

**Date: April 25, 2012**

**Subject:** XP Series Engine Preservation and Storage

**Application:** This Service Letter is applicable to Superior XP Series engines

**Compliance:** Whenever Preservation is performed on an XP Series Engine

There is no practical procedure that will ensure corrosion prevention on installed aircraft engines. The degree of corrosion is influenced by geographical locations, season and usage. The owner/operator is responsible for recognizing the conditions that are conducive to corrosion and for taking appropriate precautions. Corrosion can occur in engines that are flown only occasionally regardless of geographical location. In coastal areas and areas of high humidity corrosion can occur in as little as a few days. The best method for reducing the likelihood of corrosion is to fly the aircraft at least once every week for a minimum of one hour at normal operating conditions. Corrosion will reduce engine service life. Of primary concern are steel parts including cylinders, piston rings, camshaft, gears, and lifters.

**TEMPORARY STORAGE**

1.) Remove oil sump drain plug and drain oil. Replace drain plug, torque and safety. Remove oil filter. Install new oil filter, torque and safety. Service engine to proper sump capacity with MIL-C-6529 Type II preservative oil or equivalent. This oil is to be used temporarily for preservation purposes only, replace with approved oil prior to resuming normal operation. MIL-C-6529 Type II oil can be made by mixing 1 part Cortec VpCI-326 preservative oil concentrate to 10 parts single grade engine oil.

2.) On aircraft: Perform a ground run-up. Perform a pre-flight inspection and correct any discrepancies. Fly the aircraft for at least one hour with oil temperature reaching above 180°F. Do not exceed 400°F cylinder head temperature.

**Note:** *Ground running of the engine to circulate preservative oil and purge water from the oil system is not acceptable.*

3) On test cell: Perform engine run-up to warm engine to operating temperature. Run engine at operating temperature for a minimum of 15 minutes.

**WARNING: BEFORE MOVING THE PROPELLER, DO THE FOLLOWING TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY OR DEATH:**

**A.) DISCONNECT ALL SPARK PLUG LEADS.**

**B.) VERIFY THAT THE MAGNETO SWITCHES ARE CONNECTED TO MAGNETOS AND THAT THEY ARE IN THE "OFF" POSITION AND THE "P" LEADS ARE GROUNDED.**

**C.) SET THROTTLE POSITIONS "CLOSED."**

**D.) SET MIXTURE CONTROL "IDLE-CUT OFF."**

**E.) SET BRAKES AND BLOCK AIRCRAFT WHEELS. ENSURE THAT AIRCRAFT TIE DOWNS ARE INSTALLED AND VERIFY THAT THE CABIN DOOR LATCH IS OPEN.**

**F.) WHILE TURNING THE PROPELLER, DO NOT STAND WITHIN THE ARC OF THE BLADES.**

4.) After operation, verify that all spark plug leads are removed. Protect the ignition lead ends with AN-4060 protectors. Remove the top spark plugs. Using a common garden sprayer or equivalent, spray atomized concentrated preservative oil MIL-P-46002, Grade I or equivalent (such as Cortec VpCI-326) at room temperature through the upper spark plug hole of each cylinder with the piston at bottom dead center position. Rotate crankshaft as opposite cylinders are sprayed. Stop crankshaft with none of the pistons at top dead center.

5.) Drain preservative oil. Re-spray each cylinder. To thoroughly cover all surfaces of the cylinder interior move the nozzle or spray gun from the top to the bottom of the cylinder.

6.) Install top spark plugs but do not install spark plug leads.

7.) Seal all engine openings exposed to the atmosphere using suitable plugs and covers.

8.) On aircraft, tag each propeller in a conspicuous place with the following notation on the tag, or if new or overhauled on the propeller flange: "Do Not Turn Propeller – Engine Preserved – (Preservation Date)"

**Note:** If the engine is not to be returned to flyable status on or before the 90 day expiration it must be preserved in accordance with "Indefinite Storage" procedures in this section.

## **INDEFINITE STORAGE**

1.) Remove oil sump drain plug and drain oil. Replace drain plug, torque and safety. Remove oil filter. Install new oil filter, torque and safety. Service engine to proper sump capacity with MIL-C-6529, Type II preservative oil. This oil is to be used temporarily for preservation purposes only, replace with approved oil prior to resuming normal operation. MIL-C-6529 Type II oil can be made by mixing 1 part Cortec VpCI-326 preservative oil concentrate to 10 parts single grade engine oil.

2.) On aircraft: Perform a ground run-up. Perform a pre-flight inspection and correct any discrepancies. Fly the aircraft for at least one hour with oil temperature reaching above 180°F. Do not exceed 400°F cylinder head temperature.

**Note:** Ground running of the engine to circulate preservative oil and purge water from the oil system is not acceptable.

3.) On test cell: Perform engine run-up to warm engine to operating temperature. Run engine at operating temperature for a minimum of 15 minutes.

