



6-4.22. Alternator Inspection

Frequency

During 500-hour inspection

Procedure

1. Remove engine cowling and aircraft components necessary to gain access to the alternator.
2. Remove the alternator according to instructions in Section 10-4.1.1 or Section 10-4.1.1.1. Perform the “Alternator Drive Hub Inspection” in Section 6-4.22.1 or Section 6-4.22.2 on all gear driven alternators. For belt driven alternator removal, refer to the engine primary ICA (**Ref: Section 1-1.1**).
3. Inspect Continental Motors alternators according to the Alternator Service Manual (“Related Publications” in Section 1-2.5); correct any discrepancies discovered during the inspection. For engines equipped with Hartzell (Kelly) ES10024 consult Hartzell Service Information Letter A-135 for one time inspection requirements. For engines equipped with Hartzell (Kelly) ES-6012 or ES7024 belt driven alternators, consult Hartzell Service Information Letters A-137 and A-138 for one time inspection requirements. For additional instructions regarding Hartzell alternator instructions for continued airworthiness, consult Section 10-4.3. Remove and replace all other alternators with a new, rebuilt or serviceable alternators.
4. Install the serviceable alternator according to “Gear Driven Alternator Replacement, Forward Mount” in Section 10-4.1 or “Gear Driven Alternator Replacement, Aft Mount” in Section 10-4.2 after successfully completing the alternator manufacturer's service and inspection requirements. For belt driven alternator installation, refer to the engine primary ICA (**Ref: Section 1-1.1**).
5. Perform the instructions in the normal “Engine Start” (Section 7-3.2) and “Ground Run-up” (Section 7-3.3) to verify alternator operation.
6. Install airframe components and cowling according to the aircraft manufacturer's instructions.

6-4.22.1. Alternator Drive Hub Inspection **FWD**

Applicable Engines:

GTSIO-520-C, D, F, H, K, L, M, N, IO-520-B, BA, BB, C, CB, M, MB, NB, TSIO-520-B, BB, BE, D, DB, E, EB, J, JB, K, KB, L, LB, N, NB, UB, VB, WB, IO-550-A, B, C, G, N, P, R, IOF-550-B, C, N, P, R, TSIO-550- B, C,E, G, K, N, TSIOF-550-D, J, K, P, TSIOL-550, A, B, C

NOTE: This procedure only applies to the direct drive alternator. The alternator drive hub is designed to slip when abnormal torque is required to rotate the alternator shaft.

Procedure

1. Remove the top spark plugs according to instructions in Section 6-4.9.2.
2. Remove the alternator according to the instructions in Section 10-4.2.1.



torque or less. Replace the drive hub if slippage occurs under 100 inch pounds of torque.

- 4) Install the serviceable drive hub on the alternator according to instructions in Section 10-4.2.3.

b. Inspect the multi-part drive coupling:

- 1) Secure the alternator coupling gear (Figure 6-99) (5) in the jaws of a padded vice, leaving the gear section free.

NOTE: At 500 Hours, replace the retainer and bushings regardless of condition, on the multi-piece couplings.

- 2) Remove the sleeve (6), bushings (8), and retainer (7). Do not remove the drive hub (1) unless damage is suspect. Discard the bushings (8) and retainer (7).
- 3) Inspect the nut (3), gear (5) and sleeve (6) for wear and replace if necessary.
- 4) Install a new retainer (7) and two new bushings (8) in the hub (1) on the alternator shaft. Install the sleeve (6) and gear (5) on the shaft and secure with the nut (3).
- 5) Install the drive hub assembly according to instructions in Section 10-4.2.3.

