



Title: OIL DRAIN PROVISIONS, ECi AEL65460 CRANKCASES

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Technical Portions are FAA DER Approved.

- 1.0 PURPOSE:** To provide customers and owners with data and procedures for adding oil drain provisions to the front main bearing saddle of ECi AEL65460 crankcases in certain applications.
- 2.0 MODELS AFFECTED:** 4-cylinder engines using fixed pitch propellers and ECi or Lycoming 320-series crankshafts without oil tubes or drain holes in the center of the front main bearing journal (such as early model O-320-E2D and E3D crankshafts) and ECi or Lycoming 360-series crankshafts with solid front main bearing journals (such as model O-360-A4M, -C4P crankshafts).
- 3.0 TIME OF COMPLIANCE:** At engine assembly, engine overhaul or whenever the engine crankcase is disassembled.
- 4.0 BACKGROUND:** The long front main bearing (P/N AEL13884 or equivalent) used in 4 cylinder 320 and 360 engines is comprised of two bearing surfaces separated by a 1.12" wide annular groove which does not support the crankshaft. This groove is used as part of the propeller governor oil pressure circuit in engines having constant speed propellers. For engines with fixed pitch propellers, however, this same groove requires some type of drain provision in order to ensure proper oil flow and to prevent accumulation of moisture or contaminants that could damage the crankshaft.

For many fixed pitch models, oil from the 1.12" annular groove area of the bearing is drained via the crankshaft, either by means of a single drain hole or through an oil tube opening into the ID of the crankshaft front main bearing journal lightening hole, and from there into the crankcase interior. See Figure 1. For engines using crankshafts without oil drain provisions (i.e., "solid" crankshafts with no drain hole, oil tube or lightening hole through the front main journal ID, or crankshafts having a rear plug which is not pierced per Lycoming Service Instruction 1435), the oil drain must be provided by the engine crankcase. This drain consists of a single hole drilled between the bearing dowels in the front main bearing saddle of the left crankcase half (2-4 cylinder side). See Figure 2

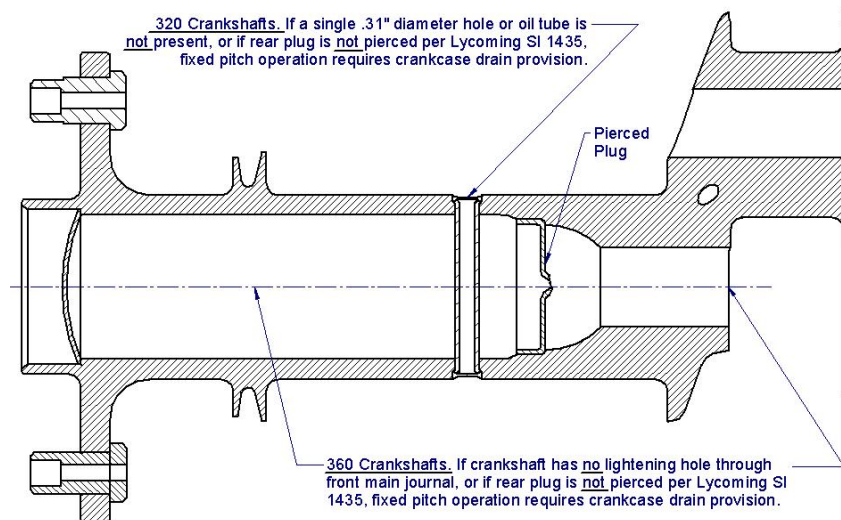


Figure 1: Explanation of Applicable Crankshafts



5.0 ASSESSMENT: When preparing to assemble ECi crankcases in 320 and 360 engines intended for fixed pitch propeller operation, customers must make an assessment of the oil drain provisions of the crankcase and crankshaft combination. If the crankshaft already has oil drain provision, no further action is required. If the crankshaft has no oil drain provision as described above, then this provision must be added to the crankcase, if not already present, by drilling a drain hole in the left crankcase half as described below.

NOTE: If both the crankcase and the crankshaft already have oil drain provisions, this condition will not be detrimental to the engine in any way; and it may be assembled in this configuration for fixed pitch operation.

6.0 REWORK: If oil drain provision in the crankcase is required, drill a single oil drain hole in the left crankcase half according to Figure 2 below.

IMPORTANT! Do not confuse this hole with the angled .375" governor oil passage in the right crankcase half!

- 6.1 Mount the left crankcase half securely and squarely on the table of a suitable drill press or vertical milling machine in order to ensure accurate positioning and perpendicularity.
- 6.2 De-burr the edges of the drilled hole .005"-.015" as shown and thoroughly inspect the crankcase to ensure that all metal chips have been removed.
- 6.3 Install an AN932-4 steel plug in the right crankcase half using Teflon tape and torque to 85 in.-lbs.
- 6.4 Make the following statement in appropriate engine maintenance records:

“Drilled oil drain hole in left crankcase half and installed plug in right crankcase half per ECi Service Instruction 04-4, Figure 2.”

