
Chapter 9. Engine Preservation and Storage

9-1. Preserving and Storing an Engine

An engine which has been removed from the shipping container (uncrated) but not installed or operated within 30 days should be placed back into storage. There are separate procedures for:

1. storing an installed engine,
 - temporary (from 30 days up to 90 days)
 - indefinite (90 days or more)
2. storing a crated (uninstalled) engine
3. returning an engine to service after storage.

9-1.1. Engine Preservation Checklist

Create a copy of the engine checklist (Table 9-1, “Engine Preservation Checklist,” on page 7) and record the serial number, date placed in storage and projected inspection dates for each engine placed in storage. The checklist covers a 90-day storage cycle. Complete a new checklist for every 90-day storage cycle and attach over previous checklists until the engine is returned to service.

9-1.2. New or Unused Engine Storage

1. Determine the engine state (installed or crated) and projected period to be stored. “Temporary” storage is defined as a period of 30 to 90 days when the engine will not be used. “Indefinite” storage covers 90 days or more. If the engine state is an:
 - a. Installed engine and the storage period is:
 - 1) 30-90 days, follow the instructions in Section 9-1.3, “Installed Engine, Temporary Storage,” on page 9-1.
 - 2) 90 days or more, follow the instructions in Section 9-1.4, “Installed Engine, Indefinite Storage,” on page 9-3.
 - b. Crated engine (not installed in an aircraft), follow the instructions in Section 9-1.5, “Crated Engine, Indefinite Storage,” on page 9-4.
2. Cover the engine with a plastic bag after preservation.
3. Install and attach the container cover to the base (if not already installed).

9-1.3. Installed Engine, Temporary Storage

“Temporary” storage is defined as a period of 30 to 90 days when the engine will not be used. If the storage period is likely to exceed 90 days, prepare the engine for “Indefinite” storage according to instructions in Section 9-1.4.

1. Change the engine oil according to Section 6-4.8, “Engine Oil Servicing,” on page 6-33. Service the engine oil sump to the proper capacity with oil conforming to MIL-C-6529.

WARNING

If preheaters are used to warm the engine, do not leave preheaters on for longer than 24 hours to prevent corrosion.

2. Perform a “Preflight Inspection”; correct any discrepancies noted.
3. Perform an “Engine Start” and “Ground Run-up” according to the instructions in Section 7-3.2 and Section 7-3.3, respectively.
4. Fly the aircraft for one hour at normal operating temperatures.
5. Allow the engine to cool after flight.
6. Disconnect and remove all spark plug leads.

NOTE: Specification for AN-4060, *Ignition Lead Terminal Protector*, has been canceled. If AN-4060 protectors are not available, a plastic bag with elastic band may be used to protect the end of the ignition terminal from fouling.

7. Remove the top spark plugs from the engine; cover the ignition leads with AN-4060 (or equivalent) protectors.

WARNING

Disconnect all spark plug leads. Place the throttle in the CLOSED position. Set the brake and chock the aircraft wheels. Install aircraft tie-downs. Do not stand or place equipment within the arc of the propeller.

8. With the piston at the Bottom Dead Center position, use a common garden sprayer with clean reservoir and nozzle to spray atomized cylinder preservation oil that meets MIL-PRF-46002, through the top spark plug hole of each engine cylinder. Rotate the crankshaft as opposite cylinders are sprayed.
9. Stop the crankshaft at a position where no pistons are at Top Dead Center.
10. Spray each cylinder again; thoroughly coat all interior cylinder surfaces by moving the nozzle from top to bottom of the cylinder while spraying. When all cylinders walls are thoroughly coated, ensure no piston is positioned at Top Dead Center.
11. Install the top spark plugs; do not install the spark plug leads.
12. Seal all engine openings exposed to the atmosphere using suitable plugs and covers. Attach a “REMOVE BEFORE FLIGHT” streamer to each location.
13. Attach a tag in a prominent location on the engine, preferably the propeller (or storage container, if installed) with the following information:

*DO NOT TURN PROPELLER - ENGINE PRESERVED
(preservation date)*

14. Indicate the status of new or rebuilt engines which have not been placed in service on the preservation tag.

NOTE: If the engine is not returned to service within 90 days of initial temporary storage, it must be preserved according to the “Installed Engine, Indefinite Storage” instructions in Section 9-1.4.

9-1.4. Installed Engine, Indefinite Storage

WARNING

Perform this procedure in an area free of sparks, flames, or other ignition sources.

1. Change the engine oil according to the “Engine Oil Servicing” in Section 6-4.8. Service the engine oil sump to the proper capacity with oil conforming to MIL-C-6529.

WARNING

If preheater are used to warm the engine, do not leave preheaters on for longer than 24 hours to prevent corrosion.

