Transport Canada Aviation Transports Canada Aviation

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AIRWORTHINESS MANUAL ADVISORY (AMA)

Subject: Use Of Automotive Gasoline In Aircraft Engines

1. Purpose.

This advisory material is published to make the owners-pilots of amateur-built aircraft aware of the technical problems connected with the use of automotive gasoline (Mogas) in aircraft engines when Grade 80/87 aviation gasoline (Avgas) is not available. Suggestions are offered as means of avoiding engine operating difficulties when using alternate fuels.

2. Reference Airworthiness Standards.

Chapter 549 "Amateur Built Aircraft", section 549.9.

3. Background.

Engines should always use the type of fuel recommended by the engine manufacturers. Because of increasing production costs and decreasing market demand, Avgas has become increasingly difficult to obtain. The shortage of Grade 80 aviation gasoline affects those reciprocating aircraft engines which where originally certificated on 80/87 octane or lower grade fuel. It has been demonstrated that the prolonged use of alternate fuels may cause fuel system and engine failures and therefore constitute a hazard to a safe flight activity.

In 1986 Transport Canada started a nation wide field trial program to determine whether or not Mogas can be authorized as a viable alternative fuel for general aviation.

4. Use Of Automotive Gasoline.

The following issues should be considered:

(a) *Anti-knock performance:* Anti-knock fuel additives in Mogas are different from those of Avgas and in the long term they may be associated with the corrosion of valves.

(b) *Fuel contamination:* After it leaves the pump, the fuel is easily subject to contamination, which may lead to filters/strainers clogging, etc. with the consequence of partial or total loss of power. Rigorous attention should be paid to water draining and fuel filtration procedures.

(c) *Carburetor icing*: This constitutes a more prevalent problem. Mogas has higher volatility and possibly higher water content than Avgas. The higher volatility causes a greater temperature drop in the carburetor throat; therefore, icing can occur at a higher ambient temperature, where air contains more moisture at same relative humidity. Icing onset is quicker and builds up much more rapidly. AMA 549.13/2 addresses the prevention of carburetor icing.

(d) *Vapour lock:* Mogas and in particular Canadian gasoline, has a wider boiling range, which may increase the possibility of vapourlock. After any prolonged period of "heat soak" at low RPM (e.g. during taxiing and holding during take-off on a hot day) local hot spots in the engine compartment may induce vapour lock in fuels lines with the consequence of power loss during take-off. It is particularly important to be aware of the danger of using winterized Mogas in warm weather conditions. Due to seasonal and stability variations a prolonged storage is not recommended.

(e) *Alcohol content*: Fuel containing alcohol has been proven to be harmful to non-metallic components of both aircraft engines and fuel systems. Fuel cells, wet wing tanks, non-metallic fuel lines and seals should be regularly and carefully inspected for signs of leakage or deterioration. The presence of alcohol in the fuel may be easily determined, using of the methods shown in Appendix I to this AMA.

(f) *Lead-free fuel:* Prolonged and/or continuous use of unleaded fuel may be harmful to some engine components. The life of certain components may be drastically reduced (e.g. accelerated wearing of engine valve seats). To offset the gradual depletion of lead deposits within the engine as a result of prolonged used of unleaded fuels, intermittent use of leaded fuel is suggested.

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