**WARNING: BEFORE MOVING THE PROPELLER, DO THE FOLLOWING TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY OR DEATH:**

**A.) DISCONNECT ALL SPARK PLUG LEADS.**

**B.) VERIFY THAT THE MAGNETO SWITCHES ARE CONNECTED TO MAGNETOS AND THAT THEY ARE IN THE "OFF" POSITION AND THE "P" LEADS ARE GROUNDED.**

**C.) SET THROTTLE POSITIONS "CLOSED."**

**D.) SET MIXTURE CONTROL "IDLE-CUT OFF."**

**E.) SET BRAKES AND BLOCK AIRCRAFT WHEELS. ENSURE THAT AIRCRAFT TIE DOWNS ARE INSTALLED AND VERIFY THAT THE CABIN DOOR LATCH IS OPEN.**

**F.) WHILE TURNING THE PROPELLER, DO NOT STAND WITHIN THE ARC OF THE BLADES.**

4.) After flight, or test cell run, remove all spark plug leads. Protect the ignition lead ends with AN-4060 protectors. Remove the top spark plugs. Install protective cap plugs in bottom spark plug holes. Using a common garden sprayer or equivalent, spray atomized concentrated preservative oil MIL-P-46002, Grade I or equivalent (such as Cortec VpCI-326) at room temperature through the upper spark plug hole of each cylinder with the piston at bottom dead center position. Rotate crankshaft as opposite cylinders are sprayed. Stop crankshaft with none of the pistons at top dead center.

5.) Re-spray each cylinder. To thoroughly cover all surfaces of the cylinder interior move the nozzle or spray gun from the top to the bottom of the cylinder.

6) Spray atomized concentrated preservative oil into the engine through the breather fitting and the oil filter ports.

7.) Install dehydrator plugs (MS27215-2 or AN4062-1) in each of the upper spark plug holes. Make sure each plug is blue in color when installed.

8.) Before engine has cooled install desiccant bags in exhaust pipes. Attach a red "Remove Before Flight" streamer to each bag of desiccant in the exhaust pipes and seal the openings.

9.) Seal all engine openings exposed to the atmosphere using suitable plugs and covers.

10.) On aircraft, tag each propeller in a conspicuous place with the following notation on the tag, or if new or overhauled, on the propeller flange: "Do Not Turn Propeller – Engine Preserved – (Preservation Date)"

**INSPECTION PROCEDURES**

- 1) Engines prepared for indefinite storage must have the cylinder dehydrator plugs visually inspected every 15 days. The plugs must be replaced as soon as they indicate other than a dark blue color. If the dehydrator plugs have changed color in one-half or more of the cylinders, all desiccant material on the engine must be replaced.
- 2) The cylinder bores of all engines prepared for indefinite storage must be re-sprayed with corrosion preventive mixture every 90 days.

**RETURNING AN ENGINE TO SERVICE AFTER STORAGE**

- 1) Remove all seals and all desiccant bags.
- 2) Remove cylinder dehydrators and plugs or spark plugs from upper and lower spark plug holes.
- 3) Remove oil sump drain plug and drain the corrosion preventive mixture. Replace drain plug, torque and safety. Remove oil filter. Install new oil filter torque and safety. Service the engine with oil in accordance with the manufacturer's instructions.

***WARNING: BEFORE MOVING THE PROPELLER, DO THE FOLLOWING TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY OR DEATH:***

**A.) DISCONNECT ALL SPARK PLUG LEADS.**

**B.) VERIFY THAT THE MAGNETO SWITCHES ARE CONNECTED TO MAGNETOS AND THAT THEY ARE IN THE "OFF" POSITION AND THE "P" LEADS ARE GROUNDED.**

**C.) SET THROTTLE POSITIONS "CLOSED."**

**D.) SET MIXTURE CONTROL "IDLE-CUT OFF."**

**E.) SET BRAKES AND BLOCK AIRCRAFT WHEELS. ENSURE THAT AIRCRAFT TIE DOWNS ARE INSTALLED AND VERIFY THAT THE CABIN DOOR LATCH IS OPEN.**

**F.) WHILE TURNING THE PROPELLER, DO NOT STAND WITHIN THE ARC OF THE BLADES.**

- 4) Rotate propeller by hand several revolutions to remove preservative oil.
- 5) Service and install spark plugs and ignition leads in accordance with the manufacturer's instructions.
- 6) Service engine and aircraft in accordance with the manufacturer's instructions.
- 7) Thoroughly clean the aircraft and engine. Perform visual inspection.
- 8) Correct any discrepancies.
- 9) Conduct a normal engine start.
- 10) Perform a test flight in accordance with the Installation and Operation Manual.
- 11) Correct any discrepancies.
- 12) Perform a test flight in accordance with airframe manufacturer's instructions.
- 13) Correct any discrepancies prior to returning aircraft to service.
- 14) Change oil and filter after 25 hours of operation.