LYCOMING
652 Oliver Street
Williamsport, PA. 17701 U.S.A.
Tel. 570-323-6181
Fax. 570-327-7101
www.lycoming.com

SERVICE INSTRUCTION

DATE: October 31, 2011

Service Instruction No. 1535
Engineering Aspects are
FAA (DER) Approved

SUBJECT: Counterweight and Roller Removal, Inspection, and Installation

MODELS AFFECTED: All Lycoming engines with counterweights installed

TIME OF COMPLIANCE: As required

NOTE

Incomplete review of all the information in this document can cause errors. Read the entire Service Instruction to make sure you have a complete understanding of the requirements.

This Service Instruction contains procedures and dimensions to remove, inspect, and install counterweights and rollers for Lycoming engine crankshafts.

Parts Handling

⚠ *CAUTION*

WHEN TOUCHING THESE PARTS, DO NOT MAKE SCORES, SCRATCHES, OR ETCH MARKINGS OF ANY KIND ON THE CRANKSHAFT, COUNTERWEIGHTS, AND ROLLERS. A MARK IN ANY OF THESE AREAS CAN CAUSE THE PART TO WEAKEN AND TO FAIL.

Counterweight and Roller Removal

To disassemble the counterweight:

1. Remove the circlips, counterweight washers, and matched rollers from the counterweight (Figure 1). Discard the circlips and counterweight washers, regardless of condition.
2. Remove the rollers and counterweight from the crankshaft.
3. Tag the rollers to prevent mixing of roller pairs.

NOTE

If the counterweight has been removed during engine overhaul, the counterweight bushing must be removed and replaced during engine overhaul (as per the latest revision of Service Bulletin No. 240).

4. Remove the counterweight bushings as per instructions in the latest revision of Service Instruction No. 1143.

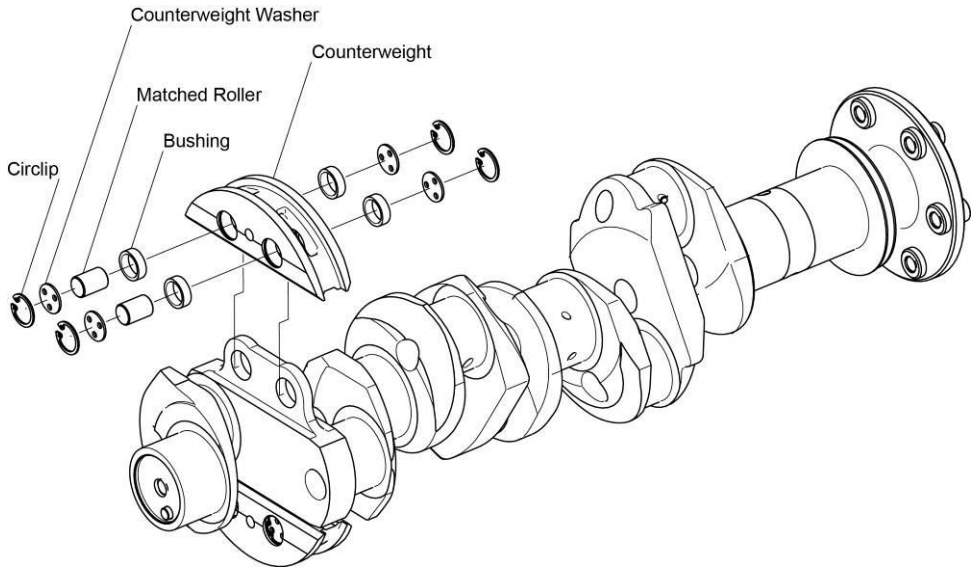


Figure 1
Counterweight, Washers, Circlips, Rollers, and Bushings

Counterweight Inspection

Examine each counterweight as per Table 1.

TABLE 1
COUNTERWEIGHT INSPECTION

Instruction	Findings	Corrective Action
Examine the surface of the counterweight for scoring, scratches, punch marks, or any other surface damage.	Surface damage or surface not smooth	Replace the counterweight*
Examine the bushing bore on the counterweight for roundness and for any scratches, etching, galling or any other surface damage.	Bushing bore on the counterweight is not round, not smooth, or has surface damage	Replace the counterweight*
If the counterweight bushings were removed, measure the bushing bore. (Refer to the latest revision of Service Instruction No. 1143.)	Bushing bore is out of tolerance	Replace the counterweight*
Complete non-destructive testing (magnetic particle inspection) as per guidelines in the latest revision of Service Instruction No. 1285 on the counterweight to identify cracks.	One or more cracks	Replace the counterweight*
* Refer to the latest revision of Service Instruction No. 1012 to identify the correct replacement counterweight.		

Roller Inspection

Examine each roller as per Table 2.