2. Perform an “Engine Start” and “Ground Run-up” according to the instructions in Section 7-3.2 and Section 7-3.3, respectively.
3. Perform a Preflight Inspection; correct any discrepancies noted.
4. Fly the aircraft for one hour at normal operating temperatures.
5. Allow the engine to cool after flight.

WARNING

Disconnect all spark plug leads, place the Throttle in the CLOSED position, set the brake and chock the aircraft wheels. Install aircraft tie-downs, Do not stand or place equipment within the arc of the propeller.

6. Disconnect and remove all spark plug leads.

NOTE: Specification for AN-4060, *Ignition Lead Terminal Protector*, has been canceled. If AN-4060 protectors are not available, a plastic bag with elastic band may be used to protect the end of the ignition terminal from fouling.
7. Remove the top and bottom spark plugs from the engine and cover the ignition leads with AN-4060 (or equivalent) protectors.
8. Install protective plugs (P/N 656816) in the bottom spark plug holes.
9. With the piston at the Bottom Dead Center position, use a common garden sprayer (with clean reservoir and nozzle) to spray atomized cylinder preservation oil that meets MIL-PRF-46002, through the top spark plug hole of each engine cylinder. Rotate the crankshaft as opposite cylinders are sprayed.
10. Spray each cylinder again; thoroughly coat all interior cylinder surfaces by moving the nozzle from top to bottom of the cylinder while spraying. When all cylinder walls are thoroughly coated, ensure no piston is positioned at Top Dead Center.
11. Install dehydrator plugs MS27215-1 or MS27215-2 in each of the top spark plug holes. Ensure that each dehydrator plug is dark blue in color when installed.
12. Attach a “REMOVE BEFORE FLIGHT” streamer tag to desiccant bags and place the tagged desiccant bag in the exhaust pipes. Seal the exhaust pipe openings.

Engine Preservation and Storage

13. Seal all other exposed engine openings with suitable plugs and covers. Attach “REMOVE BEFORE FLIGHT” streamers to installed plugs and covers.
14. Affix a readily visible tag to the propeller (or storage container, if installed) with the following information:

DO NOT TURN PROPELLER - ENGINE PRESERVED
(preservation date)
15. Indicate the status of new or rebuilt engines which have not been placed in service on the preservation tag.
16. Make a copy of Table 9-1, “Engine Preservation Checklist,” on page 7. Enter the serial number, storage date and next inspection due date on the form. Attach the form to the engine.
17. For indefinite storage, visually inspect the dehydrator plugs at 15-day intervals. Change the dehydrator plugs at the first indication (if any plug is not dark blue, replace the dehydrator plug) of color change. If more than half the dehydrator plugs change color, replace all desiccant material on the engine.
18. Repeat application of cylinder preservative application at 90 intervals.

9-1.5. Crated Engine, Indefinite Storage

Store engines awaiting installation in the original crate in a sheltered area, protected from the elements. Factory new and rebuilt engines are preserved for 90 days prior to shipment from the factory.

WARNING

Perform this procedure in an area free of sparks, flames, or other ignition sources.

1. Monitor engines awaiting installation to ensure the preservation date.
2. Perform a Visual Inspection upon receipt of the engine; correct any discrepancies noted.
3. Remove spark plugs, shipping plugs, or dehydrator plugs from top spark plug bosses.
4. Rotate the crankshaft until the No. 1 piston is at the Bottom Dead Center (BDC) position.
 - a. Use a common garden sprayer (with clean reservoir and nozzle) to spray atomized cylinder preservation oil that meets MIL-PRF-46002, through the cylinder top spark plug hole; thoroughly coat all interior cylinder surfaces by moving the sprayer nozzle from top to bottom of the cylinder while spraying.
 - b. Rotate the crankshaft to position each cylinder at BDC and repeat application of preservation oil to each cylinder.
 - c. Repeat application of preservative oil to each cylinder without rotating the crankshaft.

- d. When all cylinder walls are thoroughly coated, ensure no piston is positioned at Top Dead Center.
- e. Remove the oil fill gauge rod (dipstick) from the oil fill tube and spray approximately two ounces of preservative oil through the oil filler tube. Reinstall the oil fill gauge rod.
5. Install dehydrator plugs MS27215-1 or MS27215-2 in each of the top spark plug holes. Ensure that each dehydrator plug is dark blue in color when installed.
6. Install a dehydrator plug (MS27215-1 or MS27215-2) in the crankcase breather tube and wrap with moisture resistant tape to seal the breather opening.
7. Insert two desiccant bags (MIL-D-3464) in the induction inlet. Cover the opening with an appropriately sized shipping plug or moisture resistant tape.
8. If an exhaust system is provided with the engine, insert a desiccant bag (MIL-D-3464) in the exhaust outlet. If no exhaust is provided, Cover the opening with an appropriately sized shipping plug or moisture resistant tape.
9. Seal exposed engine openings (open exhaust ports, induction plenum or throttle inlet) with suitable plugs and covers.
10. Wrap the engine with the original shipping bag, place two desiccant bags (MIL-D-3464) inside the shipping bag. Wrap the shipping bag around the base of the shipping crate with moisture resistant tape and cover with the original shipping crate.
11. Affix a readily visible tag to shipping crate with the following information:

