# O-470-A,B,E,G,J, K,L,M,P,R, S & U

## CONTINENTAL® AIRCRAFT ENGINE

# OVERHAUL MANUAL

TECHNICAL CONTENT ACCEPTED BY THE FAA

**Publication X30586**



**CHANGE 6**

OCT 2013

## Supersedure Notice

This manual revision replaces the front cover and list of effective pages for Publication Part No. X30586, dated September 1988. Previous editions are obsolete upon release of this manual.

## Effective Changes for this Manual

| | | | |
|---|---|---|---|
| 0 ..... September 1988 | 4 ..... October 1992 | | |
| 1 ..... February 1989 | 5 ..... 31 August 2011 | | |
| 2 ..... March 1991 | 6 ..... 15 October 2013 | | |
| 3 ..... October 1991 | | | |

## List of Effective Pages

Document Title: O-470 Series Engine Overhaul Manual
Publication Number: X30586 Initial Publication Date: September 1988

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Published and printed in the U.S.A. by Continental Motors, Inc.

Available exclusively from the publisher: P.O. Box 90, Mobile, AL 36601

| ITEM NO. | TYPE PART NUMBER | APPLICATION | MODELS | REMARKS |
|---|---|---|---|---|
| 2 *(cont'd)* | Oil - Grade 50, MHS 27 (CITGO, Inc.) | • Pistons, Piston Pins, Piston Rings | See Remarks | ---------- |
| | | • Rocker Arms, Pivots, Valves and Tappets<br>• Fuel Connections to Carb. (male threads only)<br>• V.T.C. Unit Pistons and Centrifugal Valves | See Remarks | 6-285 & 6-320 |
| | | • Thrust Washer<br>• Oil Filter Adapter Seals<br>• O-Rings<br>• Connecting Rod Nuts - Tiara engine only) | All Models | ---------- |
| 3 | **#646943** - Anti Seize Lubricant<br>TELEDYNE CONTINENTAL MOTORS Aircraft Products | • Connecting Rod Nuts - (all models except Tiara)<br>• All Fuel Injector Nozzles (at cyl hd)<br>• Pressure Regulator Threads<br>• Exhaust Studs (nut end before torquing)<br>• All Class #4 Studs<br>• Plug Vernatherm | All Models | Use sparingly on male threads only At Engine Assembly |
| 4 | **MIL-S-3545-C - Grease** (Shell #5)<br>TELEDYNE CONTINENTAL MOTORS Aircraft Products | • All Fuel Injection Linkage<br>• O-Rings on Fuel Pumps<br>• Mixture Shaft Bushing | All Models | At Assembly |
| 5 | **Alvania** (Shell #2) | • Oil Seal Lips Only | All Models | ---------- |
| 6 | Permatex Aviation Grade 3D (Permatex, Inc.) and **# 641543** - Silk Thread<br>TELEDYNE CONTINENTAL MOTORS Aircraft Products | • Crankcase Parting Face - see figure 70-20-00 for Crankcase Threading Procedure.<br>• Crankcase Parting Face - see figure 70-20-00 for Crankcase Threading Procedure.<br>• Pressure Oil Pump Covers | See Remarks | O-200, C90, O-300<br>470, 520, 550 GTSIO-520 6-285, 6-320<br>All Models |
| 7 | Permatex Aviation Grade 3D (Permatex, Inc.) and **#641543** Silk Thread<br>and<br>**#646942** Gasket Maker | • Crankcase Parting Face see figure 72-20-00 for Crankcase Threading Procedure.<br>• Scavenge Oil Pump Covers | All 360 Models<br>All Models | ----------<br>---------- |

