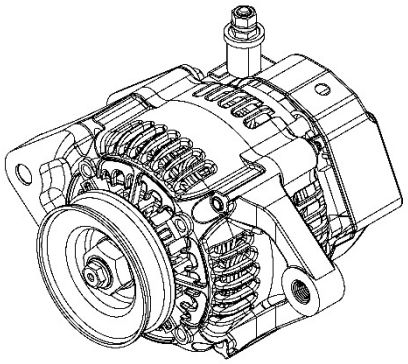
Technical Manual

for

Model No. LX60
Alternator

for Lycoming Engines



Including:

Installation Instructions;
Troubleshooting Guide; and
Instructions for Continued Airworthiness

B & C Specialty Products
P.O. Box B
Newton, KS 67114
(316) 283-8000

BandC.com

LX60-TM (5/1/2020)

NOTE

The LX60 Alternator is not STC'd or PMA'd
and is intended for installation on amateur-built aircraft only.

INTRODUCTION

This kit is applicable to Lycoming-powered aircraft requiring a lightweight, high-performance belt-drive Alternator.

INSTALLATION OVERVIEW

(1) Disconnect aircraft battery.
(2) Remove engine cowling.
(3) Remove spinner, propeller, and nose cowl.
(4) Remove existing alternator/generator, mounting bracket, tension arm, and belt (if applicable).
(5) For Wide Deck installations with alternator mounting bosses on the right-hand engine case and single-groove flywheel pulleys, refer to page B-1 and install the LX60 Alternator.
(6) For Narrow Deck installations without alternator mounting bosses on the right-hand engine case, refer to page B-3 and install the LX60 Alternator.
(7) For Wide Deck installations with alternator mounting bosses on the right-hand engine case and single-groove flywheel pulleys, refer to page B-6 and install the LX60 Alternator.
(8) Re-install spinner, propeller, and nose cowl.
(9) Connect the LX60 to the alternator controller (regulator) and output circuit breaker or current limiter.
(10) Reconnect the aircraft battery and perform preliminary functional test on page C-1.
(11) Check all fasteners for security and safety. Check that all wiring is clear of flight controls throughout the entire range of control movement.
(12) Re-install engine cowling. Perform final test on page C-1.
(13) Update ship's weight and balance, pilot operating handbook and maintenance records.

PARTS LIST

The following parts are supplied with the LX60 when ordered with the FK5402-1 Installation Kit for Wide Deck (Boss Mount) engines:

Qty.	Part No.	Description
1	LX60	Alternator
1	403-315-2	Boss Mount Bracket
2	MS-20074-05-06	Bolt
1	73383	Locking Plate
1	AN6-40A	Pivot Bolt
2	AN960-616L	Washer
1	MS21045-6	Nut, Locking

1	AN6H10A	Bolt, Drilled Head
1	5710-628-90	Spacer, Fore
1	460-322-2	Tension Arm
1	460-319-1	Spacer, Aft
1	MS-20074-05-05	Bolt
1	AN960-516L	Washer
1	460-225-9	Assembly, Field Connector
1	7360	Belt

The following parts are supplied with the LX60 when ordered with the FK5402-2 Installation Kit for Narrow Deck (Case Mount) engines using the B&C Starter:

Qty.	**Part No.**	**Description**
1	LX60	Alternator
1	403-200-1	Case Mount Bracket
1	AN6-40A	Pivot Bolt
2	AN960-616L	Washer
1	MS21045-6	Nut, Locking
1	AN6H10A	Bolt, Drilled Head
1	5710-628-90	Spacer, Fore
1	460-322-2	Tension Arm
1	460-319-1	Spacer, Aft
2	MS-20074-05-05	Bolt
2	AN960-516L	Washer
1	460-225-9	Assembly, Field Connector
1	7312	Belt

The following parts are supplied with the LX60 when ordered with the FK5402-3 Installation Kit for Narrow Deck (Case Mount) engines using a non-B&C Starter:

Qty.	**Part No.**	**Description**
1	LX60	Alternator
1	403-201-1	Case Mount Bracket
1	AN6-40A	Pivot Bolt
2	AN960-616L	Washer
1	MS21045-6	Nut, Locking
1	AN6H10A	Bolt, Drilled Head
1	5710-628-90	Spacer, Fore
1	460-322-2	Tension Arm
1	460-319-1	Spacer, Aft
2	MS-20074-05-05	Bolt
2	AN960-516L	Washer
1	460-225-9	Assembly, Field Connector
1	7312	Belt

The following parts are supplied with the LX60 when ordered with the FK5402-4 Installation Kit for Wide Deck (Boss Mount) engines with a Dual-Groove flywheel pulley:

Qty.	Part No.	Description
1	LX60	Alternator
1	403-301-4	Boss Mount Bracket, Dual-Groove Pulley
2	MS-20074-05-06	Bolt
1	73383	Locking Plate
1	AN6-40A	Pivot Bolt
2	AN960-616L	Washer
1	MS21045-6	Nut, Locking
1	AN6H10A	Bolt, Drilled Head
1	5710-628-90	Spacer, Fore
1	460-322-2	Tension Arm
1	460-319-1	Spacer, Aft
1	MS-20074-05-05	Bolt
1	AN960-516L	Washer
1	460-225-9	Assembly, Field Connector
1	7360	Belt

If replacements of the above items are needed, they may be ordered individually from B&C Specialty Products (Phone: 316-283-8000; or Online: BandC.com).

CHANGE IN WEIGHT AND BALANCE

Installation of this kit will impact aircraft weight as follows —

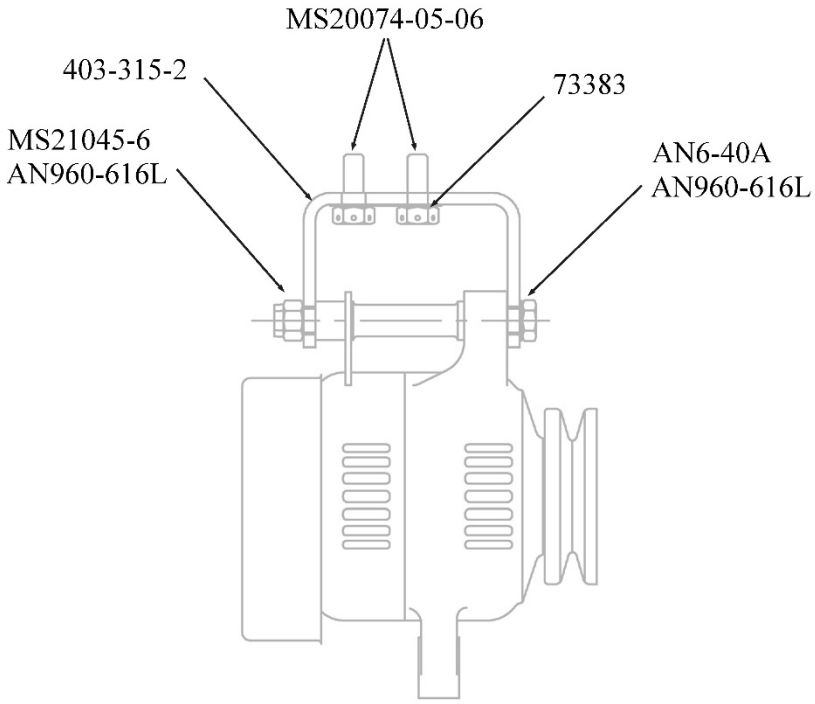
LX60 Alternator: 7.1 lbs.
FK5402-1 or -4 Installation Kit (with Tension Arm & Hardware): 1.1 lbs.
FK5402-2 or -3 Installation Kits (with Tension Arm & Hardware): 1.0 lbs.

INSTALLATION

Wide Deck (Boss Mount), Single-Groove Flywheel Pulley

Step 1. Refer to applicable service manual instructions; remove and retain engine cowl, spinner, propeller, and nose cowl. Disconnect ship's battery, Negative (-) terminal first.

Step 2. Refer to applicable service manual instruction. Remove existing alternator/generator, mounting bracket, tension arm, and belt (if applicable).