TABLE 2
ROLLER INSPECTION

Instruction	Findings	Corrective Action
Examine the surface of the roller for scoring, scratches, punch marks, or any other surface damage.	Surface damage or surface not smooth	Replace the roller*
Measure the roller dimensions as per Table 3.	Roller is out of tolerance	Replace the roller*
Complete non-destructive testing as per the instructions in the latest revision of Service Instruction No. 1285 on the roller to identify cracks.	One or more cracks	Replace the roller*
* Refer to the latest revision of Service Instruction No. 1012 to identify the correct replacement roller.		

Counterweight and Roller Installation

⚠ *CAUTION*

DURING INSTALLATION, DO NOT MAKE SCORES, SCRATCHES, OR ETCH MARKINGS OF ANY KIND ON THE CRANKSHAFT, COUNTERWEIGHTS AND ROLLERS. A MARK IN ANY OF THESE AREAS CAN CAUSE THE PART TO WEAKEN AND TO FAIL.

1. Examine the counterweights and rollers as per instructions in Tables 1 and 2.
2. If the counterweights and/or rollers must be replaced, identify the correct counterweight and roller sets and location on your engine as per the latest revision of Service Instruction No. 1012.

⚠ *CAUTION*

DO NOT INSTALL TWO DIFFERENT ROLLERS ON THE SAME COUNTERWEIGHT. ALL MUST BE MATCHED PAIRS OF IDENTICAL PARTS.

3. Measure the outside diameter of each roller to be installed to make sure it is in compliance with the dimensions in Table 3.

NOTE

During engine overhaul or if the counterweight bushings are damaged or non-compliant, replace the counterweight bushings with new bushings. Refer to the latest revision of Service Instruction No. 1143 for counterweight bushing replacement.

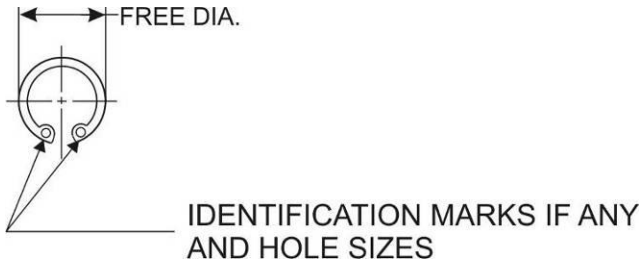
TABLE 3 ROLLER PART NUMBER AND OUTSIDE DIAMETERS		
P/N	Outside Diameter	
	in.	mm
69433	0.5045 to 0.5050	12.8143 to 12.8270
70416	0.6945 to 0.6950	17.6403 to 17.6530
72022	0.6650 to 0.6655	16.8910 to 16.9037
72797	0.6910 to 0.6915	17.5514 to 17.5641
72965	0.6597 to 0.6602	16.7564 to 16.7691
73287	0.5189 to 0.5194	13.1801 to 13.1928
73338	0.5255 to 0.5260	13.3477 to 13.3604
73648	0.6567 to 0.6572	16.6802 to 16.6929
73649	0.6093 to 0.6098	15.4762 to 15.4889
73814	0.5647 to 0.5652	14.3434 to 14.3561
75631	0.4736 to 0.4741	12.0294 to 12.0421
76042	0.6415 to 0.6420	16.2941 to 16.3068
76043	0.6790 to 0.6795	17.2466 to 17.2593
76788	0.6890 to 0.6895	17.5006 to 17.5133
77007*	0.5162 to 0.5167	13.1115 to 13.1242
77385	0.5840 to 0.5845	14.8336 to 14.8463
77386	0.5328 to 0.5333	13.5331 to 13.5458
LW-15558	0.6446 to 0.6451	16.3728 to 16.3855
14W21696	0.7161 to 0.7166	18.1889 to 18.2016
14W22647	0.6541 to 0.6546	16.6141 to 16.6268
* Used on no longer supported TIGO-541 engine model.		

4. If the counterweight bushings were removed (for inspection or overhaul), install new counterweight bushings as per instructions in the latest revision of Service Instruction No. 1143.
5. Install the applicable counterweight with the correct roller pair (identical rollers) on the correct crankshaft lobe and configuration as identified in the latest revision of Service Instruction No. 1012

NOTE

A *new* counterweight washer pair and a *new* circlip pair must be installed on the counterweight during counterweight installation.

6. Identify the correct circlip as per Figure 2.
7. Install new circlips and new counterweight washers in the two holes on the counterweight as shown in Figure 3. Install the new circlip on one side of each counterweight with the sharp edge outward as shown in Figure 3.