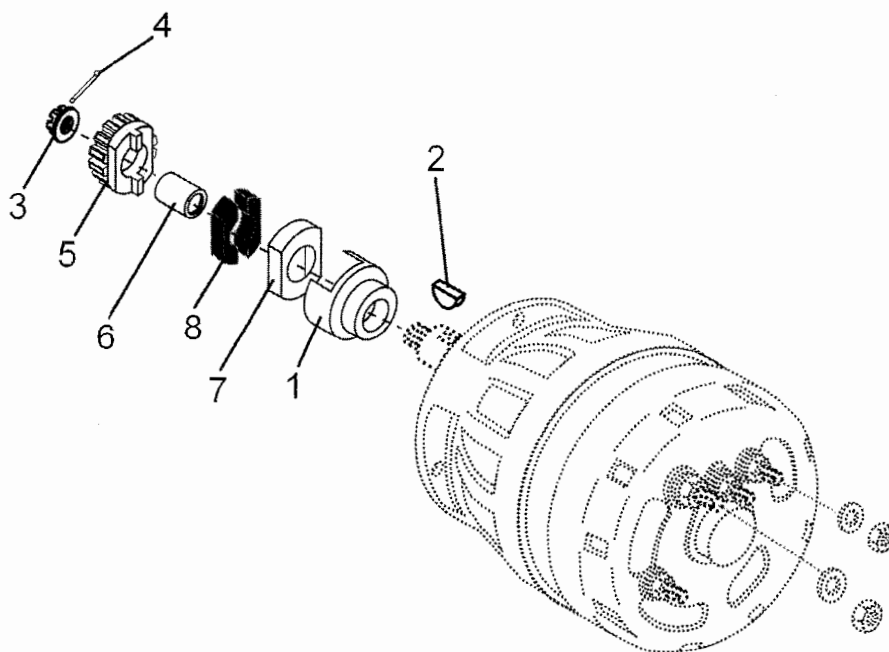


Figure 6-99. Alternator and Coupling Assembly

1	Drive Hub	3	Castellated Nut	5	Gear	7	Retainer
2	Woodruff Key	4	Cotter Pin	6	Sleeve	8	Bushings

6. Install the alternator according to instructions in Section 10-4.2.4.
7. Install the top spark plugs according to instructions in Section 6-4.9.2.



10-4. Alternator Replacement

Replace the alternator when it fails to deliver the correct voltage and amperage to the aircraft electrical system. If electrical malfunctions are isolated to the alternator, physical inspection of the alternator must be accomplished before replacement. The engine may be equipped with a direct drive alternator, a belt-driven alternator, or both. For Continental Motors alternators, refer to Table 1-2 for the appropriate instructions to service or overhaul the alternator. Consult Section 10-4.3 for applicable continued airworthiness instructions or replace the alternator with a new, rebuilt, or serviceable alternator during the 500 hour inspection.

On all GTSIO-520 and All 520 and 550 series engines with a Permold crankcase, a gear driven alternator pad, forward of the No. 5 cylinder is driven off the crankshaft face gear. In this manual, these alternators are designated as **FWD**. See Section 10-4.1 for removal and installation instructions. C-75, C-85, C-90, C-115, C-125, C-145, E-165, E-185, E-225, O-200, GO-300, GIO-300, O-300, IO-240, IOF-240, and all 360 series engines feature an alternator mounting pad on the accessory case, driven off the camshaft gear. These alternators are designated as **AFT** in this manual; see Section 10-4.2 for removal and installation instructions.

10-4.1. Gear Driven Alternator Replacement, Forward Mount **FWD**

10-4.1.1. Gear Driven Alternator Removal **FWD**

Applicable Engines:

IO-520-B, BA, BB, C, CB, M, MB, NB, TSIO-520-B, BB, BE, D, DB, E, EB, J, JB, K, KB, L, LB, N, NB, UB, VB, WB, IO-550-A, B, C, G, N, P, R, IOF-550-N, P, R, TSIO-550-B, C, E, G, K, N, TSIOF-550-D, J, K, P, TSIOL-550, A, B, C

WARNING

Turn the Ignition Switch OFF and disconnect engine electrical power before commencing maintenance or inspections. Confirm continuity between the magneto capacitor and aircraft ground to prevent accidental engine start during maintenance. Do not stand or place equipment within the arc of the propeller.

1. Turn the Ignition Switch to the OFF position and disconnect engine electrical power.
2. Disconnect the aircraft battery according to the aircraft manufacturer's instructions.
3. Disconnect electrical connections from the alternator according to the aircraft manufacturer's instructions.
4. Remove the nut (Figure 10-4) (10), washer (8), lock washer (9), and from the four alternator mounting studs; discard the lock washers (9).
5. Remove the alternator (2) from the crankcase mounting studs.

CAUTION: Exercise care when cleaning the residue from the mounting flange; mask the crankcase opening to avoid contaminating the engine oil supply.