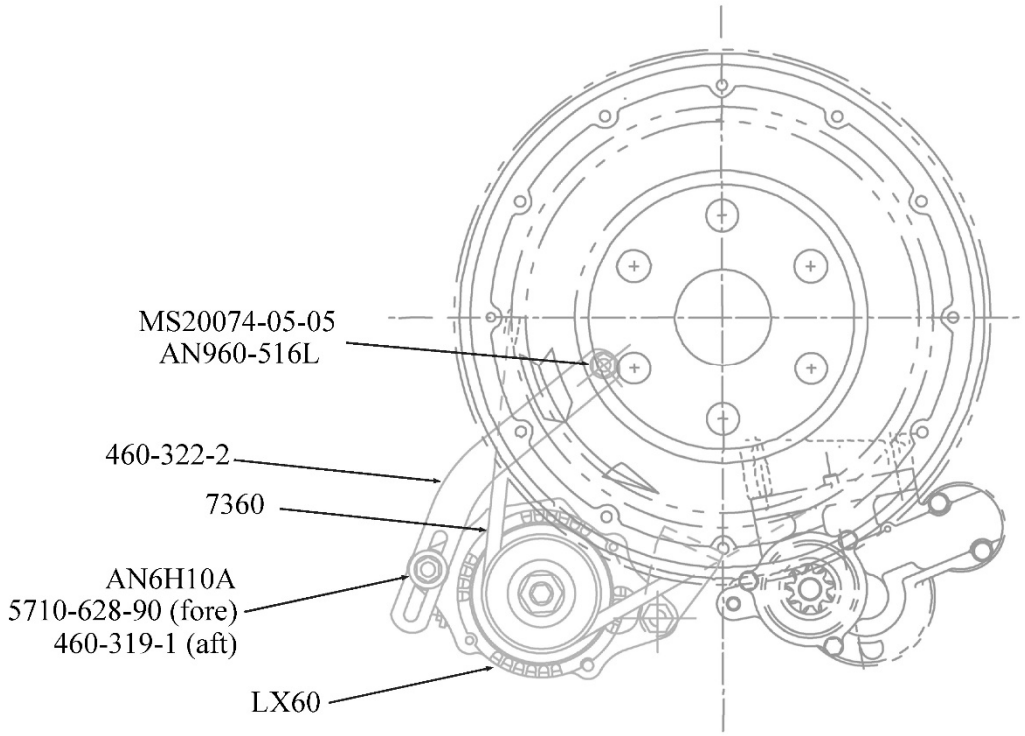


Step 3. Mount the 403-315-2 bracket to the engine case boss, using the two MS-20074-05-06 bolts and the 73383 locking plate. Torque the bolts to engine manufacturer's specifications or 110-150 in-lbs. Lock the bolts by bending the tabs on the locking plate up against the flats on the bolt hex.

CAUTION

Take care in preparing the engine case to accept the 403-315-2 bracket. ***The LX60 receives its ground through the mounting bracket.*** It is essential that the mating surfaces are clean and the mounting hardware is tight. On non-standard installations, make sure the alternator is grounded well enough to carry full alternator output despite any mechanical/electrical isolation mounts.

Step 4. Position the LX60 alternator so that the alternator "pivot tube" fits within the U-shaped opening of the 403-315-2 bracket. Secure the alternator in place using the AN6-40A pivot bolt, two AN960-616L washers, and MS21045-6 locking nut. Do not fully tighten bolt and nut to allow for later adjustment.



Step 5. Attach the 460-322-2 belt tension arm to the engine case using the MS-20074-05-05 bolt and an AN960-516L washer. Attach tension arm slotted end to alternator using the AN6H10A bolt, with the 5710-628-90 spacer fore and 460-319-1 spacer aft of the tension arm. Leave both bolts loose for belt adjustment.

Step 6. Install 7360 drive belt, slipping it around the LX60 alternator pulley and the ring gear support (flywheel) pulley. Re-install nose cowl and propeller. Properly torque and safety propeller bolts to manufacturer's specifications. Adjust the tension of the belt according to one of the methods described in Lycoming Service Instruction 1129C (or latest revision). As a minimum, the following procedure should be followed:

A. Hold and secure propeller so as to prevent engine rotation;

B. Apply torque wrench to alternator pulley nut until belt slips;

C. Belt slip should not be observed below 12-14 ft.-lbs. for a new belt, or 8-10 ft.-lbs. for a used belt (viz. one that has been installed previously and run on an engine).

Torque tension arm bolts to 110-150 in-lbs. and the alternator pivot bolt to 225-300 in-lbs. Safety wire the tension arm bolts.

Step 7. Install the 460-225-9 field connector assembly on the LX60, and route the wire aft to the alternator controller/regulator. Use adel clamps, nylon wire ties, or waxed string to secure this harness aft, making sure that it is tied away from chafe points and clear of all flight control mechanisms throughout the entire range of control movements. Route harness through grommets when firewall penetration is required. Install a ring terminal on the unfinished end of the harness, and connect to the alternator controller/regulator field supply terminal according to the manufacturer's specifications.

Step 8. Wire the output of the LX60 to a suitably-sized current limiter (60 amp) or circuit breaker (70 amp), per the latest revision of AC 43.13. Take care to route the wire separately from the field connector assembly (Step 7) using adel clamps, and dress it from the alternator aft to a suitable anchor point on the firewall, allowing enough slack for all possible engine movement. Torque the output post nut to 50 In-Lbs. Install an insulating elbow over the connection.

Step 9. Reconnect the aircraft battery, Positive (+) terminal first. Perform preliminary functional test on page C-1.

Step 10. Check all fasteners for security and safety. Check that all wiring is clear of flight controls throughout the entire range of control movement. Re-install the engine cowling.

