

Smart Engine Saver

Instructions and use

I. Background

Water is harmful to precision engine parts. Water is present in every engine as a result of the combustion of gasoline, and as condensation from the outside air. The Engine Saver is designed to reduce the amount of moisture from both sources and protect the precision internal engine parts from the damage that can be caused by this moisture. By reducing the moisture and its damaging effects, the chances that your engine will reach TBO are increased.

One of the bi-products of the normal combustion of gasoline in the engine cylinder is water in the form of vapor. A small amount of this vapor leaks by the piston rings, and into the crankcase. When the engine is shut down, the crankcase is filled with a mixture of gases including water vapor. As the crankcase cools, this water vapor condenses, forming droplets on the precision engine parts.

The second source of moisture is from the outside air. Changes in atmospheric pressure force moist air in and out of the engine. Changes in air temperature from midday to midnight then cause this moisture in the crankcase air to condense and form water droplets on the precision engine parts.

The oil companies long ago recognized the existence of this process and the detrimental effects of water on engine life and have spent millions of dollars developing oil additives to protect the inner surfaces of your engine from the effects of this water.

The benefits of these oil additives are great, and we recommend their use, however we feel that *the best way to prevent damage from moisture is to reduce the possibility that water will form in the first place.* This is what the Engine Saver does. (No water, No problem)

The Engine Saver produces a supply of low humidity air (dew point is typically about -100 degrees F) that flows into the engine through the engine breather tube. This low humidity air flushes the moisture from the engine, and the slight positive pressure from the pump (less than 1 psi) prevents additional high humidity outside air from re-entering. The dry air flows past the piston ring end gaps, into the combustion chamber, and then out an open intake or exhaust valve, bathing all internal engine surfaces with dry air.

II. Setup & Use

The Engine Saver is shipped to you complete. Open the box and inspect all parts for shipping damage. Contact us if anything is damaged, so we can file a claim. The device should be setup and used as follows: **NOTE: It is suggested that the unit be setup just shortly before it will be used with your engine, as this will maximize the life of the dryer.**

1. Remove any material that was wrapped around the dryer to protect it in shipping. Reinstall the dryer on the base, and secure with the straps.
2. The dryer assembly has threaded plastic fittings on both ends that are protected by RED screw on caps. Remove and save the RED caps from both ends of the dryer.

3. You will find a white plastic nut in the parts bag. Slip the nut over the tube which comes from the pump mounted on the Engine Saver base and attach the tube to the fitting on the top (lid) of the dryer assembly. Tighten the fitting with your fingers only, a wrench is not necessary.
4. Attach the long tube in the parts bag to the fitting on the bottom end of the dryer, finger tight.
5. Plug the Engine Saver into a 120V electrical outlet. The pump should turn on. The initial cycle will run the pump for 1 hour continuously every time the system is started. With the pump running, hold your finger over the end of the wand for about 10 seconds, and release it. You must hear and feel the release of air indicating that the pump is working, and that all the fittings are tight. The air flow is set low (about 1 liter a minute) to increase the dryer life. This test should be performed each time the wand is inserted into the breather, and any time the dryer is recharged, or the fittings have been taken apart to insure there is a flow of dry air. If you do not feel an air flow, check the fittings for leaks, or see the section on adjusting flow.
6. Locate the engine breather tube on your engine. The breather will exit from the bottom of the cowl. Make sure that you have located the breather, as there can be more than one tube exiting the cowl.
7. The Engine Saver is shipped with 2 different size breather tube adaptors, (wands). The small diameter adaptor will fit most of the breather tubes, and the larger diameter adaptor can be cut to fit most other sizes. The adaptor must fit snugly into the breather tube to form an air tight seal. If the small diameter adaptor does not fit your application, use a pair of scissors to trim the disks on the larger diameter adaptor to fit your opening. Trim the top disk first to determine the correct size, then trim the lower disk to match. Attach the correct wand to the plastic tube coming from the dryer.
8. Most breather tubes have a small hole about 2 inches up from the end (sometimes called the ice hole). This hole is intended to prevent buildup of high crankcase pressure if moisture from the engine were to freeze the end of the breather tube closed during certain flight conditions. Insert the breather adaptor into the breather tube a sufficient distance to place the disks above this vent hole.
9. If the Engine Saver is not going to be used for a period of time, it is suggested that the fittings be removed from the dryer, and the RED caps be reinstalled to prevent moisture from entering the dryer when it is not in use.
10. The dryer material contains 7% colored indicator beads. When the dryer is working effectively to remove moisture, the indicator beads will be (Clear and Blue). As the dryer absorbs moisture, the beads will change from blue to pink. You will notice the color change starting at the bottom of the dryer and progressing along the length of the dryer. When about 90% of the indicator beads have changed to pink, it will be necessary to recharge the dryer as described below.