Non-Overhaul Repair and Replacement

6. Remove and discard the gasket (1); clean any remaining gasket residue from the crankcase flange with lacquer thinner.
7. Place the alternator in a horizontal position, rotate the shaft in both direction. If the shaft does not turn freely, rotor friction or bearing stress is indicated, or noticeable shaft displacement is detected during rotation, replace the alternator.
8. Perform a "Gear Tooth Inspection" on the alternator drive hub gear according to the instruction in Section 11-1.1. If the drive hub gear teeth are chipped, broken, or otherwise damaged, replace the drive hub according to instructions in Section 10-4.1.2 and perform a "Foreign Object Contamination Inspection" according to instructions in Section 6-5.7.
9. Inspect the drive hub coupling for serviceability. If the coupling exhibits damage or missing material, replace the drive hub and perform a "Foreign Object Contamination Inspection" according to instructions in Section 6-5.7.
10. Perform a "Gear Tooth Inspection" on the alternator drive hub gear according to the instruction in Section 11-1.1. If the face gear teeth are chipped, broken, or damaged, disassemble the engine and replace the crankshaft face gear.
11. Perform an "Alternator Drive Hub Inspection" according to instructions in Section 6-4.22.1.

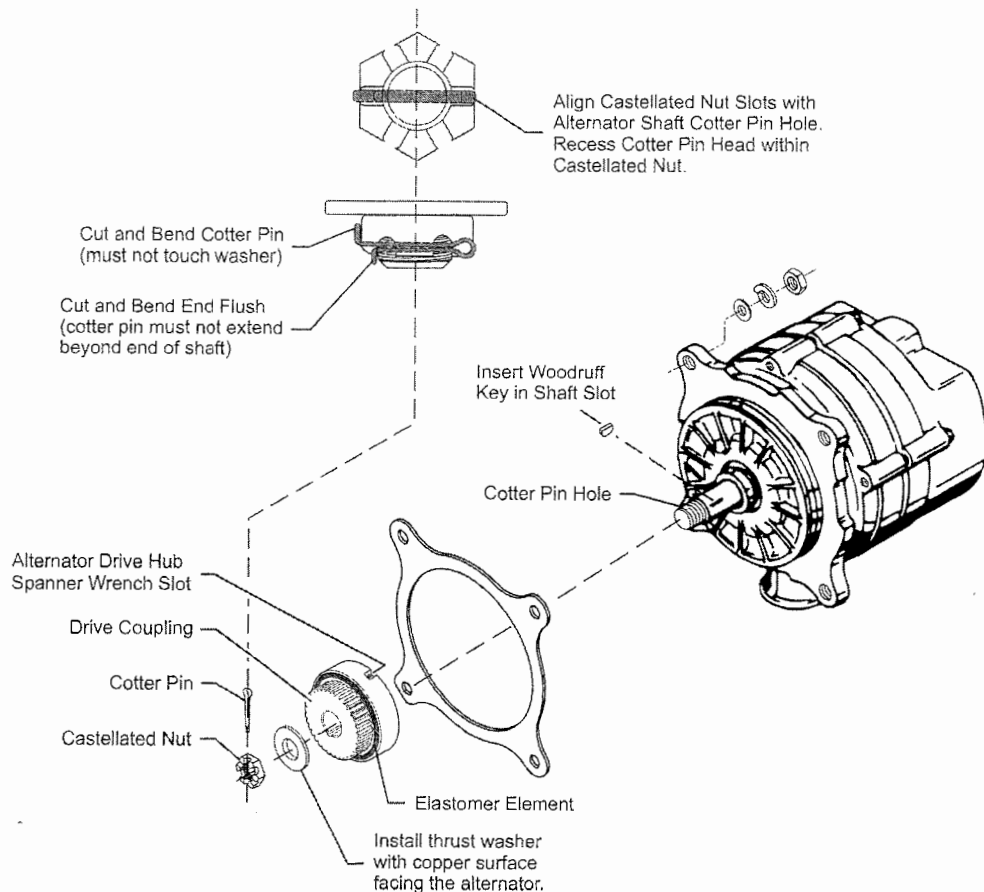


Figure 10-4. Alternator and Drive Hub



10-4.1.2. Alternator Drive Hub Removal **FWD**

Applicable Engines:

IO-520-B, BA, BB, C, CB, M, MB, NB, TSIO-520-B, BB, BE, D, DB, E, EB, J, JB, K, KB, L, LB, N, NB, UB, VB, WB, IO-550-A, B, C, G, N, P, R, IOF-550-N, P, R, TSIO-550-B, C, E, G, K, N, TSIOF-550-D, J, K, P, TSIOL-550, A, B, C

1. Remove the alternator from the crankcase according to the instructions in Section 10-4.1.1.

CAUTION: Remove and discard the spring coupling (Part No. 6409333 or 640934) if installed on the alternator. The elastomer coupling superseded the spring couplings.