Step 11. Perform final test on page C-1. Update ship's weight and balance, pilot operating handbook and maintenance records.

Narrow Deck (Case Mount)

Using B&C or non-B&C Starter

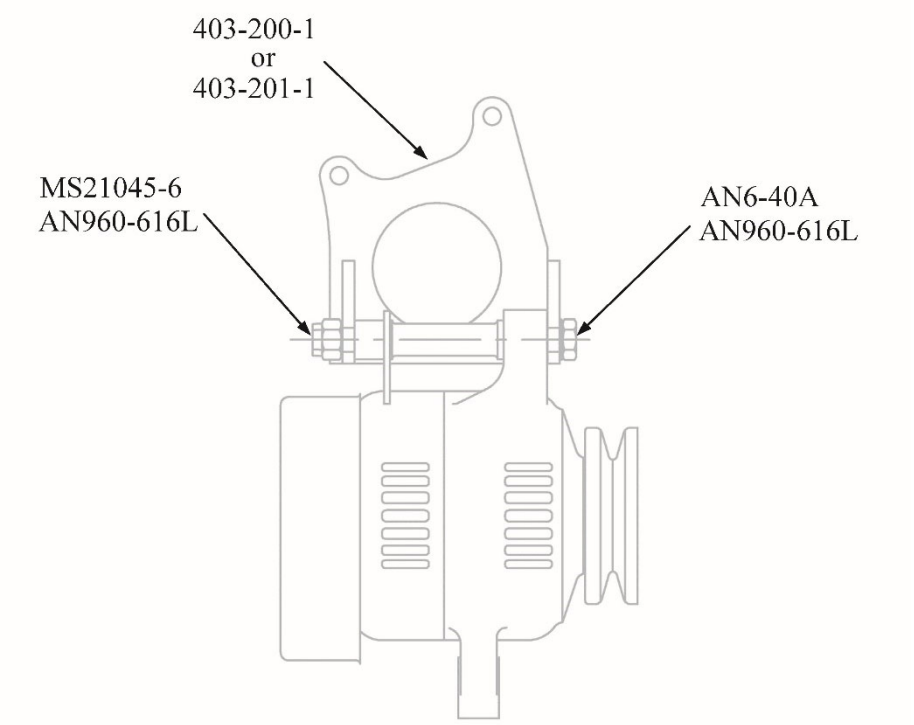
Step 1. Refer to applicable service manual instructions; remove and retain engine cowl, spinner, propeller, and nose cowl. Disconnect ship's battery, Negative (-) terminal first.

Step 2. Refer to applicable service manual instruction. Remove existing alternator/generator, mounting bracket, tension arm, and belt (if applicable).

Step 3. Mount the 403-200-1 or 403-201-1 bracket to the engine, using the two lower ¼" case through bolts closest to the prop flange. The installer must provide two Grade 5 or Grade 8 plated course thread bolts for this purpose; these must be ¼" longer than the existing bolts. Torque the bolts to engine manufacturer's specifications.

CAUTION

Take care in preparing the engine case to accept the 403-315-2 bracket. ***The LX60 receives its ground through the mounting bracket.*** It is essential that the mating surfaces are clean and the mounting hardware is tight. On non-standard installations, make sure the alternator is grounded well enough to carry full alternator output despite any mechanical/electrical isolation mounts.