| ITEM NO. | TYPE PART NUMBER | APPLICATION | MODELS | REMARKS |
|---|---|---|---|---|
| 8 | **#646942** - Gasket Maker (use alone on models listed)<br>TELEDYNE CONTINENTAL MOTORS Aircraft Products | • Starter Adapter Assembly to Crankcase. (Apply thin coat to adapter).<br>• Sump to Crankcase. (Apply thin coat to oil sump). | See Remarks<br>See Remarks | 520 Permold Models only<br>O-470G, IO-470C,J,H,N,K, IO-520B,BA,BB,NB,N TSIO-520D,DB,UB & IO-550B |
| | **#646942** - Gasket Maker and Gasket | • Sump to Crankcase with Gasket (Apply thin coat between gasket and sump) | See Remarks | All Models with Sump Gasket. |
| 9 | **EC1252** - Pully - Seal - White Spot - 3M Brand | • Air Throttle & Fuel Metering Assembly<br>• Magneto Flanges<br>• Cylinder Deck Stud Nuts & All Thru Bolts | All Models | ---------- |
| 10 | **#642188-1** - Gasket Sealant (TCM)<br>1.5 oz. tube<br>TELEDYNE CONTINENTAL MOTORS Aircraft Products | • All Gaskets - Both Sides Except Magneto Gasket | See Remarks | Tiara 6-285 6-320 |
| | | • Rocker Cover Gaskets (cover side) | See Remarks | For All Stamped Covers |
| | | • Gasket Accessory Case to Crankcase (crankcase side only) | See Remarks | Models C-90, O-200, O-300, All 360 |
| | | • Gasket - Idler Pin<br>• Gasket - Intake Manifold<br>• Oil Drain Back Tubes<br>• Gasket & Oil Filter Neck Holes | See Remarks | Models 470, 520 & GTSIO-520 |
| | | • Gasket - Oil Cooler - Both Sides | See Remarks | All 360 Models |
| | | • Oil Seal at Alt Drive ( OD only) | | Tiara 6-285, 6-320 |
| | | • All Press Type Plugs (Hubbard (etc) In Parting LIne Area of 3-way Joints<br>• Oil Seal Accessory Drive (OD only) | See Remarks | Sump to Crankcase or Sump to Crankcase to Acc Case Models TSIO360A, AB,C,CB,D,DB IO360C,CB,G,GB |

## 70-20-00 PERMATEX AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

2. Apply Permatex No. 3D to the threaded case half first, only in areas where thread is shown, using short light brush strokes until an even, thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear. If not, use a new can of aviation Permatex. (Allow the Permatex to air dry to a tacky condition before threading).

3. Apply Permatex to all areas listed in paragraph "2" above on the non-threaded crankcase half, using the same technique as in paragraph "2".

4. Apply grade D silk thread P/N 641543 as shown in illustration, being sure that free ends are covered by gaskets, except at oil seal.

5. Assemble crankcase halves using bolts for alignment to prevent movement of the thread and torque all bolts in proper sequence according to figure 72-60-02 Torquing sequence as soon as possible.

