

Reciprocating Engine Division/
 Subsidiary of Textron Inc.
 652 Oliver Street
 Williamsport, PA 17701 U.S.A.

SERVICE BULLETIN

DATE: November 7, 1975

Service Bulletin No. 381C
 (Supersedes Service Bulletin No. 381B)
 Engineering Aspects are
 FAA (DEER) Approved

SUBJECT: Oil Pump Woodruff Key Drive and Impeller Replacement

- MODELS AFFECTED:**
- I. All O, HO, HIO, VO and IVO-360; O and IO-540 engines having serial numbers as specified in the following chart.
 - II. All O, HO, HIO, VO and IVO-360; O and IO-540 engines listed in the following chart, installed in listed aircraft that were overhauled after December 21, 1972 and modified by the installation of hardened sintered iron oil pump drive impellers as described in Service Instruction No. 1272.
 - III. All of the above specified engine models that were remanufactured at Avco Lycoming and shipped between December 21, 1972 and December 10, 1974 are subject to the modification described in this bulletin. However, during remanufacture many of these engines were built with oil pump drive components that are satisfactory for continued service and not subject to the modification herein required; see inspection paragraph to determine if compliance with this bulletin is required.

Aircraft Manufacturer	Applicable Engine Model	Serial Numbers of Engines Affected by this Service Bulletin	Serial Numbers of Engines Exempt from Requirements of this Service Bulletin
Hughes Tool Co.	O-360-C2D HO-360-B1A HO-360-B1B	L-18550-36A thru L-19846-36A	L-19817-36A, L-19818-36A, L-19847-36A and up.
	HIO-360-A1A HIO-360-B1A	L-10179-51A thru L-13551-51A	L-12577-51A, L-12727-51A, L-12853-51A, L-12890-51A, L-12892-51A thru L-12894-51A, L-12919-51A, L-12966-51A thru L-12968-51A, L-12979-51A, L-13034-51A thru L-13040-51A, L-13124-51A thru L-13128-51A, L-13170-51A thru L-13174-51A, L-13257-51A thru L-13262-51A, L-13280-51A thru L-13283-51A, L-13513-51A and up.
	HIO-360-D1A	L-10179-51A thru L-13512-51A	
Enstrom Aircraft Corp.	HIO-360-C1A	L-10179-51A thru L-13372-51A	L-11578-51A, L-12193-51A, L-12445-51A, L-12763-51A, L-12845-51A, L-12847-51A thru L-12849-51A, L-12895-51A, L-12897-51A, L-12898-51A, L-12911-51A, L-12912-51A, L-12914-51A thru L-12916-51A, L-12918-51A, L-12969-51A thru L-12972-51A, L-13041-51A, L-13042-51A, L-13119-51A thru L-13123-51A, L-13142-51A thru L-13148-51A, L-13271-51A thru L-13275-51A, L-13373-51A and up.
	HIO-360-C1B	L-10179-51A thru L-13551-51A	L-13552-51A and up.
Brantly Helicopter Corp.	VO-360-A1A VO-360-A1B VO-360-B1A IVO-360-A1A	All engines modified to incorporate hardened impeller in accordance with S. I. No. 1272.	All engines that were not modified to incorporate hardened impeller in accordance with S. I. No. 1272.
Britten-Norman Corp.	O-540-E4C5	L-15327-40 thru L-17105-40A	
	IO-540-K1B5	L-10536-48 thru L-12725-48	

- TIME OF COMPLIANCE:**
- I. All O, HO, HIO, VO and IVO-360 series engines that have accumulated 400 or more hours of service since new, remanufactured or overhauled must be modified in accordance with this bulletin within next 10 hours of operation.
 - II. All applicable O and IO-540 engines installed in above multi-engine aircraft that have accumulated 400 or more hours of service since new, remanufactured or overhauled must be modified in accordance with this bulletin within next 50 hours of operation.

