

APPROVED PERSON PANEL

COVID19 ENGINE PROTOCOL PANEL

This advisory protocol is drafted to assist in preserving aircraft health during the COVID 19 lockdown and is drafted for recommendation as follows:

Subject: COVID-19 engine preservation protocol
Applicability: **Rotax 914 and 915 fuel injected series**
Engine group: Group 2: Turbo-normalised, turbo-charged and supercharged piston engines
Issue date: 24 May 2020
Expiry date: end of COVID-19 lockdown for aircraft
Compliance: recommendation

Introduction

This information is intended to assist the aircraft/engine owner, operator, approved person, AME, or builder to achieve correct operating conditions for the engine and consequently optimum performance and reliability. This information is to be used in addition to the technical information contained in the Operator's Manual, Maintenance Manual and/or Repair Manual.

Background

During unusual circumstances, such as this COVID19 pandemic, owners, pilots or operators might not have prepared their aircraft for costly medium to long term storage. No practical procedure will completely prevent corrosion on installed aircraft engines, their systems or propellers. Corrosion is influenced by geographical location, usage and environmental factors. Aircraft owners and operators should evaluate the conditions in which they operate and take precautionary measures as required.

Experience has shown that active corrosion and electrolysis can be found on cylinder walls of inoperative engines for periods as brief as two days where aircraft are stored at sea level, or in high temperatures and/or humid conditions. Should an owner/operator of an aircraft feel that this might be applicable to them they may apply on a case by case basis. Working engines on the other hand will have acquired a varnish on the cylinder walls that tends to protect them from corrosion. The same for the cam shaft and main bearings. Aircraft operated in high humidity regions like coastal areas, rivers and lakes have a greater need for more frequent engine, propeller and systems preservation actions than those operated in arid regions. Operators/owners should use their discretion in this regard.

Recommendations

If the engine is not going to be used for an extended period of time then certain measures have to be taken to protect engines against heat, direct sunlight, corrosion and formation of residue.

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Procedures

1. It is recommended that the engines be brought up to operating temperatures at least once in a 30-day cycle. This includes cylinder head, oil and water temperatures. This can only be achieved when operating the engine at high power settings for extended periods. It is recommended to fly the aircraft for a period exceeding 30 min to achieve normal operating temperatures. This does not include warmup and taxi time but actual flight time at high cruise power settings.
2. Avionics systems are susceptible to moisture damage and more so in humid environments, it is recommended that these be switched on for at least 15 to 20 minutes once in two weeks in humid conditions and once in 30 days in more arid conditions. This should be sufficient to ensure enough heat generated to evaporate any moisture buildup which could affect performance. It is best this be achieved in-flight as it would ensure sufficient battery charge and therefore extend battery life.
3. Electrically variable pitch and constant speed propellers need to be cycled through their entire range of travel at least three times to ensure lubrication of internal thrust bearings. It is best to do this whilst engine is running to ensure electrical brushes remain free and lubrication is spread evenly. It is recommended to do this at least once every 30 days.
4. Depending on engine stoppage or storage period the following storage preservation measures are recommended:
 - (i) **After each flight:**
 - a. Activate choke for a moment before stopping engine
 - b. Close all engine openings like exhaust pipe, venting tube and air filter to prevent entry of contamination and humidity.
 - (ii) **Engine stoppage of one to four weeks**
 - a. Proceed with preservation prior to engine stop or on the engine at operating temperature.
 - b. Let the engine run at increased idle speed.
 - c. Shut engine down with no fuel in carburettor and secure against inadvertent engine start.
 - d. Remove air filters and inject approx. 3 ccm of preservation oil or equivalent oil into the air intake of each carburettor (see section 8 & 9).
 - e. Close all engine openings such as exhaust pipe, venting tube and air filter to prevent entry of contamination and humidity.
 - f.

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(iii) At out of service periods or storage of engine for longer than 4 weeks up to 1 year

- (a) Proceed with preservation prior to engine stop or on the engine at operating temperature .
- (b) Let the engine run at increased idle speed
- (c) Shut engine down with no fuel in Carburettor and secure against inadvertent engine start
- (d) Close all engine openings such as exhaust pipe, venting tube and air filter to prevent entry of contamination and humidity.
- (e) Remove top spark plugs and inject approx. 6 cc preservation oil (see section 6) or equivalent oil into each cylinder and slowly turn crankshaft 2 to 3 turns by hand to lubricate top end parts. Refit spark plugs.
- (f) Drain gasoline from float chambers, fuel tank and fuel lines.
- (g) Drain coolant on liquid cooled engines, to prevent any damage by freezing.

WARNING:

Generally comply with standard rules for handling of chemicals

Apply oil to all joints of carburettor.

Close all openings of the engine like exhaust end pipe, venting tube and air intake to prevent entry of dirt and humidity.

WARNING:

All devices used to cover engine openings should be designed to be clearly visible to the pilot during aircraft walk around inspection.

All devices used to cover engine openings should be clearly marked "**REMOVE BEFORE FLIGHT**".

The removal of all engine covering or protecting devices should be add to the aircraft pre-flight check lists.

5. Engine back to operation after shut down periods or storage

- (i) After out of service periods of longer than one year the engine has to be examined by an Approved Person
- (ii) All covers against entry of contamination and humidity have to removed again from exhaust end pipe, venting tube and air filter.
- (iii) Visual inspection of spark plugs for condition and electrode gap.
- (iv) Clean spark plugs as required with cleaning agent and synthetic brush.
- (v) Remove four bottom spark plugs and turn crank shaft by hand till all excess oil out of cylinder chamber/sleeve)
- (vi) The crankshaft should rotate easily. If crankshaft cannot be turned easily, examination of the engine has to be conducted by an Approved Person.
- (vii) Fill fuel in tank, vent fuel line and carburettor float chamber.
- (viii) After an extended shutdown period of an engine change the lubrication oil and vent the lubrication system.

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(ix) Fill in coolant and vent the cooling system.

6. Preservation Oil

This preservation oil (Mineral Two Stroke Oil) on hydro carbon base is insoluble in water and the pour point is below -18°C.

WARNING: Observe general rules for handling of chemicals.

7. Injection of the preservation Oil

- (i) remove air filter or intake silencer
- (ii) inject specified amount of preservation oil into each carburettor