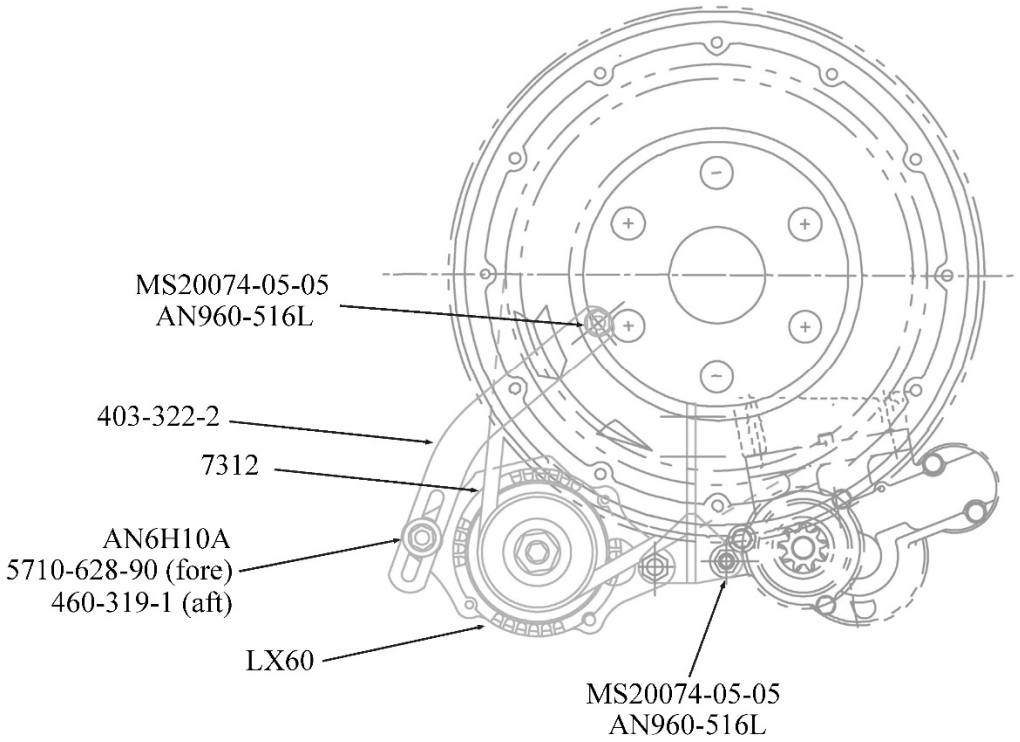
Step 4. Connect the 403-200-1 or 403-201-1 bracket to the lug on the inboard side of the starter using an MS20074-05-05 bolt and AN960-516L washer. Torque to 150 +/- 15 in-lbs.

CAUTION

The 403-200-1 or 403-201-1 alternator bracket ***must be supported*** laterally via connection with the starter lug. Failure to properly support the bracket will lead to bracket fatigue and possible failure.

Step 5. Position the LX60 alternator so that the alternator "pivot tube" fits within the two ears of the 403-200-1 or 403-201-1 bracket. Secure the alternator in place using the AN6-40A pivot bolt, two AN960-616L washers, and MS21045-6 locking nut. Do not fully tighten bolt and nut to allow for later adjustment.

Step 6. Attach the 460-322-2 belt tension arm to the engine case using the MS-20074-05-05 bolt and an AN960-516L washer. Attach tension arm slotted end to alternator using the AN6H10A bolt, with the 5710-628-90 spacer fore and 460-319-1 spacer aft of the tension arm. Leave both bolts loose for belt adjustment.



Step 7. Install 7312 drive belt, slipping it around the LX60 alternator pulley and the ring gear support (flywheel) pulley. Re-install nose cowl and propeller. Properly torque and safety propeller bolts to manufacturer's specifications. Adjust the tension of the belt according to one of the methods described in Lycoming Service Instruction 1129C (or latest revision). As a minimum, the following procedure should be followed:

A. Hold and secure propeller so as to prevent engine rotation;

B. Apply torque wrench to alternator pulley nut until belt slips;

C. Belt slip should not be observed below 12-14 ft.-lbs. for a new belt, or 8-10 ft.-lbs. for a used belt (viz. one that has been installed previously and run on an engine).

Torque tension arm bolts to 110-150 in-lbs. and the alternator pivot bolt to 225-300 in-lbs. Safety wire the tension arm bolts.

Step 8. Install the 460-225-9 field connector assembly on the LX60, and route the wire aft to the alternator controller/regulator. Use adel clamps, nylon wire ties, or waxed string to secure this harness aft, making sure that it is tied away from chafe points and clear of all flight control mechanisms throughout the entire range of control movements. Route harness through grommets when firewall penetration is required. Install a ring terminal on the unfinished end of the harness, and connect to the alternator controller/regulator field supply terminal according to the manufacturer's specifications.

Step 9. Wire the output of the LX60 to a suitably-sized current limiter (60 amp) or circuit breaker (70 amp), per the latest revision of AC 43.13. Take care to route the wire separately from the field connector assembly (Step 7) using adel clamps, and dress it from the alternator aft to a suitable anchor point on the firewall, allowing enough slack for all possible engine movement. Torque the output post nut to 50 In-Lbs. Install an insulating elbow over the connection.

Step 10. Reconnect the aircraft battery, Negative (-) terminal last. Perform preliminary functional test on page C-1.

Step 11. Check all fasteners for security and safety. Check that all wiring is clear of flight controls throughout the entire range of control movement. Re-install the engine cowling.

Step 12. Perform final test on page C-1. Update ship's weight and balance, pilot operating handbook and maintenance records.