DO NOT TURN CRANKSHAFT - ENGINE PRESERVED
(preservation date)
12. Indicate the status of new or rebuilt engines which have not been placed in service on the preservation tag.
13. Make a copy of Table 9-1, "Engine Preservation Checklist," on page 7. Enter the serial number, storage date and next inspection due date on the form. Attach the form to the outside of the shipping crate.
14. Visually inspect dehydrator plugs at 15-day intervals. Change the dehydrator plugs at the first indication (if any plug is not dark blue, replace the dehydrator plug) of color change. If more than half the dehydrator plugs change color, replace all desiccant material on the engine.
15. Repeat application of cylinder preservative at 90 intervals.

9-1.6. Return an Engine to Service after Storage

1. Remove seals and desiccant bags.
2. Remove cylinder dehydrators (or plugs) from top and bottom spark plug holes.
3. Change the engine oil according to the “Engine Oil Servicing” in Section 6-4.8. Service the engine to the proper sump capacity with oil conforming to MIL-C-6529 Type II (Break-in oil, SAE J 1966 non-dispersant mineral oil).
4. Rotate propeller several revolutions by hand to remove preservative oil.
5. Remove AN-4060 protectors from the ignition leads.
6. Service and install spark plugs and leads according to the instructions in Section 6-4.9.2, “Spark Plug Maintenance” and Section 6-4.9.3, “Ignition Harness Maintenance”.
7. Clean and service engine and aircraft according to the Aircraft Manufacturer’s instructions. Perform a visual inspection and correct any discrepancies noted.
8. Perform a normal engine start according to the Airplane Flight Manual or Pilot’s Operating Handbook.
9. Conduct an “Engine Operational Check” according to instructions in Section 6-4.7; correct any discrepancies.
10. Perform a “Flight Check” according to instructions in Section 7-2.4; correct any discrepancies before releasing the aircraft for normal service.
11. Change engine oil and filter after first 25 hours of operation.

Table 9-1. Engine Preservation Checklist

Engine Serial Number:		Date Placed in Storage		
Inspection Item	Status	Inspection Due Date	Completion Date	Performed By
Engine preserved and stored according to the instructions in Section 9-1.4	<input type="checkbox"/> YES	N/A	/ /	
15 day inspection	<input type="checkbox"/> PASSED <input type="checkbox"/> CORRECTED	/ /	/ /	
30 day inspection	<input type="checkbox"/> PASSED <input type="checkbox"/> CORRECTED	/ /	/ /	
45 day inspection	<input type="checkbox"/> PASSED <input type="checkbox"/> CORRECTED	/ /	/ /	
60 day inspection	<input type="checkbox"/> PASSED <input type="checkbox"/> CORRECTED	/ /	/ /	
75 day inspection	<input type="checkbox"/> PASSED <input type="checkbox"/> CORRECTED	/ /	/ /	
90 day inspection	<input type="checkbox"/> PASSED <input type="checkbox"/> CORRECTED	/ /	/ /	
90 day cylinder treatment	<input type="checkbox"/> PASSED <input type="checkbox"/> CORRECTED	/ /	/ /	
Engine removed from storage	<input type="checkbox"/> COMPLETED	/ /	/ /	
<p>* Check condition of dehydrator plug for discoloration. Contents should be dark blue in color. If plugs are discolored, remove and replace with new plugs. If more than half the dehydrator plugs on the engine require replacement, remove and replace the desiccant bags in the exhaust pipes with fresh desiccant bags and reseal the exhaust pipe.</p> <p>** Treat each cylinder bore with MIL-PRF-46002. With the piston at the bottom dead center position, use a common garden sprayer (with clean reservoir and nozzle) to spray atomized cylinder preservation oil that meets MIL-PRF-46002, (at room temperature) through the top spark plug hole of each engine cylinder. Thoroughly cover all interior cylinder surfaces by moving the nozzle from top to bottom. Rotate the crankshaft as opposite cylinders are sprayed. Ensure no piston is positioned at top dead center.</p>				
Inspector Notes:				

Intentionally Left Blank