REFERENCE: During April, 1970 newly designed oil pump impellers, made of sintered iron and featuring a Woodruff key in the drive shaft were introduced in production of some four and six cylinder Avco Lycoming engines: this change was offered to owners of earlier built engines by Service Instruction No. 1230. However, it became evident that although not subject to failure, the wear characteristics of the new drive were not comparable to the earlier design and a further change was introduced in December, 1972 to provide a hardened drive impeller; this is described in Service Instruction No. 1272. In addition to the hardened sintered iron drive impeller, a steel impeller was also used in some engines. It is now evident that the area of the Woodruff keyway in the hardened drive impeller and the steel impeller is subject to severe wear and eventual failure and consequently the drive components are now further modified as herein described.

This modification consists of replacing the oil pump drive shaft and drive impeller to eliminate the Woodruff key drive which has proven to be the cause of excessive wear in the keyway of the hardened drive impeller. Therefore, it is recommended that all of the applicable engines installed in aircraft listed above, as well as any others that may have been modified in accordance with Service Instruction No. 1272, use the following procedure for parts replacement.

NOTE

The modifications shown in Service Instruction No. 1272 are no longer recommended and the instruction may be considered as inactive and non-applicable. Actually, engines that were never modified to incorporate the hardened sintered iron impellers as described in Service Instruction No. 1272, are not subject to the modification required by this bulletin.

INSPECTION: Applicable remanufactured engines shipped after December 21, 1972 should be inspected to determine if this modification is required: first of all, if the engine log book indicates the engine has not been modified in accordance with Service Instruction No. 1230 or No. 1272, proceed to remove the accessory drive cover from the mounting pad at the lower right side of the accessory housing to obtain access to the area between the crankcase and the accessory housing. On some engines this accessory drive pad is not machined, in this event it will be necessary to remove either the left magneto or the *fuel pump to obtain access to the area between the crankcase and the accessory housing. Regardless of which accessory pad is used, determine if the oil pump idler gear is secured with a cotter pin at the location shown in figure 1. This can be accomplished using an inspection mirror, preferably an illuminated one. If the cotter pin is visible, it is unnecessary to perform the modification required by this bulletin.

PROCEDURE:

Essentially this modification consists of replacing the oil pump drive shaft and drive impeller; since this necessitates removal of the accessory housing the procedure varies by engine model and airframe installation. On all but certain of the Hughes Tool Co. aircraft this can be accomplished by removing only the accessory housing; but on O-360-C2D, HO-360-B1A, -B1B and HIO-360-B1A it is also necessary to remove the oil sump because of the accessory housing attaching studs that attach the sump to the bottom of the accessory housing.

*1. Unless the entire sump is to be removed it is very important during removal of the accessory housing to not damage the gasket between the sump and the accessory housing: if it is damaged, the

partial gasket supplied with the kit may be installed as described in step 4.

2. After the accessory housing has been removed, disassemble the oil pump and carefully inspect both the housing and oil pump cover for damage.

3. Reassemble the oil pump using the new drive shaft and drive impeller supplied with the kits shown in the following "Parts Data" section. See figure 2. Be sure all of the parts are lubricated thoroughly during assembly. After assembly, turn the drive shaft several revolutions to determine if it moves freely; if not, open the pump and correct the cause before the unit is reassembled on the engine.

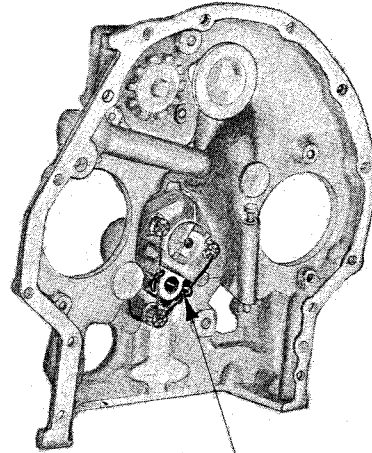
* - Before removing the fuel pump, be sure the cam on the hub of the idler gear is not in position to exert force on the arm of the fuel pump; if it is, damage to the mounting threads will occur when the fuel pump is removed.