Wide Deck (Boss Mount), Dual-Groove Flywheel Pulley

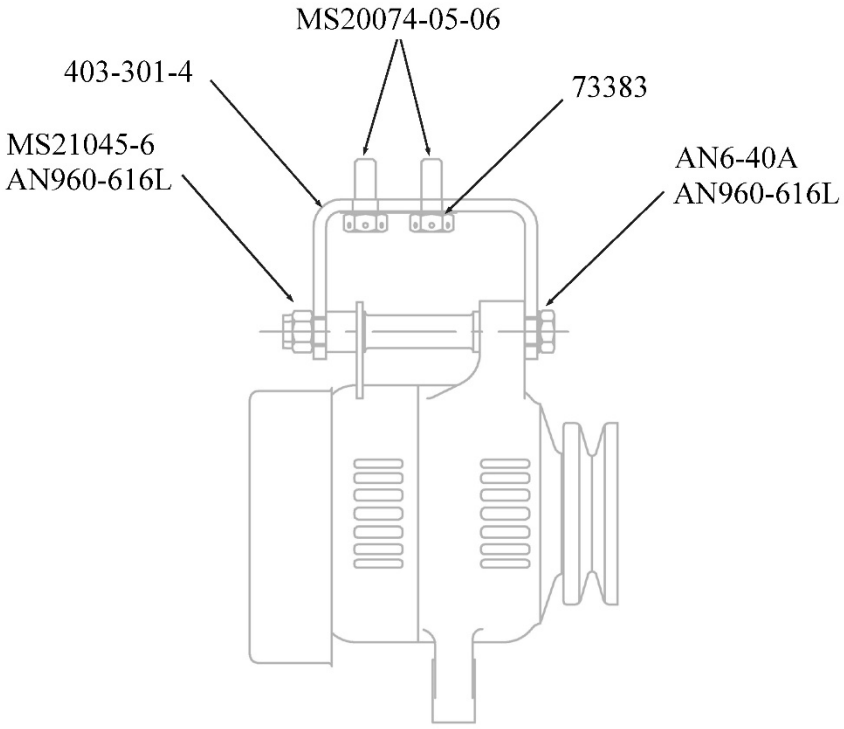
Step 1. Refer to applicable service manual instructions; remove and retain engine cowl, spinner, propeller, and nose cowl. Disconnect ship's battery, Negative (-) terminal first.

Step 2. Refer to applicable service manual instruction. Remove existing alternator/generator, mounting bracket, tension arm, and belt (if applicable).

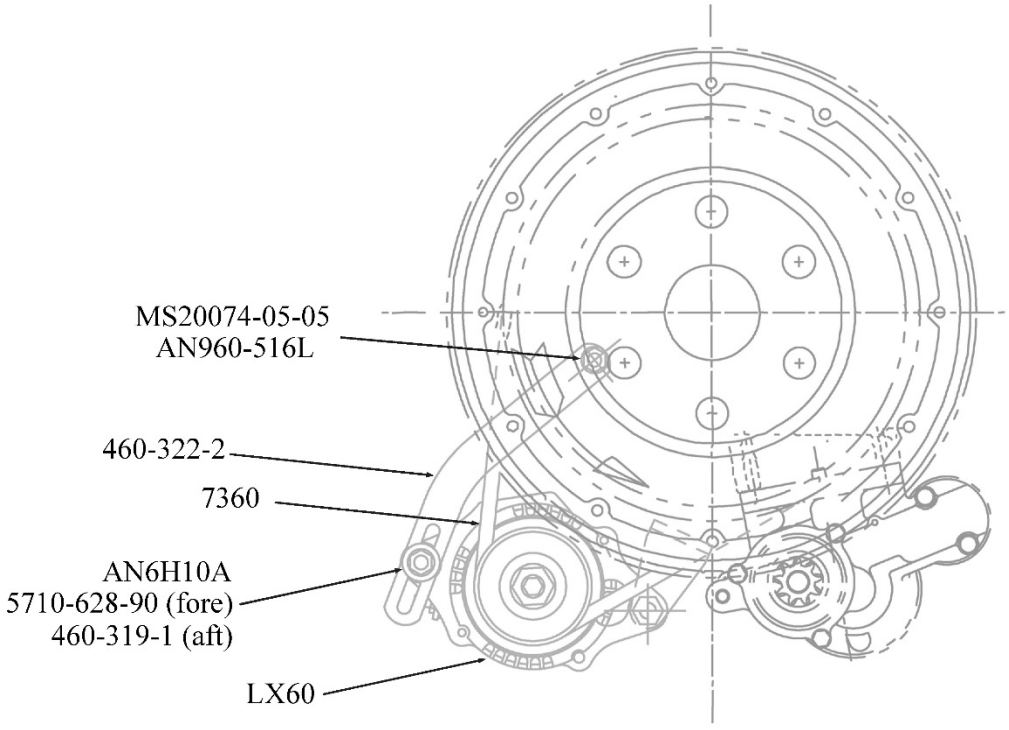
Step 3. Mount the 403-301-4 bracket to the engine case boss, using the two MS-20074-05-06 bolts and the 73383 locking plate. Torque the bolts to engine manufacturer's specifications or 110-150 in-lbs. Lock the bolts by bending the tabs on the locking plate up against the flats on the bolt hex.