2. Remove and discard the cotter pin (Figure 10-4) (7) and remove the castellated nut (4).
3. Pull the drive hub assembly (5) from the alternator shaft.
4. Remove and discard the Woodruff key (3).
5. Separate the thrust washer (6) and drive hub assembly (5).
6. Inspect, disassemble, troubleshoot, repair, and assemble Continental Motors alternators according to the Alternator Service Instruction (X30531). If the alternator is manufactured for CM by Hartzell Engine Technologies, consult Section 10-4.3 for applicable airworthiness instructions. For all other alternators, replace the alternator with a new, rebuilt, or serviceable unit.

10-4.1.3. Alternator Drive Hub Installation **FWD**

Applicable Engines:

IO-520-B, BA, BB, C, CB, M, MB, NB, TSIO-520-B, BB, BE, D, DB, E, EB, J, JB, K, KB, L, LB, N, NB, UB, VB, WB, IO-550-A, B, C, G, N, P, R, IOF-550-N, P, R, TSIO-550-B, C, E, G, K, N, TSIOF-550-D, J, K, P, TSIOL-550, A, B, C

WARNING

If the shipping washer is not removed prior to installing the drive hub assembly, the shipping washer will interfere with the crankshaft face gear and damage the engine and alternator.

1. Remove the shipping spacer and washer from the alternator shaft and discard to prevent interference with the crankshaft face gear.
2. Inspect the drive hub for slippage according to the instructions in Section 10-4.1.4.

NOTE: A new Woodruff key is included with new alternators; Woodruff key replacement is not required for new alternators.

3. Install a new Woodruff key (Figure 10-4) (3).

WARNING

The special thrust washer (6) must be installed with the bearing surface (copper color) toward the alternator.



Non-Overhaul Repair and Replacement

4. Install the drive hub assembly (5), and new thrust washer (6) on the alternator shaft.
5. Install the castellated nut (4) on the shaft. Secure the drive hub with an Alternator Drive Hub Spanner Wrench (see Section 2-1, "Special Tools".) and torque the castellated nut (4) to the minimum value specified in Appendix B.
6. If the slots of the nut do not align with the cotter pin hole in the alternator shaft, the castellated nut may be torqued up to the maximum value in Appendix B. If the cotter pin holes will not align with the nut slot within the torque range, replace the nut.
7. Install the new cotter pin (7) according to the "Cotter Pin Installation" instructions in Section C-7, cut and bend the cotter pin according to the illustration in Figure 10-4 to prevent it from touching the thrust washer and to attain clearance when installing the alternator on the engine.
8. Install the alternator according to "Gear Driven Alternator Installation" instructions in Section 10-4.1.5.

10-4.1.4. Alternator Drive Hub Slippage Inspection **FWD**

NOTE: There is no need to remove the drive hub from the alternator. The spanner wrench is designed to secure the drive hub without removing it from the shaft.

1. Secure the alternator in a shielded vise only tight enough to prevent movement.

CAUTION: Secure only the outer diameter of the drive hub assembly; allow the gear freedom of movement to prevent shearing the elastomer coupling.

2. Secure the alternator drive hub with an "Alternator Drive Hub Spanner Wrench (Table 2-1); adjust the bolts using finger pressure only - do not torque the bolts.

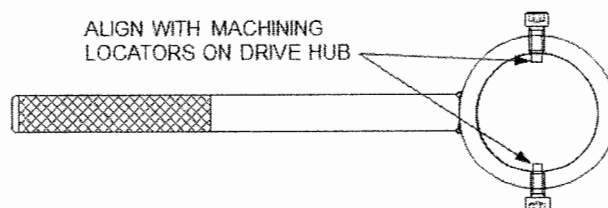


Figure 10-5. Alternator Drive Hub Spanner Wrench

3. Measure the drive hub assembly slippage using an "Alternator Drive Hub Torque Tool" (Figure 2-5) and a currently calibrated torque wrench set to value for the drive hub condition specified in Table 10-4. Turn the hub through a 45° arc at a rate of 1° to 2° per second. No slippage is permitted below the value specified in Table 10-4.
4. If the coupling slips with less torque applied than the value specified in Table 10-4, or the coupling exhibits physical damage, discard and replace the alternator elastomer drive coupling and repeat the slippage check on the new drive coupling.

