



*- Fly Confident*

## **RADIAL ENGINE RECOMMENDATIONS**



## CONGRATULATIONS

You have just purchased the finest radial engine available today. When Pratt & Whitney designed and manufactured high horse power radials they did not conceive of them being in use some 70 years later. Neither did they imagine the high TBOs that are attained in present day flight operations. Maintenance practices from the hey day of radial engines were primarily concerned with flight safety. Many operational and maintenance questions were left for operators to resolve on their own.

This manual is a compilation of maintenance advice gathered over fifty years of experience worldwide. Our goal is to assist you in achieving not only safe operations, but also maximum service hours for your purchase. We are highlighting practices and procedures considered to be key ingredients for safe and economical operation of Pratt & Whitney and Curtiss Wright radial engines. We know through years of experience that following these recommendations will enhance engine life.

We support our product. Familiarize yourself with the warranty. Feel free to call or email our engine product support department for advice or with concerns you wish to discuss. Spare parts, components and accessories are available. We are committed to radial engine overhaul for as long as there is a need.

Thank you for your business. We look forward to working with you.

Sincerely,  
PRECISION ENGINES LLC

Dave A. Cort  
President



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## **PRE-OIL PROCEDURES**

Overhauled engines and engines that have been inactive must be pre-oiled prior to start. The instructions contained within the engine manufacturer's manuals are the only acceptable method of pre-oiling.

## **RECOMMENDED OILS**

Precision recommends that mineral oil be utilized for the first 50 hours of engine operation. Single grade, ashless dispersant oils should be utilized for the remainder of the engine's life. Precision Engines, LLC does not approve the use of multi grade engine oils in engines above 1800 cubic inches.

## **OIL CHANGES**

Corrosive acids will accumulate within the oil system. Low use operators need to change oil every season to avoid engine damage. Continuous use operators need to change oil every 150 hours of operation.

## **OIL SYSTEMS**

The oil system must be cleaned and inspected every engine change. The hopper tank, oil lines and propeller dome must be completely cleaned. The oil cooler must be cleaned and x-rayed to ensure no contaminants remain trapped. Precision Engines LLC will not be liable for engine damage due to chemical or particulate oil contamination.

## **EXTERNAL OIL FILTER**

There is no evidence that after market external oil filters have a detrimental effect on engine longevity. Only FAA approved systems should be installed.

## **PRE-HEAT**

When outside temperatures require preheat, external heaters must be utilized to sufficiently warm the oil. In addition, the internal components must be warm enough to allow for proper clearances.



## **LIQUID LOCKS**

Cylinder liquid locks must be avoided. Some engines are more prone to the accumulation of fluids in the cylinders and intake pipes than others. Pulling the propeller backwards will move any fluid accumulations into the intake pipe where certain damage will occur at engine start. Whenever the presence of excess fluids is suspected, the spark plugs must be removed and the cylinder drained of fluid.

## **INITIAL START AND GROUND OPERATIONS**

After the engine has been properly pre-oiled, it may be operated at idle speed without the cowling only until the oil temperature achieves minimum levels. Install the cowling and perform the remainder of the engine checks. A Precision Engines LLC product does not require an initial extended ground run.

Never operate the engine on the ground with the cowl flaps closed. It is not necessary to operate the engine on the ground to raise the CHT to an arbitrary temperature. Once minimal oil temperature is reached, the engine is ready for normal flight procedures.

## **BAROMETRIC POWER CHECKS**

The barometric power check is the best method used to determine the continuous serviceability of the engine. Note the field barometric level prior to start. Operate the engine at field barometric pressure. The RPM noted at that setting is field barometric RPM and the value is used to determine engine serviceability. An appreciable loss of RPM, indicates engine difficulties.

## **SPARK PLUGS**

Precision Engines LLC recommends that only commercially available spark plugs produced today be installed in radial engines. Since the advent of 100LL, spark plug lead fouling has declined and the need for the older, hotter range of spark plugs is no longer required.



## **VALVE ADJUSTMENTS R2800-CB/CA**

The direct method, as specified in Maintenance Manual Part Number 166498, will achieve accurate valve adjustment on the R-2800 CA and CB series engines. Precision Engines LLC manufactures the required tooling.

