IOF-240-B

CONTINENTAL® AIRCRAFT ENGINE

MAINTENANCE AND OVERHAUL MANUAL

Technical Portions Accepted by the Federal Aviation Administration

Publication M-22

CHANGE 1

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Supersedure Notice

This manual is a revision of the contents of IOF-240 series engine maintenance and overhaul information contained in Publications M-22, dated August 2007 and OH-22, dated September 2007. Previous editions are obsolete upon release of this manual.

Effective Changes for this Manual

0 ..... 31 October 2011			
1 ..... 15 June 2012			

List of Effective Pages

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3-1.2. Mechanic's Tools

The tools listed below are required to perform overhaul procedures on the engines.

Open end wrenches – ¼-inch through 1-	1/4-inch Slide hammer
Deep socket wrenches: •¼-inch drive •5/32 through ½-inch drive •3/8-inch through 1-1/2-inch drive •7/16-inch through 1-1/4-inch	Ratchets: •¼-inch drive •3/8-inch drive •½-inch drive
Deep well sockets: •½-inch drive •7/16-inch drive through 1-inch	Heat Gun (variable intensity/ equipped with a small tip)
Calibrated torque wrenches: •0 to 1000 in-lbs •0 to 500 in-lbs •0 to 100 ft-lbs	•Drill, 0.266 (H) Pneumatic drill •00.339 Drill High speed borer •Drill bit No. 17 bit (0.1730)
Micrometers	Ball peen hammer
Allen wrenches - assortment	Pullers
Slotted screwdrivers – assortment	Blind Bearing Remover
Phillips screwdrivers – Nos. 1 and 2	Vernier calipers
Safety wire pliers	Leather or soft plastic mallet
Common pliers	Small hole gauges, thickness gauges
Diagonal cutter pliers	Feeler gauges (leaf-type)
Needle nose pliers	C-clamps
Duck bill pliers	Brass wire brush
Snap ring pliers (with 90-degree bend)	Stiff-bristled, non-wire scrub brush
Inspection light/flashlight	Dry blaster cleaning tool
2-inch Merit wheel	Air impact tool
T-handle Drive	Tool maker's square
Magnifying glass (10X power)	Inertia puller
Mirror	Profilometer
Utility Knife or Razor Knife	Chamfer Tool
Scissors	Morse adapter
Crimp Tool	Heavy duty drill press
Wire ties	Arbor press (and 8-inch arbors)
Ring expander	Vertical mill
Shield vise	Engine hoist
Fiber drift, brass drift, pin or punch	Engine stand
Magnet	Transport dolly
Stud Extractor Tool	Aircraft tie downs and stop blocks
Ezy Out	V-blocks

3-2. Lubricants, Sealants and Adhesives

3-2.1. Engine Oil Specifications

Lubricating oils qualified for use in Continental Motors engines are required to meet SAE (Society of Automotive Engineers) specifications. SAE J-1899 is the specification for aircraft piston engine ashless-dispersant oil. SAE J-1966 is the specification for aircraft piston engine non-dispersant mineral oil.

> NOTE: MIL-L-6082E, dated 1 November 1995 and MIL-L-22851D, dated 1 November 1995 have been superseded by SAE specifications SAE J-1966 and SAE J-1899, respectively.

QPL-J-1899: Qualified Products List is available from:

SAE Headquarters
400 Commonwealth Drive
Warrendale, PA 15096-001

The Naval Air Systems Command maintains QPL-J-1899 and QPL-J-1966.

Naval Air Systems Command
47123 Buse Road
Building 2272, Suite 540
Patuxent River, MD 20670
http://www.anchordesk.navy.mil

Recommended Oil Grade:

Above 40°F ambient air, sea level- SAE 50 or Multi Viscosity

Below 40°F ambient air, sea level - SAE 30 or Multi Viscosity

> NOTE: Continental Motors makes no endorsement of the listed products. The alphabetical listing is provided only for the convenience of Continental Motors customers. If the aviation oil you use or wish to use is not listed, contact the Naval Air Systems Command.