Table 10-4. Alternator Drive Hub Slippage

Coupling Assembly Condition	Slippage Prohibited Below:
New coupling or coupling with less than 25 hours in service	180 in-lbs.
Coupling with more than 25 hours in service	140 in-lbs.



10-4.1.5. Gear Driven Alternator Installation **FWD**

Applicable Engines:

IO-520-B, BA, BB, C, CB, M, MB, NB, TSIO-520-B, BB, BE, D, DB, E, EB, J, JB, K, KB, L, LB, N, NB, UB, VB, WB, IO-550-A, B, C, G, N, P, R, IOF-550-B, C, N, P, R, TSIO-550- B, C, E, G, K, N, TSIOF-550-D, J, K, P, TSIOL-550, A, B, C

Prior to alternator installation, perform an “Alternator Drive Hub Slippage Inspection” in Section 10-4.1.4 and install a serviceable drive hub according to instructions in Section 10-4.1.3.

WARNING

Turn the Ignition Switch OFF and disconnect engine electrical power before commencing maintenance or inspections. Confirm continuity between the magneto capacitor and aircraft ground to prevent accidental engine start during maintenance. Do not stand or place equipment within the arc of the propeller.

CAUTION: If the removed alternator exhibited gear tooth or elastomer coupling damage, the engine must be inspected for foreign object contamination prior to installing a new alternator.

1. Turn the Ignition Switch to the OFF position and disconnect engine electrical power.
2. Perform a “Gear Tooth Inspection” on the alternator face gear according to the instruction in Section 11-1.1. If the face gear teeth are chipped, broken, or damaged, disassemble the engine and replace the crankshaft face gear.
3. Install a new gasket on the alternator mounting studs.
4. Install the alternator on the mounting studs using four *new* lock washers, four plain washers and four nuts. Torque the nuts to 150-180 in. lbs. in an alternating cross pattern.
5. If the alternator had a grounding strap when it was removed, install the grounding strap when installing the alternator.
6. Reconnect electrical connections at the alternator according to the aircraft manufacturer’s instructions.
7. Consult the aircraft maintenance manual for instructions to reconnect ram air ducts, if equipped, for alternator cooling air.
8. Reconnect the aircraft battery according to the aircraft manufacturer’s instructions.
9. Start the engine (“Engine Start” instructions in Section 7-3.2) and test the alternator output according to the instructions in the Aircraft Maintenance Manual.



10-4.2. Gear Driven Alternator Replacement, Aft Mount **AFT**

Applicable Engines:

C-75, C-85, C-90, C-115, C-125, C-145, E-165, E-185, E-225, GO-300, GIO-300, O-300, IO-240, IOF-240, and all IO-360, LTSIO-360, TSIO-360

10-4.2.1. Gear Driven Alternator Removal **AFT**

WARNING

Turn the Ignition Switch OFF and disconnect engine electrical power before commencing maintenance or inspections. Confirm continuity between the magneto capacitor and aircraft ground to prevent accidental engine start during maintenance. Do not stand or place equipment within the arc of the propeller.

1. Turn the Ignition Switch to the OFF position and disconnect engine electrical power.
2. Disconnect the aircraft battery according to the aircraft manufacturer's instructions.
3. Disconnect electrical connections from the alternator according to the aircraft manufacturer's instructions.

NOTE: The alternator gasket on 360 series engines is NOT integrated with the tachometer drive adapter gasket.

4. For 360 series engines, proceed to the next step. On C-Series, O-200, IO-240, IOF-240 series engines *only*, remove the tachometer drive adapter, or tachometer drive adapter pad cover, depending on, configuration, according to instructions in the primary ICA (Ref: Section 1-1.1).
5. Remove three lock nuts (Figure 10-6) (8) and washers (7) from the three alternator mounting studs. Discard the lock nuts (8).
6. Remove the alternator (1) from the accessory case mounting studs.

CAUTION: Exercise care when cleaning the residue from the mounting flange. Mask the accessory case opening to avoid contaminating the engine oil supply.