CAUTION

Take care in preparing the engine case to accept the 403-315-2 bracket. ***The LX60 receives its ground through the mounting bracket.*** It is essential that the mating surfaces are clean and the mounting hardware is tight. On non-standard installations, make sure the alternator is grounded well enough to carry full alternator output despite any mechanical/electrical isolation mounts.



Step 4. Position the LX60 alternator so that the alternator "pivot tube" fits within the U-shaped opening of the 403-301-4 bracket. Secure the alternator in place using the AN6-40A pivot bolt, two AN960-616L washers, and MS21045-6 locking nut. Do not fully tighten bolt and nut to allow for later adjustment.



Step 5. Attach the 460-322-2 belt tension arm to the engine case using the MS-20074-05-05 bolt and an AN960-516L washer. Attach tension arm slotted end to alternator using the AN6H10A bolt, with the 5710-628-90 spacer fore and 460-319-1 spacer aft of the tension arm. Leave both bolts loose for belt adjustment.

Step 6. Install 7360 drive belt, slipping it around the LX60 alternator pulley and the ring gear support (flywheel) pulley. Re-install nose cowl and propeller. Properly torque and safety propeller bolts to manufacturer's specifications. Adjust the tension of the belt according to one of the methods described in Lycoming Service Instruction 1129C (or latest revision). As a minimum, the following procedure should be followed:

A. Hold and secure propeller so as to prevent engine rotation;

B. Apply torque wrench to alternator pulley nut until belt slips;

C. Belt slip should not be observed below 12-14 ft.-lbs. for a new belt, or 8-10 ft.-lbs. for a used belt (viz. one that has been installed previously and run on an engine).

Torque tension arm bolts to 110-150 in-lbs. and the alternator pivot bolt to 225-300 in-lbs. Safety wire the tension arm bolts.

Step 7. Install the 460-225-9 field connector assembly on the LX60, and route the wire aft to the alternator controller/regulator. Use adel clamps, nylon wire ties, or waxed string to secure this harness aft, making sure that it is tied away from chafe points and clear of all flight control mechanisms throughout the entire range of control movements. Route harness through grommets when firewall penetration is required. Install a ring terminal on the unfinished end of the harness, and connect to the alternator controller/regulator field supply terminal according to the manufacturer's specifications.

Step 8. Wire the output of the LX60 to a suitably-sized current limiter (60 amp) or circuit breaker (70 amp), per the latest revision of AC 43.13. Take care to route the wire separately from the field connector assembly (Step 7) using adel clamps, and dress it from the alternator aft to a suitable anchor point on the firewall, allowing enough slack for all possible engine movement. Torque the output post nut to 50 In-Lbs. Install an insulating elbow over the connection.

Step 9. Reconnect the aircraft battery, Positive (+) terminal first. Perform preliminary functional test on page C-1.

Step 10. Check all fasteners for security and safety. Check that all wiring is clear of flight controls throughout the entire range of control movement. Re-install the engine cowling.

Step 11. Perform final test on page C-1. Update ship's weight and balance, pilot operating handbook and maintenance records.

PRELIMINARY FUNCTION TEST

Step 1. Re-connect the battery. The magneto switch should remain OFF.

Step 2. Close the alternator "Field" and "Sense" circuit breakers (if so equipped).

Step 3. Turn ON the battery and alternator master (Field) switches. Check that none of the alternator breakers trip.

Step 4. Using a digital voltmeter (preferably digital), check the voltage at the alternator controller/regulator field supply terminal.

Step 5. Select a clean engine ground for negative reference. Check the voltage at the alternator field connector assembly. ***Note: the connector must not be disconnected for this measurement.*** Use a thin probe or small wire to access one of the wire terminals within the field connector. The observed voltage should measure within 1.0 volt of the value measured at the alternator controller/regulator field supply terminal.

Step 6. Using engine ground as negative reference, check the voltage at "B" lead (output terminal) of the alternator. The voltage should be equal to the bus voltage.

Step 7. Turn OFF the battery and alternator master (Field) switches.

FINAL TEST

Step 1. Perform a normal preflight inspection.

Step 2. Move the aircraft to an area safe for engine start.

Step 3. Ensure that alternator "Field" and "Sense" circuit breakers (if so equipped) are closed.