Table 3-3. Qualified SAE J-1899 Ashless Dispersant Engine Oil

Supplier	Brand
Air BP Lubricants	Castrol Aviator AD Oil
	Castrol Aviator A Oil
ChevronTexaco	ChevronTexaco Aero Oil AD
	ChevronTexaco Aero Oil AD SAE 20W-50
Delta Petroleum Company	Delta Avoil Oil
Exxon Company, USA	Exxon Elite
	Exxon Aviation Oil EE
Gulf Oil Company	Gulfpride Aviation AD
Mobil Oil Company	Mobil Aero Oil
NYCO SA	Turbonycoil 3570
Pennzoil Company	Pennzoil Aircraft Engine Oil
Phillips 66	Phillips 66 Type A 100 AD, 120 AD
	Phillips 66 X/C Aviation Oil SAE 20W-50, SAE 25W-60
	Phillips 66 Victory Aviation Oil 100AW
Quaker State Oil & Refining Co.	Quaker State AD Aviation Oil
Red Ram Limited (Canada)	Red Ram X/C Aviation Oil 20W-50
Shell Aviation	Aeroshell Oil, (Mineral) 65, 80, 100, 2F Anti Corrosion Formula
	Aeroshell Multi-grade Oil AD, 15W - 50
	Aeroshell Oil W65, W80, W100
	Aeroshell Oil W80 Plus, W100 Plus Anti Corrosion Formula
Sinclair Oil Company	Sinclair Avoil
Total France	Total Aero DM 15W - 50

Table 3-4. Break-in Oil

Type	Equivalent	Application
SAE J-1966 Aviation Oil	Non-dispersant mineral oil for piston aircraft engines Phillips 66 Aviation Antirust Oil 20W-50 Phillips 66 Aviation Type M Antirust Oil 20W-50	First 25 hours of engine operation or until oil consumption stabilizes
MIL-C-6529 Type II Corrosion preventive mineral oil	Fly-away oil	

NOTE: Mineral oil conforming to MIL-C-6529 Type II contains a corrosion preventive additive and must not be used for more than 25 hours or six months, whichever occurs first. If oil consumption has not stabilized in this time, drain and replenish the oil and replace the oil filter.

Table 3-5. Preservative Oil

Type	Equivalent	Application
MIL-P46002A	NOX-RUST 1101	Temporary or Indefinite Storage
MIL-P46002A	Motorstor Engine Protectant	Temporary or Indefinite Storage

3-2.2. Oil Change Intervals

Refer to the engine maintenance manual and/or the aircraft manufacturers or Supplemental Type Certificate (STC) holders AFM/POH for fuel specifications, specified oil change intervals and inspection procedures.

Oil change intervals published in this manual are minimum requirements. More frequent oil and filter changes enhance engine service life. We recommend engine oil be drained and replenished every 25 hours of operation or 4 months for engines that incorporate an oil screen. Engines with full flow oil filters, should have the oil changed every 50 hours or 6 months.

NOTE: When using the small (4.80 inch high oil filter) do not exceed 50 hours and/or 6 months between oil and filter changes. Oil screens and oil filter elements must be inspected for contaminates at each oil change. Oil analysis may be used in addition to the oil screen or filter element inspection, but not as a replacement for it.

3-2.3. Additives

There are many fuel and oil additives and/or concentrates on the market today which were formulated primarily for automotive and industrial engine applications. From time to time, we receive inquiries regarding use of these products in our aircraft engines. Most of these additives and concentrates, while they may be highly beneficial to automotive and industrial operation, are not compatible with air-cooled, light aircraft engines in their operating environments. With the exception of the use of isopropyl alcohol and ethylene glycol monomethyl ether compound described in the following paragraph, we do not recommend the use of additives or concentrates in any of our aircraft engines. In fact, the use of such additives may void the engine warranty. Use only recommended fuels and lubricants.

WARNING

Mixing of the DEGMME compound with fuel concentration in excess of the recommended (0.15 percent volume maximum) could have a harmful effect on engine components. Use only the manufacturer's recommended blending equipment and procedures to achieve proper proportioning.

Under certain ambient conditions of temperature and humidity, sufficient quantities of water may exist in the fuel to create restrictive ice formation in the fuel supply. To alleviate this occurrence, it is permitted to add no more than three percent Isopropyl Alcohol to the fuel supply. Also, Diethylene Glycol Monomethyl Ether (DEGMME) conforming to military specification MIL-DTL-85470B, if approved by the aircraft manufacturer, may be added for this purpose. The DEGMME compound must be carefully mixed with the fuel in concentrations not to exceed 0.15 percent by volume.