CIRCLIP IDENTIFICATION

FREE DIAMETER		HOLE SIZE		STAMPED MARK	CIRCLIP P/N
in.	mm	in.	mm		
1.031 to 1.056	26.19 to 26.82	0.076 to 0.093	1.93 to 2.36	N/A	LW-14820
1.299 to 1.344	33.00 to 34.14	0.076 to 0.090	1.93 to 2.29	N/A	77005

Figure 2
Circlip Identification

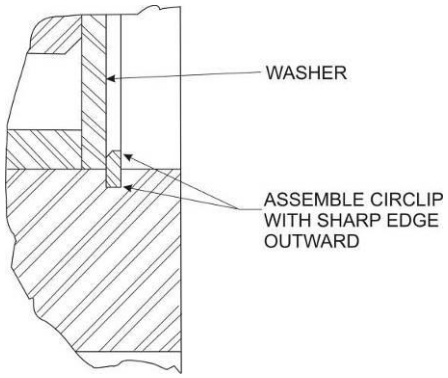


Figure 3
Assembly of Circlips in Counterweight

NOTE

The Lycoming gage set P/N 64892 is necessary to examine circlips installed on the counterweight. Table 4 identifies the gage set to use for the respective circlip part numbers. Revision "E" to P/N 64892 gage set eliminated gage P/N 64892-1 from the set. If you have gage P/N 64892-1, discard it. Gage P/N 64892-1 was used to check cast counterweights which are no longer used by Lycoming Engines. Therefore, this gage is no longer applicable.

The dimensional specifications in Table 4 are the current dimensions for gages P/N's 64892-2 and 64892-3 which are used to check the circlips P/N LW-14820 and P/N 77005 respectively. You also can locally manufacture new gages or make a purchase of a new gage set P/N 64892 through any Lycoming authorized distributor.

Figure 4 shows the location of the A and B dimensions given in Table 4. Dimension A is the diameter of the gage (See Table 4 and Figure 4). Dimension B is the width of the gage.

8. Make sure the circlip seating is correct as follows:
   a. Install one end of the counterweight circlip gap gage, P/N 64892-2 or -3 between the ends of the circlip (Figure 5).
   b. Make sure the gage is on the bottom of the groove.
   c. Pass the gage through the ends of the circlip.
   d. Move the gage back and forth.
      1) The gage must pass the ends of the circlip.
      2) When moved back and forth, the gage must be clear of the inside edge of the top of the circlip.
   e. If the gage does not move freely between the ends and under the top of the circlip, the circlip seating is not correct. Install the circlip again and do a check of the circlip seating again as per the previous steps. The circlip must be seated correctly.

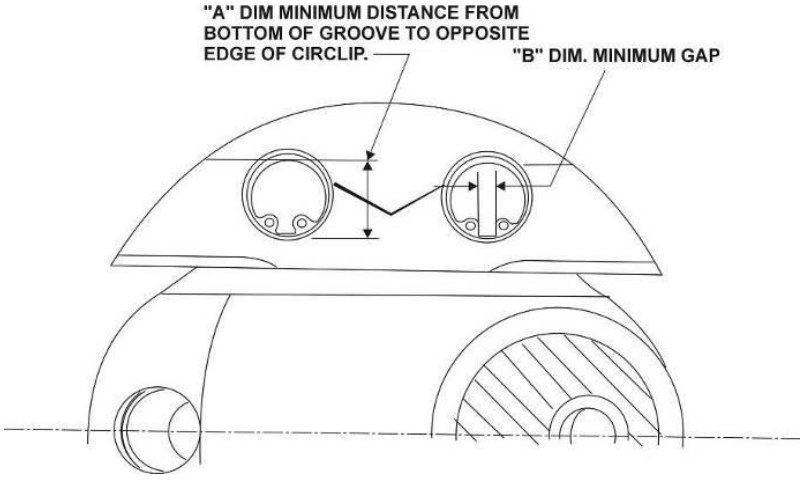


Figure 4
A and B Dimensions

TABLE 4
GAGE DIMENSIONS (FIGURE 4)

Circlip P/N	A Dimension		B Dimension		Gage	APPLICATION
	in.	mm	in.	mm		
LW-14820	0.892 (-0.000 +0.002)	22.700 (-0.000 +0.051)	0.198 (-0.000 +0.002)	5.03 (-0.000 +0.051)	64892-2	All counterweights
77005	1.132 (-0.000 +0.002)	28.8 (-0.000 + 0.051)	0.245 (-0.000 +0.002)	6.22 (-0.000 +0.051)	64892-3	Only for TIGO-541 engines

Circlip Check Gage P/N 64892

Circlip Installed

Insertion of Circlip Check Gage

Figure 5
Circlip Gage

ISSUED			REVISED			PAGE NO.	REVISION	
MO	DAY	YEAR	MO	DAY	YEAR	7 of 7	--	S.I. 1535
10	31	11	--	--	--			