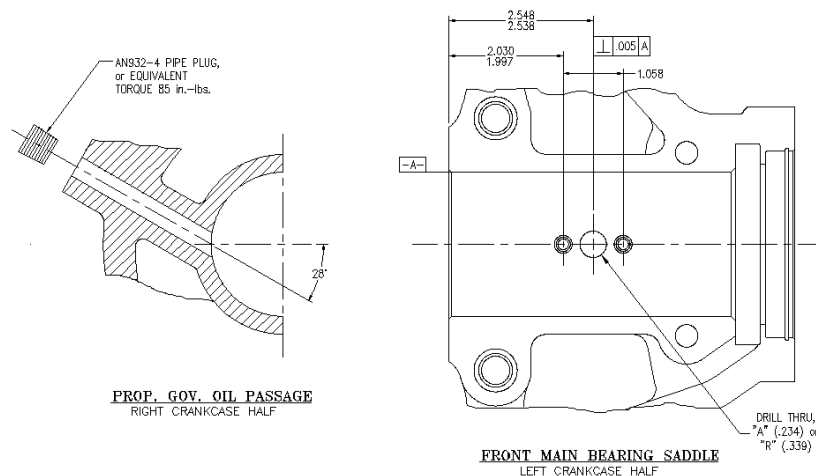


Figure 2: Depiction of Fixed Pitch Operation



7.0 CONVERSION TO CONSTANT SPEED: Crankcases reworked in accordance with this Service Instruction may subsequently be converted for operation with constant speed propellers, if desired, by exchanging crankshaft and reconfiguration of the crankcase oil passages in accordance with Figure 3 below. Proceed as follows:

- 7.1 Tap threads in the drain hole of the left crankcase half. If the hole is .234", use a 1/16-27 NPT tap. If the hole is .339", use a 1/8-27 NPT tap. Mount the left crankcase half securely and squarely on the table of a suitable drill press or vertical milling machine and center the spindle with the hole. Install the tap in a drill chuck or collet in order to begin tapping the threads perpendicular to the main bearing saddle surface as required. Use a tapping lubricant or cutting fluid suitable for aluminum.
- 7.2 After the tap has started squarely four or five turns, loosen the chuck or collet and continue tapping by hand using a T-handle. Clear chips from the flutes of the tap periodically. Run tap in approximately 60% of its flute length, remove and clear all chips. Make a trial fit of the plug to be installed in the tapped hole. If tap is 1/16-27 NPT, use AN932-1 steel plug, or equivalent. If tap is 1/8-27 NPT, use AN932-2 steel plug, or equivalent. Use engine oil on the plug threads and torque to 40 in-lbs.
- 7.3 Note position of the plug relative to the surface of the crankcase main bearing saddle. If plug protrudes above the bearing saddle surface, remove and continue tapping in increments until the plug can be seated .01"-.06" below the bearing saddle surface when torqued to 40 in-lbs.
- 7.4 Remove the plug, de-burr the edge of the tapped hole and clean all metal chips from the crankcase half. Re-install the plug using engine oil on the threads and torque to 40 in-lbs.

IMPORTANT! No portion of the plug or edge of the tapped hole may protrude above the surface of the main bearing saddle when finished! Use a small straightedge to verify. Also make a trial fit of the AEL13884, or equivalent, bearing halves in the left crankcase half to ensure that there is no interference at any point.

- 7.5 Remove the AN932-4, or equivalent, plug from the governor oil passage in the right crankcase half, and install MS20822-6 steel elbow using a suitable sealer on the threads.

NOTE: For additional information on propeller governor oil supply lines, clamping and routing, refer to Lycoming Service Instruction 1435 with Supplement 1, Lycoming Service Bulletin 488A with Supplement 1, and FAA Airworthiness Directive 90-04-06 R1, or superseding publications, as revised.

- 7.6 Make the following statement in appropriate engine maintenance records:

"Plugged oil drain hole in left crankcase half and installed governor oil supply elbow in right crankcase half per ECi Service Instruction 04-4, Figure 3."



ENGINE COMPONENTS, INC.

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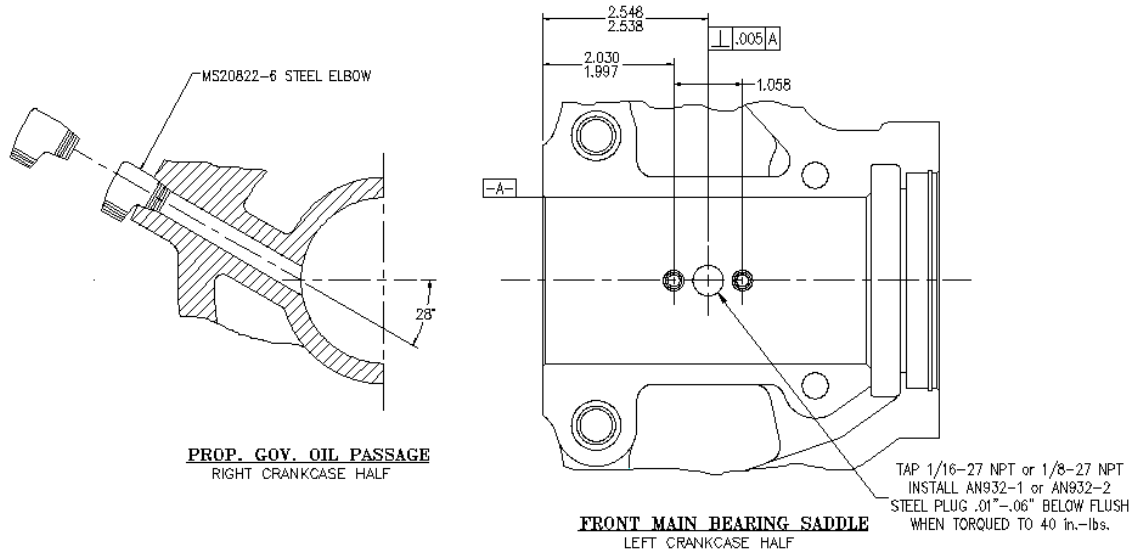


Figure 3: Depiction of Constant Speed Operation