Table B-4. Component Specific Torque Specifications

Size	Fastener	Torque Value		Models Affected
		In-Lbs	Ft-Lbs	
Crankcase				
.25-28	Nut-Crankcase Flange	100-125	8.3-10.4	IOF-240-All, As Required (AR)
.31-24	Nut-Crankcase Backbone	240-280	20.0-20-3	All Models (AR) Stainless Steel Hardware Only
.38-24	Nut-Crankcase Tie Bolts	275-325	22.9-27.1	IOF-240-All (AR)
.38-24	Nut-Cylinder to Crankcase Studs	440-460	36.7-38.3	IOF-240-All (AR)
.38-24	Nut-Mounting Bracket to Crankcase	275-325	22.9-27.1	All Models (AR)
.44-20	Nut-Crankcase Tie-Bolts-Nose & Below Camshaft	440-460	36.7-38.3	All Models (AR)
.44-20	Nut-Cylinder to Crankcase Studs (including 7th stud)	490-510	40.8-42.5	All Models (AR)
.44-20	Nut-Through Bolt at Cadmium Plated Washer	440-460	36.7-38.3	All Models (AR)
.44-20	Nut-Through Bolt at Cylinder Flange	590-610	49.2-50.8	IOF-240-All (AR)
.44-20	Nut-Through Bolt at Front Mount Belt-Driven Alternator	490-510	40.8-42.5	All Models (AR)
.50-20	Nut-Crankcase Nose Tie Bolts	640-660	53.5-55.0	All Models (AR)
.62-18	Plug-(with crush washer)	190-210	15.8-17.5	All Models (AR)
Gears				
.25-28	Bolt, Gear to Camshaft	140-160	11.7-13.3	IOF-240-All (AR)
.25-28	Bolt, Gear to Crankshaft (P/N 22532)[1]	140-160	11.7-13.3	IOF-240-All (AR)
.38-24	Bolt- Vacuum & Fuel Pump Gear to Camshaft	275-325	22.9-27.1	IOF-240-All (AR)
Connecting Rods				
.38-24	Nut, Connecting Rod (Nuts: 24804 or 626140 w/bolt P/N 530213)[2 & 3]	400-475	33.3-39.6	IOF-240-All (AR)
.38-24	Nut, Connecting Rod (Spiralock (Nut P/N 654487 w/ bolt P/N 654693)	490-510	40.8-42.5	IOF-240-All (AR)
Miscellaneous Fuel Injection				
.31-24	Nut, Throttle and Mixture Control Levers to Shaft	100-120	8.3-10.0	All Fuel Injected Model (AR)
.31-32	Nut, Fuel Injection Line	40-45	3.3-3.7	All Fuel Injected Model (AR)
.38-24	Nut, Fuel Injection Line	55-60	4.5-5.0	All Fuel Injected Model (AR)

Table B-4. Component Specific Torque Specifications

Size	Fastener	Torque Value		Models Affected
		In-Lbs	Ft-Lbs	
Miscellaneous Lubrication System Fasteners				
.25-20	Bolt, Oil Pump Cover to Crankcase	75-85	6.3-7.1	All Models (AR)
.62-18	Plug, Oil Cooler (w/crush washer)	190-210	15.8-17.5	All Models (AR)
.62-18	Plug, Oil Suction Tube (w/ crush washer)	190-210	15.8-17.5	All Models (AR)
.62-18	Plug, Oil Sump Drain	190-210	15.8-17.5	All Models (AR)
.62-18	Oil Filter Cartridge	180-216	15.0-18.0	All Models (AR)
.75-16	Oil Filter, Disposable	192-216	16.0-18.0	All Models (AR)
.88-16	Cap, Oil Pressure Relief Valve	190-210	15.8-17.5	IOF-240-All (AR)
1.00-14	Vernatherm (Oil Temperature Control Valve)	190-210	15.817.5	All Models (AR)
1.00-18	Screen Assembly, Scavenge Oil	200-210	16.7-17.5	IOF-240-All (AR)
1.25-18	Plug, Special Vernatherm	310-320	20.8-29.2	All Models (AR)
1.25-18	Vernatherm (Oil Temperature Control Valve)	410-420	34.2-35.0	All Models (AR)
1.375-16 LH	Housing, Tachometer Drive	250-350	20.8-29.2	All Models (AR)
Miscellaneous Cylinder Hardware				
.071 (18mm)	Spark Plug [4]	300-360	25.0-30.0	All Models (AR)
.125-27	Connector, Cylinder Drain	60-80	5.0-6.7	All Models (AR)
.19-32	Screw, Cylinder Baffle	10-20	.84-1.7	All Models (AR)
.25-20	Screw, Rocker Cover (tighten two lower screws first)	55-65	4.6-5.4	IOF-240-All (AR)
.25-20	Screw, Intake Flange	85-110	7.1-9.2	All Models (AR)
.25-28	Nut, Rocker Shaft Hold Down	110-120	9.2-10.0	IOF-240-All (AR)
.25-28	Nut, Exhaust (self locking)	120-130	10.0-10.8	All Models (AR)
.25-28	Nut, Exhaust Manifold Flange (Spirotallic Gasket)	100-110	8.3-9.2	All Models (AR)
.31-24	Nut, Exhaust Manifold Flange (Spirotallic Gasket)	200-210	16.7-17.5	All Models (AR)
.31-24	Nut, Induction Tube Flange	50-70	4.2-5.8	IOF-240-All (AR)