7. Remove the gasket (6) and clean any remaining gasket residue from the accessory case with lacquer thinner.
8. Rotate the crankshaft through two revolutions to perform a "Gear Tooth Inspection" on the camshaft gear according to instruction in Section 11-1.1. If the camshaft gear teeth are damaged, disassemble the engine and replace the camshaft gear.
9. Inspect the drive hub coupling for serviceability. If the coupling exhibits damage or missing material, replace the drive hub and perform a "Foreign Object Contamination Inspection" according to instructions in Section 6-5.7.
10. Place the alternator in a horizontal position, rotate the shaft in both direction. If the shaft does not turn freely, rotor friction or bearing stress is indicated, or noticeable shaft displacement is detected during rotation, replace the alternator.

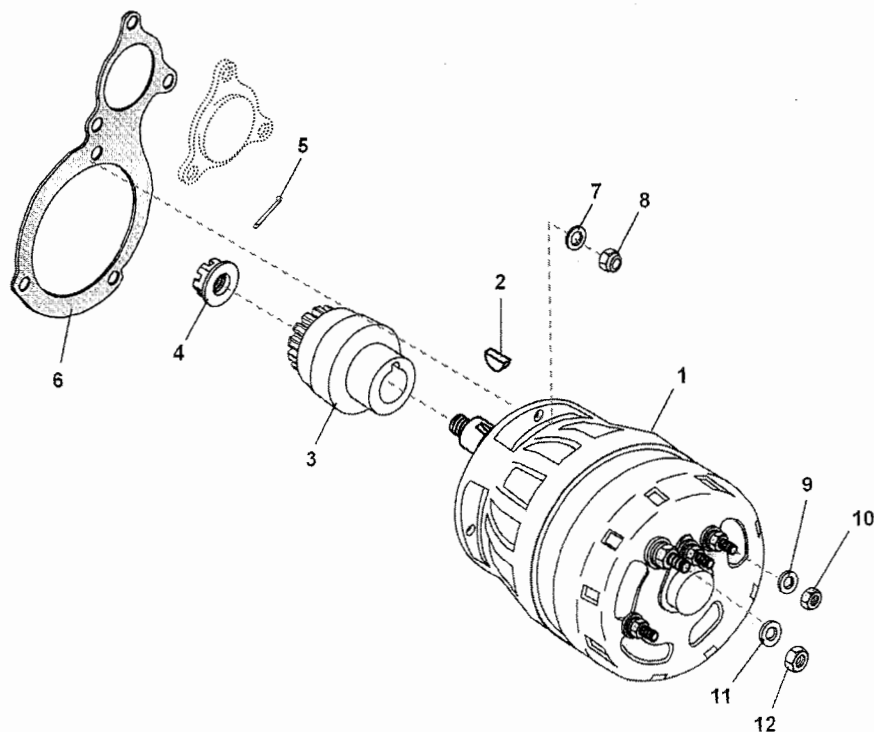


Figure 10-6. Alternator and Drive Hub

Typical for C-75, C-85, C-90, C-115, C-125, C-145, GO-300, GIO-300, O-300, IO-240, IOF-240

- | | | | | | | | |
|---|--------------------------|---|-----------------|---|----------|----|--------------|
| 1 | Alternator | 4 | Castellated Nut | 7 | Washer | 10 | Terminal Nut |
| 2 | Woodruff Key | 5 | Cotter Pin | 8 | Lock Nut | 11 | Washer |
| 3 | Drive Hub (single piece) | 6 | Gasket | 9 | Washer | 12 | Terminal Nut |

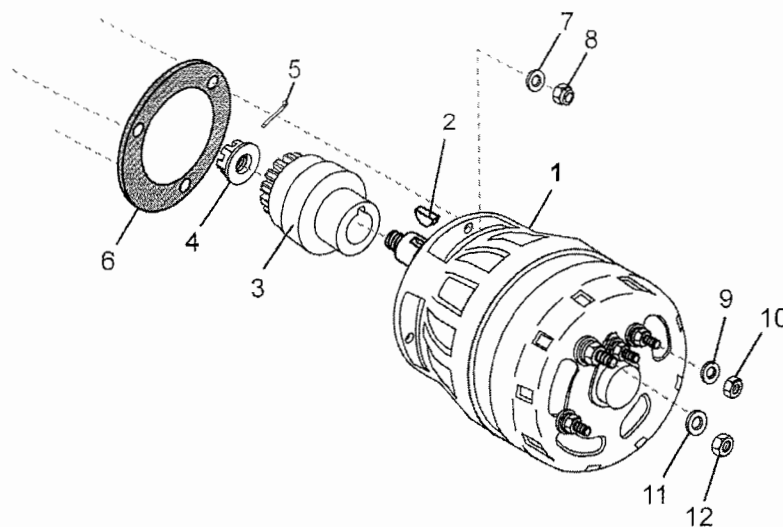


Figure 10-7. Alternator and Drive Hub

Typical for E-Series, 360 Series engines



10-4.2.2. Alternator Drive Hub Removal **AFT**

Applicable Engines:

C-75, C-85, C-90, C-115, C-125, C-145, E-165, E-185, E-225, GO-300, GIO-300, O-300, IO-240, IOF-240, and all IO-360, LTSIO-360, TSIO-360

1. Remove the alternator according to the instructions in Section 10-4.2.1.
2. Remove the cotter pin (Figure 10-8 or Figure 10-9) (4) and castellated nut (3); discard the cotter pin (4).
3. Remove the drive hub assembly (1) from the alternator shaft; inspect the Woodruff key (2), discard the Woodruff key if damaged or unserviceable.

10-4.2.3. Alternator Drive Hub Installation **AFT**

The alternator drive hub may be a one piece coupling, or an assembly of multiple parts.

Applicable Engines:

C-75, C-85, C-90, C-115, C-125, C-145, E-165, E-185, E-225, GO-300, GIO-300, O-300, IO-240, IOF-240, and all IO-360, LTSIO-360, TSIO-360

1. The Woodruff key (Figure 10-8 or Figure 10-9) (2) is factory installed on the shaft; replacement is not required unless the Woodruff key is damaged. Verify the Woodruff key is present and serviceable.
2. For the one piece coupling *only*: Perform an "Alternator Drive Hub Inspection" according to the instructions in Section 6-4.22.2.
3. Align the slot in the alternator drive hub (1) with the Woodruff key and install the hub on the shaft. For single piece drive hub proceed to step 5. For the multi-piece drive hub assembly, continue with the next step.
4. For multi-piece drive hub assembly *only*:
 - a. Inspect the retainer (7) for physical damage; replace as required. Install the retainer (7) on the shaft with the bushing tray facing away from the alternator.
 - b. Install the sleeve (6) on the alternator shaft.
 - c. Inspect the bushings (8) for physical damage, cracks, chips, or erosion. Replace on condition. Install serviceable, or new, bushings (8) in the tray of the retainer.
 - d. Install the gear (5) on the shaft and align the drive lugs with the recess between the bushings.
5. Install the castellated nut (3) on the threaded end of the alternator shaft to secure the assembly.
6. Place the toothed portion of the drive hub gear in shielded vise jaws and tighten vise just enough to prevent rotation during the torquing of the nut (3).
7. Using a currently calibrated torque wrench, torque the castellated nut (3) to the minimum torque according to Appendix B specifications. If the slots in the nut do not align with hole in the shaft, gradually increase torque to a maximum of 200 in. lbs. to align the castellated nut (3) with the cotter pin hole. If alignment cannot be achieved within the torque limits, replace the castellated nut (3).



8. Install a new cotter pin (4) through the nut and alternator shaft according to the instructions in Appendix C-7. Cut and bend the cotter pin according to the instructions in Figure 10-4 to avoid interference with mating surfaces when installing the alternator on the engine.