4. Before returning the accessory housing to the engine it is necessary to replace the gasket on the mating flange between the sump and the accessory housing if it has been damaged. (If the sump has been removed the entire sump gasket is replaced.) To replace the rear portion of the sump gasket, lay the gasket on the sump flange and cut it diagonally with a sharp knife to obtain a line to line match between the ends of the old and new gaskets. Use POB gasket compound for sealant.

5. When reassembling the accessory housing align the idler gears in their exact position for engagement with the timing gear on the camshaft. See no. 60294-7 overhaul manual for assembly procedure.

6. After reassembly, time the magnetos to the engine and run the engine to check oil pressure and magneto drop-off; check for any noticeable variance from normal oil pressure and significant change from normal magneto drop-off.

7. Compliance with this modification should be noted in the aircraft records.



IF IDLER SHAFT IS SECURED WITH A COTTER PIN AT THIS LOCATION MODIFICATION IS NOT REQUIRED

Figure 1. Interior View of Accessory Housing Showing Location of Cotter Pin in Oil Pump Idler Shaft

Full credit allowance for parts and labor will be made in accordance with the following schedule for compliance with this bulletin. Claims must be filed with nearest Avco Lycoming distributor and be accompanied with engine serial numbers.

	4 cylinder helicopter engines	6 cylinder fixed wing aircraft
Engines with 0 to 400 hours service time	\$75.00	\$50.00
Engines with 400 to 800 hours service time	\$55.00	\$35.00
Engines with 800 to 1200 hours service time	\$35.00	\$20.00
Engines with 1200 or more hours service time	materials only	

PARTS DATA:

- LW-14129 Gasket Kit, Oil Pump Shaft Replacement (4 cylinder engines)
consists of: (1) 60096 fuel pump gasket, (3) 62224 magneto gasket, (1) 73818 accessory housing gasket, (2) LW-12681, -1200 series magneto gasket, (1) LW-13353 oil sump gasket.
- LW-14130 Gasket Kit, Oil Pump Shaft Replacement (6 cylinder engines)
consists of: (1) 60096 fuel pump gasket, (3) 62224 magneto gasket, (1) 73818 accessory housing gasket, (2) LW-12681, -1200 series magneto gasket, (1) LW-14128 oil sump repair gasket.
- LW-14131 Oil Pump Shaft Replacement Kit (4 cylinder engines)
consists of: (1) 61174 oil pump drive shaft, (1) LW-14038 or 60746 drive impeller.
- LW-14133 Oil Pump Shaft Replacement Kit (6 cylinder engines)
consists of: (1) 74641 oil pump drive shaft, (1) LW-14038 or 60746 drive impeller.

