, exceeding the coolant temperature limits is unlikely. Recent engines have more squared off rocker covers and a coolant temperature probe at the head, rendering separate coolant temperature monitoring unnecessary.

Recommendations

- 1) That the coolant system be drained and refilled with 50% ethylene glycol and 50% de-ionised water mixture. We use Comma "Super Coldmaster", but any reputable brand corrosion inhibited automotive ethylene glycol based coolant is suitable.
- 2) That the CHT instrument be placarded and/or a maximum temperature warning set at 120C (1.2bar pressure cap) or 115C (0.9bar pressure cap).

When refilling the system, ensure all hose clamps are secure. Avoid splashing coolant over the engine and ignition system. When the top expansion bottle fills, tip the nose of the trike up to release some trapped air so enabling more fluid to be put in. With a cold engine, the plastic overflow bottle need contain no coolant provided the black expansion tank on top of



the engine is full. Check both valves are working and sealing in the cap. One is the pressure seal, the other in the top of the cap is the suck-back valve.

Run the engine, check for leaks. The system should remain within limits even in a continuous full power climb, or when cruising even if luggage panniers are fitted.

When cooled down, top up the coolant as necessary. Operated within normal limits, coolant loss is unusual. If losses occur, check all hose connections and also the water pump seal drain.

Documentation

“ Coolant system refilled with 50/50 antifreeze/water mix and CHT limit marked 120C (115C) I.A.W. S.B.135” entered in the engine logbook and signed by the owner or a BMAA inspector.

Further information on coolants, optimum mix for freeze protection, heat transfer properties etc. Is available from us on request.

ISSUED BY: Chief Engineer W.G.Brooks

A handwritten signature in black ink, appearing to read 'W.G. Brooks', is written over a light grey rectangular background.

DATE 05/08/13

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