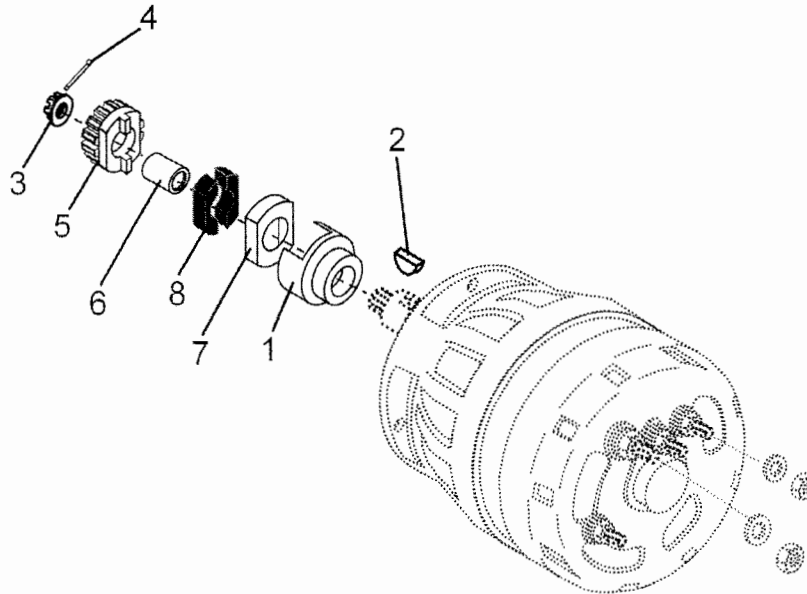


Figure 10-8. Multi-Part Alternator Drive Hub

- | | | | | | | | |
|---|--------------|---|-----------------|---|--------|---|----------|
| 1 | Drive Hub | 3 | Castellated Nut | 5 | Gear | 7 | Retainer |
| 2 | Woodruff Key | 4 | Cotter Pin | 6 | Sleeve | 8 | Bushings |

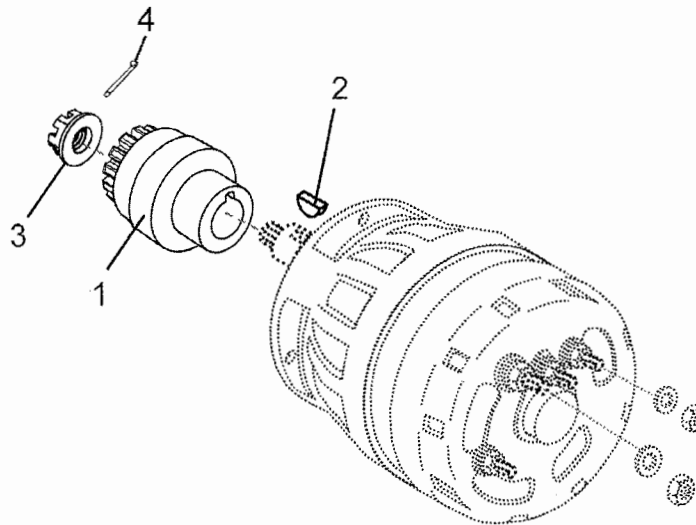


Figure 10-9. One Piece Alternator Drive Hub



10-4.2.4. Gear Driven Alternator Installation **AFT**

Applicable Engines:

C-75, C-85, C-90, C-115, C-125, C-145, E-165, E-185, E-225, GO-300, GIO-300, O-300, IO-240, IOF-240, and all IO-360, LTSIO-360, TSIO-360

WARNING

Turn the Ignition Switch OFF and disconnect engine electrical power before commencing maintenance or inspections. Confirm continuity between the magneto capacitor and aircraft ground to prevent accidental engine start during maintenance. Do not stand or place equipment within the arc of the propeller.

1. Turn the Ignition Switch to the OFF position and disconnect engine electrical power.
2. Perform a "Gear Tooth Inspection" on the camshaft gear according to the instruction in Section 11-1.1. If the camshaft gear teeth are chipped, broken, or damaged, disassemble the engine and replace the camshaft gear.
3. If the drive hub assembly was removed, install the drive hub assembly according to instructions in Section 10-4.2.3.
4. Install the new gasket (Figure 10-6 or Figure 10-7) (6) on the accessory case studs.
5. Install the alternator (1) on accessory case studs.

WARNING

Forceful alternator installation can cause mount lug fracture. If interference exists, inspect the mounting studs for bending; replace bent studs.

6. Verify the alternator enters the crankcase without binding and the mounting flange is properly seated against the crankcase. Do not force the alternator into position. If there is stud interference with the mounting lug holes while mounting the alternator, do not force the alternator over the studs.
7. Verify the alternator pilot enters the accessory case pilot bore squarely. Do not force the alternator pilot to fit into the pilot bore.
8. Secure the alternator with washers (7) and new lock nuts (8); torque the lock nuts according to Appendix B specifications.
9. For C-Series, O-200, IO-240 and IOF-240 engines only, install the tachometer drive adapter or tachometer drive adapter pad cover according to instructions in the primary ICA (**Ref: Section 1-1.1**).
10. Connect the alternator wiring according to the aircraft manufacturer's instructions. If the alternator had a grounding strap when it was removed, install the grounding strap when installing the alternator.
11. Start the engine ("Engine Start" instructions in Section 7-3.2) and test the alternator output according to the instructions in the Aircraft Maintenance Manual.