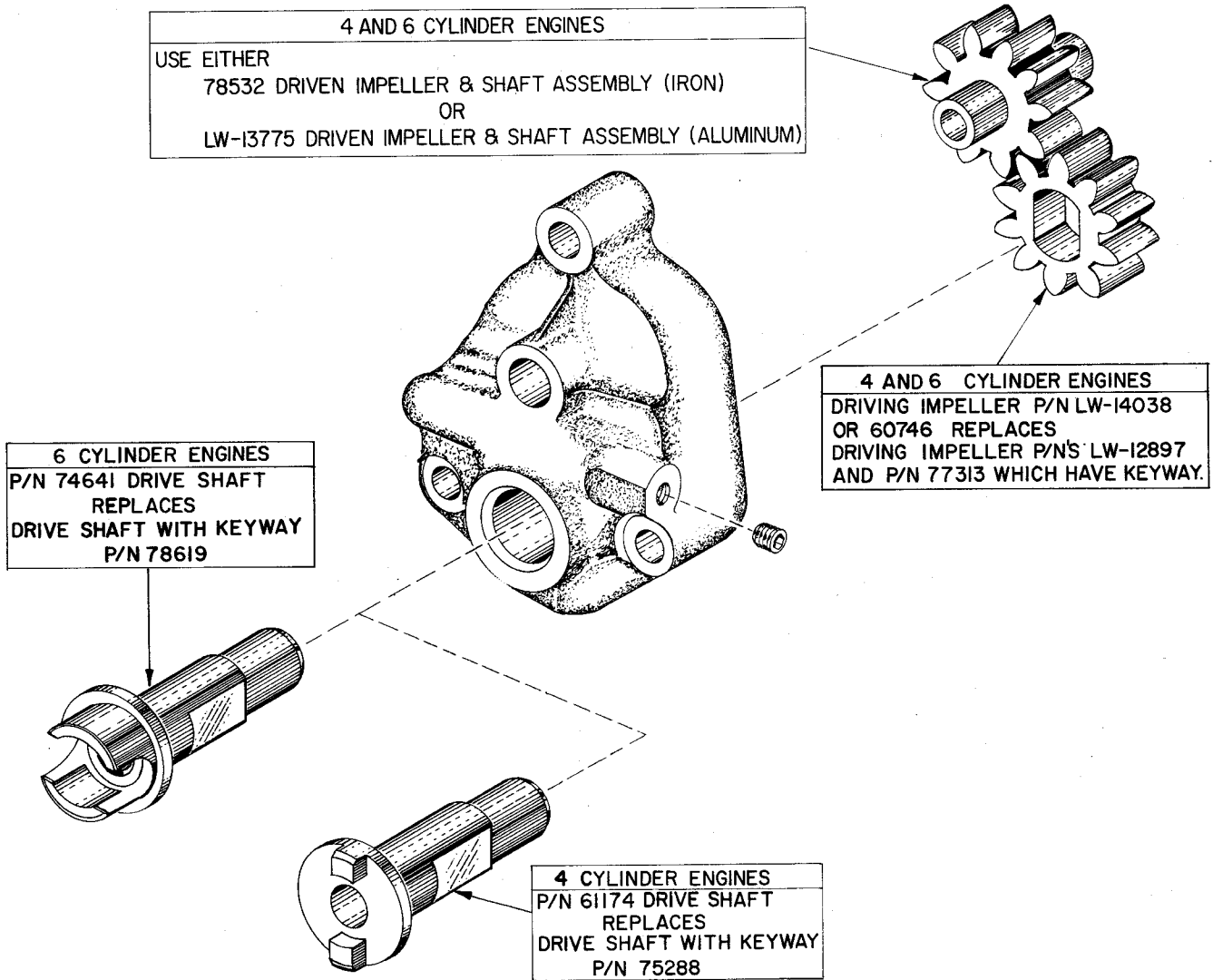


Figure 2. Oil Pump Drive Assembly

NOTE: Revision "C" adds part number 60746 drive impeller; removes credit allowance schedules applicable to May 1, 1975.

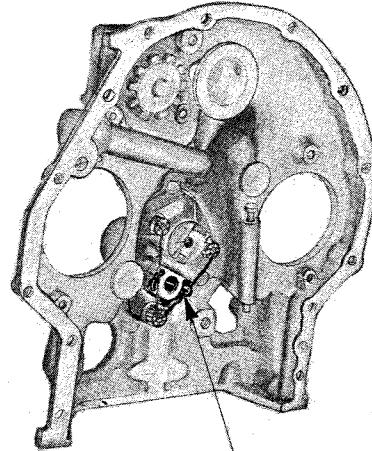
18546, L-2223, 19060 - These numbers for Avco Lycoming reference only.

4. Before returning the accessory housing to the engine it is necessary to replace the gasket on the mating flange between the sump and the accessory housing if it has been damaged. (If the sump has been removed the entire sump gasket is replaced.) To replace the rear portion of the sump gasket, lay the gasket on the sump flange and cut it diagonally with a sharp knife to obtain a line to line match between the ends of the old and new gaskets. Use POB gasket compound for sealant.

5. When reassembling the accessory housing align the idler gears in their exact position for engagement with the timing gear on the camshaft. See no. 60294-7 overhaul manual for assembly procedure.

6. After reassembly, time the magnetos to the engine and run the engine to check oil pressure and magneto drop-off; check for any noticeable variance from normal oil pressure and significant change from normal magneto drop-off.

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