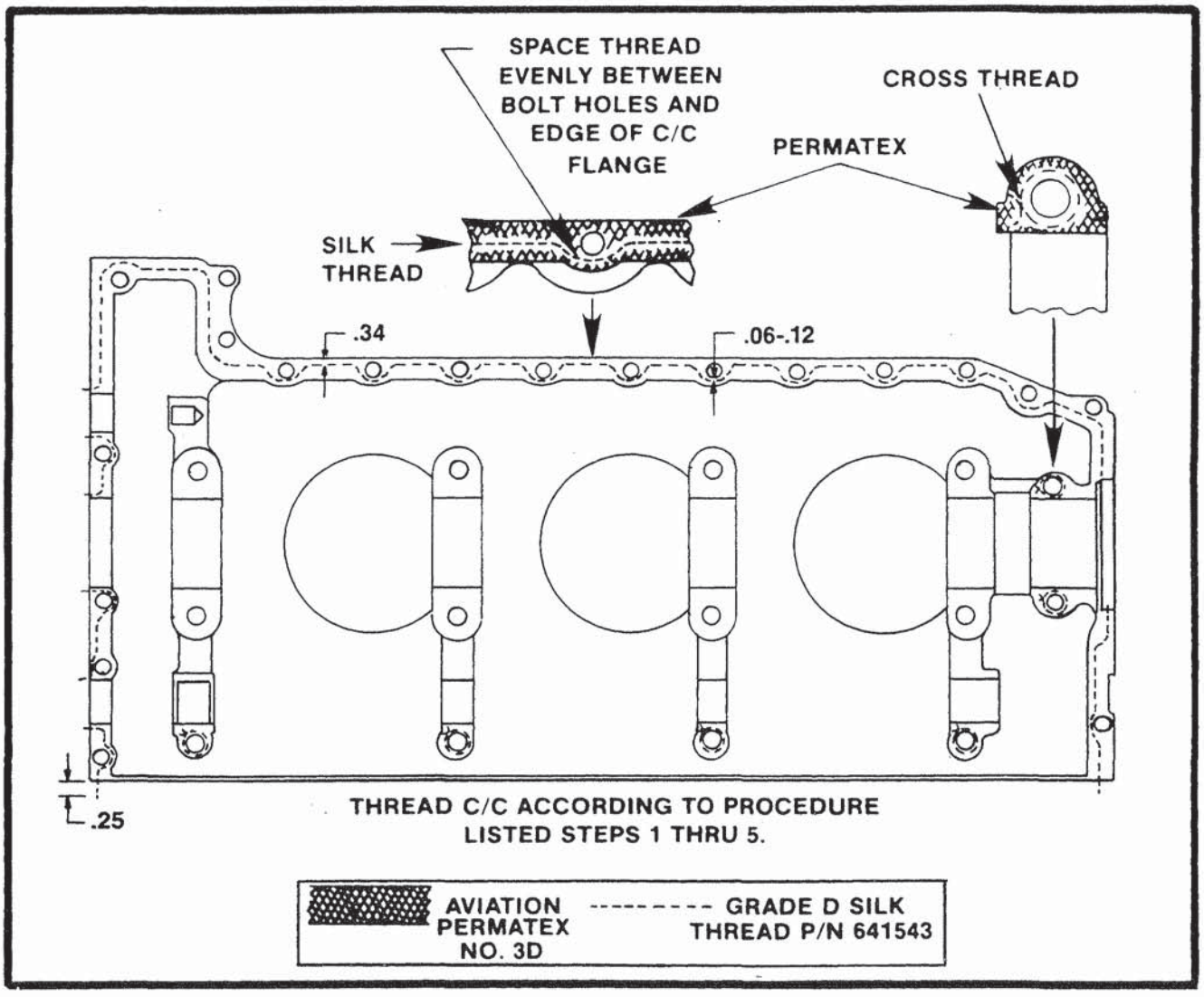


FIGURE 70-20. PERMATEX AND THREADING PROCEDURE.

## 72-60-00 FINAL ASSEMBLY

**72-60-01 GENERAL.** Apply clean 50 wt. engine lubricating oil liberally to all bare steel surfaces, journals, bearings, bushings, nuts, bolts and studs, before and/or after installation, depending on accessibility, except where special lubricants are mentioned.

**TIGHTENING TORQUES.** See Table of Tightening Torques and Instructions, Section 72-50-01.

**CLEARANCES.** Measure clearances of running parts as they are installed. Test for binding and excessive looseness by moving the running parts.

**COVERS.** It is advisable to cover openings as soon as possible and to cover assemblies and the partial engine assembly whenever they are not in the process of being assembled. Cover all openings into which small parts might be dropped.

**72-60-02 CRANKCASE. (See Figures 72-10-15 & 72-60-02A & B).**

A. Install the oil filler neck and attach the mount brackets on the left crankcase to the assembly stand in the same way as during disassembly, and place the pipe support (1) under the casting.

B. The crankshaft oil seal inside and outside diameters should be clean and dry. Install oil transfer sleeve O-ring and sleeve.

C. Lubricate all main bearing inserts and crankshaft journals and install thrust washers. Lift the shaft assembly by the number 1 connecting rod and the propeller mount flange. While a second person holds up the number 3 and 5 connecting rods, lower the assembly into position in the left crankcase bearings with the oil seal positioned so as to enter its case recess. The connecting rod position numbers should automatically be toward the upper case flange if properly installed. Lay the odd-numbered connecting rods on the upper flange.

D. Insert the governor-driven gear (1, Figure 72-10-16) into its bearing.

E. Slide the governor driver gear on the front end of the camshaft. Lay the camshaft assembly in its bearings in the left case, meshing the spur gear teeth with those of the crankshaft gear, so that the timing marks will align as illustrated in Figure 72-60-02A idler gear support pin and timing marks, and turning the governor driven gear to mesh it with the driver gear.

F. With a feeler gage, measure the crankshaft end clearance at either end of the thrust bearing with the shaft pushed toward that end. Similarly, measure the camshaft end clearance at either end of its rear bearing. Check for perceptible backlash between spur gears and bevel gears.

G. Install the idler gear assembly and support pin in the left crankcase as illustrated (bushing thrust flange to rear).

H. Use Aviation Permatex Grade 3D and spread in a thin but continuous film all around the left crankcase parting flange, taking care not to get it on other parts. Lay lengths of No. 50 silk thread on the parting flange. The thread should be inside the bolt holes but never on the edge. (See Chapter 70 Standard Practices for Crankcase Threading procedure). Care should be taken to insure that only areas illustrated be threaded.