III. Operation of the Smart Engine Saver

The Smart Engine Saver is designed to provide complete engine protection while maximizing the life time of the chemical dryer. The unit has been built with a microprocessor to control the process, and sensors that measure both temperature and humidity. At the end of a flight, the crankcase is filled with hot gasses containing a high pressure of moisture which is a product of combustion. As the engine cools, this moisture condenses and forms water droplets on your precision engine parts. Preventing this is important. When the Engine Saver is first turned on, it is designed to run continuously for 1 hour.

This will flush the moist gas out of the crankcase as the engine cools and establish a protective shield of dry air inside the crankcase and the cylinders. After the initial hour has passed, the system goes into the monitoring mode. The electronics now monitor the temperature and humidity level of the outside air. The microprocessor then adjusts the length of the time that the pump runs based on the amount of moisture present in the outside air. On hot humid days, the pump runs longer. On cold dry days, it runs less. The operating times are set to provide good engine protection while maximizing the life of the dryer, so it does not have to be recharged as often.

The system incorporates 2 LED indicators. The GREEN indicator will light whenever the power is on. The RED indicator will light then the pump is operating. Pump operating times can vary from as little as about 2 minutes on to about 15 minutes on. The pump off time will always be about 15 minutes.

If the aircraft is not going to fly for a period of time, engine protection can be enhanced by a couple simple things. First, make sure that the throttle position is at idle (Closed). Secondly, put a cover over the end of the exhaust. This can be simple as a plug inserted into the pipe, or a bag placed over the end. Plastic bowl covers with elastic edges work great. Make sure you punch about ¼ inch hole in the cover to allow the dry air flow out. These items will reduce the amount of outside air that may try to enter into the intake system or exhaust system

IV. Removing the Adapter before Flight

When preparing for the next flight, simply pull the wand from the breather, and turn the unit OFF.

NOTE: When removing the wand, visually examine it to ensure that all the rubber washers have come out with the wand and are attached to the center tube. Verify that the washers are firmly bonded each time the adaptor is reinserted into the breather tube.

V. Recharging the Dryer

The dryer contains a 7% indicating silica gel moisture absorbing material. As the indicator beads absorb moisture, its color changes from BLUE to PINK. The pink color indicates that the material is approaching its limit. Silica gel can be recharged indefinitely by heating, making the material drive off the absorbed moisture, making it capable of acting as a desiccant again. There are 2 options available to recharge the system.

- 1.) Replace the dryer – Replacement dryer assemblies are available from the manufacturer.
- 2.) Recharge the dryer material – The present material can be heated to return it to maximum efficiency as follows:
 - a.) Pour the beads into a flat metal pan. Use caution when handling the material, as the beads can be dangerous if spilled.
 - b.) Place the pan of beads in an oven set at 300°F (DO NOT EXCEED 300°F). Heat until the indicating beads have returned to the original blue color (time will depend on the amount of moisture that was absorbed).
 - c.) Remove the beads from the oven, cover the pan to reduce air contact, and allow it to cool.
 - d.) Replace the beads in the bottle as soon as they have cooled enough to be handled. Be sure to check the assembly for air leaks.

Note: Beads are 7% indicating meaning only 7% of the beads change from Blue to Pink. The other beads stay white.

VI. Adjusting Air Flow

If you do not have air flowing from the wand when you release your finger from the end holding it for 10 seconds, do the following:

1. Remove the tube from the bottom of the dryer and verify that you are getting air flow. If there is no flow, but you can hear the pump running, try adjusting the flow. Locate the pump cover between the 2 dryer supports on the engine saver base. Remove the screws holding the pump cover to the engine saver base, exposing the pump. On the top of the pump, you will find a Black adjustment knob. Turn the knob CW to increase the air speed. (A ¼ to ½ turn is normally sufficient.) Check for air flow and open the valve more if necessary. If you cannot produce and air flow, the pump may be defective. Note: DO NOT open the valve any more than is required to achieve a slight air flow. Higher air flows result in shorter dryer life.
2. If you have air flow from the pump, check the dryer assembly for damage, and the tube fittings for leakage. Correct as necessary.

VII. Warranty

Aircraft Components Inc. warrants the Engine Saver to be free of defects in materials and workmanship for a period of (1) year from date of purchase. The dryer material is not covered by this warranty. Aircraft Components Inc. will at its option replace or recondition to new status any component which fails during the warranty period. Defective units are to be shipped prepaid to the factory for our evaluation. The conclusions of Aircraft Components Inc. shall prevail in all cases. Aircraft Components Inc. shall not be responsible for loss of use or consequential damages from the use of this product. This warranty shall be the sole warranty, no other warranty is expressed or implied.

Contents

1. (1) Base Assembly Complete
2. (3) Plastic nuts for Tubes
3. (1) Dryer Assembly Complete
4. (1) 4 Ft long 3/16 Diameter Tubing
5. (1) Small diameter breather adaptor
6. (1) Large Diameter breather adaptor
7. (2) Spare Elastic Straps
8. (1) Instruction Sheet

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