## **VALVE ADJUSTMENT INTERVALS**

The valves must be checked and adjusted no later than 50 hours after the engine has been overhauled and then at 250 hour increments. Adherence to these recommendations will extend cam life and reduce premature cylinder failures.

## **IGNITION TIMING**

A small variance in ignition timing will result in a significant change in power. Ignition timing should be inspected within the first 50 hours of operation of an overhauled engine, then at intervals recommended in the Maintenance Manual. Time Rite indicators must be used whenever magnetos or distributor timing is performed.

## **CYLINDER HEAD TEMPERATURE MANAGEMENT**

Because of the variance of expansion and the contraction rates of different parts of the engine, every effort must be made to keep the cylinder head temperature stable throughout all operational ranges. Failure to keep CHTs stable will cause damage that often times cannot be repaired. Improper climb or descent, prop reversing, rapid power changes and unplanned cowl flap adjustments all cause a rapid change of the airflow through the cooling system. This rapid change in the airflow is one of the major causes of cylinder failure.

## **REDUCED POWER OPERATIONS**

Precision Engines LLC does not approve reduced power take offs. METO, Climb and Cruise manifold/RPM settings used should be those published in the aircraft operation manuals. Failure to use the published power settings could void warranty.



## **BMEP APPLICATIONS**

The BMEP system present on some engine applications is to be used in conjunction with RPM and manifold pressure to assess power output. No two engines will have exactly the same BMEP readings. The primary function of the BMEP indication system is to set the cruise mixtures.

## **REVERSE PITCH OPERATIONS**

Propeller reverse pitch should be used only when necessary for the safe completion of a flight. Use of reverse pitch to backup an aircraft is not recommended by Precision Engines LLC. Any reverse operation requires high power settings with no airflow through the cylinders and may cause damage.

## **MINIMUM MANIFOLD PRESSURE**

Operating with too low a manifold pressure is usually associated with descent. This causes the prop to drive the engine, which in turn causes the master rod bearings to reverse load. Reverse loading has a detrimental effect on engine longevity and is not approved by PELLC.

### **FOR PRODUCT SUPPORT CALL:**

**Phone: (425) 347-2800 Fax: (425) 353-9431**

**Or email: [productsupport@precisionengines.com](mailto:productsupport@precisionengines.com)**

**Or: [sales@precisionengines.com](mailto:sales@precisionengines.com)**



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## WARRANTY

1. Precision Engines LLC warrants **100%** on its engines from defects in material and workmanship for a period of 12 months from the date of delivery, or the first 100 hours of operation, whichever comes first. Operation from 101 to 500 hours is warranted within 12 months of delivery on a prorated basis in North America. Engines must be shipped to Precision Engines LLC for warranty consideration. All freight to and from Everett, WA is the customer's responsibility. *The customer agrees to **operate** the engine in accordance with the manufacturers operating procedures and instructions.*
2. The customer agrees to **maintain** the engine in accordance with the manufacturer's maintenance manual and instructions.
  - Precision Engines LLC will not be responsible for engine damage from bent or broken rods or parts damaged from failure of same due to hydraulic action resulting from improper engine starting procedures, or from any other operational irregularities resulting from , but not limited to : improper fuels and/ or lubricants, inadequate lubricants, operating at excessive temperatures, over-speeding, use of excess power, inadequate maintenance, or fouled plugs.
  - Precision Engines LLC will not be responsible for engine damage due to improper installation of the QEC assembly.
  - Precision Engines LLC will not be responsible for failure or improper installation of any ancillary hardware or system.
3. In no event shall Precision Engines LLC be liable for any expenses, charges or damages other than the repair or replacement of the item supplied.
4. Precision Engines LLC reserves the right to repair or replace the defective item at its sole option.
5. Unauthorized disassembly of an item supplied by Precision Engines LLC voids this warranty.
6. This warranty is not transferable.



### **I.R.A.N. ENGINE WARRANTY**

1. Time continued engine repairs are warranted as above for 12 months or 100 hours only. The warranty applies only to the area of the engine which Precision repairs.

### **COMPONENT AND ACCESSORY WARRANTY**

1. Components (such as cylinders, noses, blower sections, etc.) and accessories (such as carburetors, generators, pumps, generators, etc.) are warranted as above for 100 hours or 12 months from the time of repair or overhaul when purchased individually.

## NOTES

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*Investing in the longevity of radial engines*