Step 4. Turn ON the battery master and alternator master switches. Observe system voltage.

Step 5. Perform a normal engine start and allow the engine to reach proper temperature for run-up RPM.

Step 6. Set engine to approximately 1700 RPM minimum. Check for a bus voltage near 14.0 volts (or the manufacturer's specifications for the alternator controller/regulator).

Step 7. Increase electrical load using Nav lights, landing lights, etc. and check to see that the load is being supported and that low-voltage is not being indicated. Higher RPM may be required for heavy loads.

Step 8. Return engine to idle RPM. Perform a normal engine shutdown. Turn OFF battery and alternator master switches.

TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	SUGGESTED ACTION
Charging system off-line (no output)	Engine at idle or low RPM	Reduce load until increased engine RPM possible.
	Output circuit breaker/current limiter open	Check breaker/limiter condition. Investigate whether open condition indicative of short-circuit or other "hard fault" in circuit.
	Output circuit breaker/current limiter failed	Test for voltage drop in breaker/limiter. Consider replacement if voltage drop greater than 0.25 volts detected. If equipped with current limiter, evaluate and replace if open.
	DC output wire broken, or has failed crimp joint	Replace broken wire assembly; or remove old crimp joint, dress and crimp new wire terminal on output wire.
	Control circuit breaker open	Check breaker condition. Investigate whether open condition a result of chaffed or abraded wire insulation at wire bundle ties or firewall pass-thru.
	Control breaker failed	Test for voltage drop in circuit breaker. Consider replacement if voltage drop greater than 0.25 volts detected.
	Control wire broken, or has failed crimp joint(s)	Replace broken wire assembly; or remove old crimp joint, dress and crimp new wire terminal on control wire.
Alternator not supporting load (insufficient output)	Electrical system load exceeds alternator capacity	Evaluate "continuous" power requirements and reconfigure load management practice.
	Alternator/stator damaged or failing	Repair or replace alternator/stator.
Alternator over-voltage condition indicated	Inadequate aircraft Ground reference, or loss of connection to aircraft Ground	Confirm resistance between the battery negative (-) terminal and either Ground connection point on regulator (⏚) is less than 0.50 ohms. Use a digital multi-meter on the lowest scale for this measurement. Resistance in excess of this value warrants further investigation.
	Regulator failure	Repair or replace regulator.
Excessive alternator "noise" audible in headsets	Inadequate or degraded Ground connections for alternator, regulator, and/or audio or radio systems	Check for corrosion or lack of cleanliness at Grounding points. Ensure that gas-tight connections are present at each connection in Ground system.

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Instructions for Continued Airworthiness for B&C Specialty Products LX60 Alternator

The B&C LX60 alternator requires no recurrent maintenance during its service life of 2200 hours. It is recommended that at 2200 hours or less time in service or during engine overhaul the alternator be returned to B&C Specialty Products for factory overhaul.

Inspection:

1. After the first 25 hours of operation after installation, check belt tension according to one of the methods described in Lycoming Service Instruction 1129C (or latest revision). As a minimum, the following procedure should be followed:

    A. Hold and secure propeller so as to prevent engine rotation;

    B. Apply torque wrench to alternator pulley nut until belt slips;

    C. Belt slip should not be observed below 12-14 ft.-lbs. for a new belt, or 8-10 ft.-lbs. for a used belt (viz. one that has been installed previously and run on an engine).

2. At each Annual or 100 hour inspection check the alternator externally for security of mounting and wiring.

3. At each Annual or 100 hour inspection check the operation of the charging system, perform a normal engine run-up, adding and removing electrical loads

while monitoring the ammeter or bus voltmeter. Ascertain that the alternator maintains the aircraft electrical bus at the approximate regulator set point as loads are added and removed (at high loads, cruise RPM may be required).

4. At each Annual or 100 hour inspection check the alternator drive belt condition and tension. The belt should not be cracked or frayed. Perform test outlined in item 1 (above) to determine if belt tension is sufficient.

5. At each Annual or 100 hour inspection check the alternator bearings. Release the belt tension. Check for radial and axial alternator shaft play and for smooth rotation. Reject an alternator that has rough rotation or shaft play. Re-tension the belt according to one of the procedures outlined in item 1 (above).

Failure due to broken wires or damaged connectors may be corrected in the field using repair procedures complying with the latest revision of AC43.13-xx. All other repairs are by factory service or replacement only.

INSTALLATION OF THIS UNIT ON A TYPE-CERTIFICATED AIRCRAFT MUST BE ACCOMPANIED BY AN STC OR BY A ONE-TIME FIELD APPROVAL