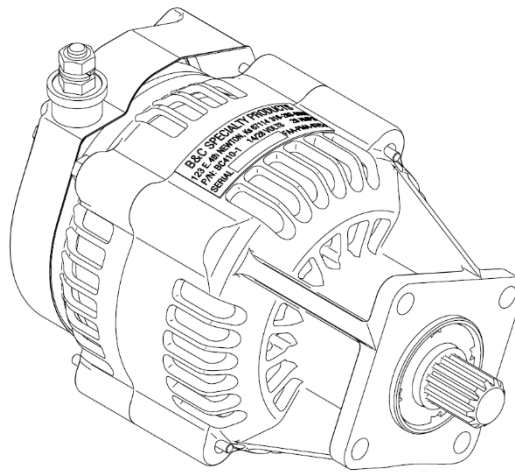


Technical Manual  
for  
**Model No. SF301**  
**Spline-Drive Alternator**

for Lycoming and Continental 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**

**NOTE**

The SF301 Alternator is not STC'd or PMA'd and is intended for installation on experimental amateur-built aircraft only.



## APPLICABILITY

This kit is applicable to Lycoming and Continental powered aircraft with AND20000 compatible (vacuum pump) accessory drive pads. Other engines with an equivalent drive pad may be compatible as well.

## PARTS LIST

The following parts are supplied with the FK5403-1 Installation Kit:

<u>Qty.</u>	<u>Part No.</u>	<u>Description</u>
1	MS9134-01 (or equal)	Gasket
4	S804-420	Nut, 1/4-20 (Lycoming engines)
4	S804-428	Nut, 1/4-28 (Continental engines)
4	AN960-416 (or equal)	Washer, Flat
4	AN936A-416 (or equal)	Washer, Locking
1	FC2-ASSY	Connector Assembly

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](http://BandC.com)).

## CHANGE IN WEIGHT AND BALANCE

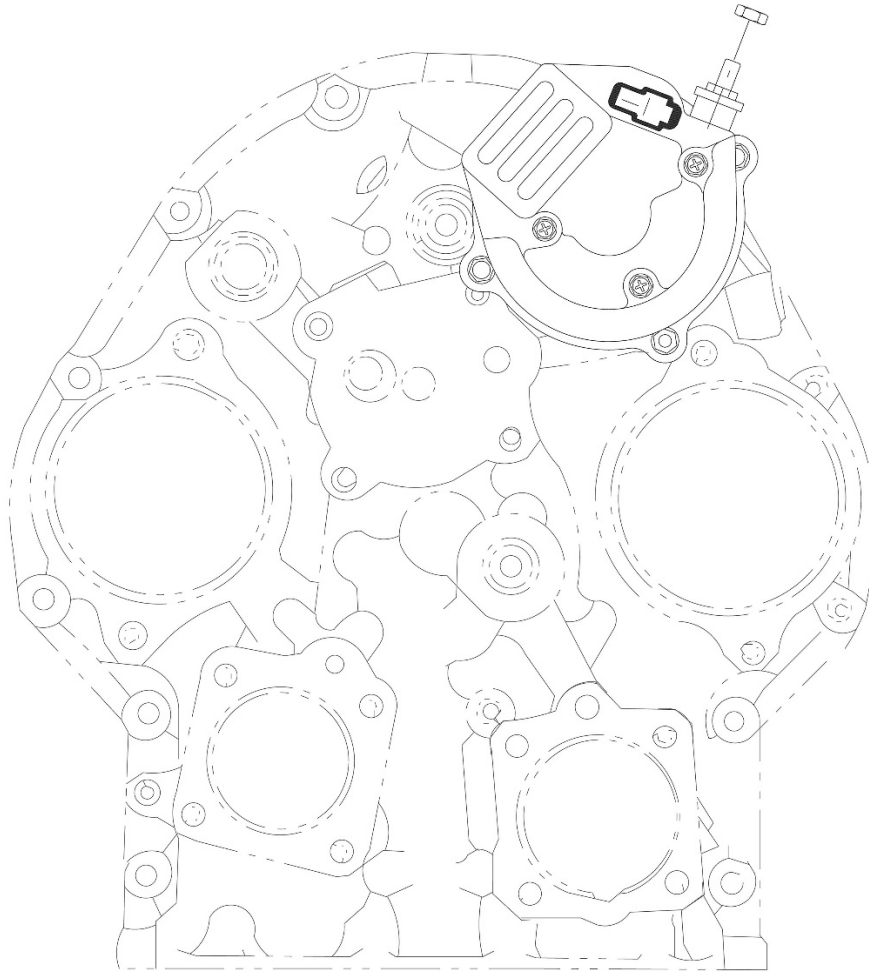
Installation of the SF301 will impact aircraft weight as follows:

SF301 Alternator: 5.70 lbs.

FK5403-1 Installation Kit: 0.15 lbs.

## INSTALLATION

- Step 1. Disconnect ship's battery, Negative (-) terminal first.
- Step 2. Remove the engine cowl to gain access to the rear of the engine.
- Step 3. Locate the AND20000 accessory (vacuum pump) pad. Remove cover plate (if applicable). Remove all old gasket material from the drive pad, being careful not to damage the aluminum surface.
- Step 4. Prepare a new MS9134-01 Gasket, applying a thin coat of Permatex Hylomar HPF or Loctite 518 gasket sealer (or equal) on both sides of the gasket to promote good surface adhesion. Place the gasket on the studs of the accessory adapter drive pad.



**Typical SF301 Installation (Lycoming accessory case shown)**

- Step 5. Position (and hold) the SF301 Alternator on the studs. Note that the Alternator may be oriented or “clocked” to position the output post at any one of four different stations. Select the “clocking” orientation that permits the output wiring to make the most direct connection to the aircraft electrical bus while also remaining serviceable and clearing any other nearby accessories.

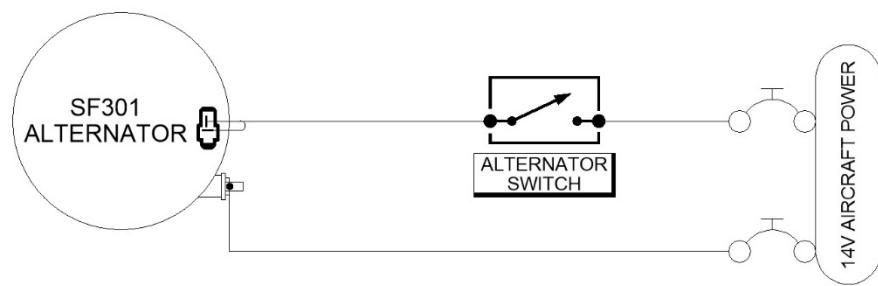
- Step 6. Secure the SF301 at the selected “clocking” orientation, using an AN960-416 Flat Washer, AN936A-416 Lock Washer, and S804-420 Nut (Lycoming or Titan engine) or S804-428 Nut (Legacy Continental engine) on each stud. Torque the mounting nuts in a two-step sequence. First, torque all four mounting nuts to 10 in-lbs. using a cross-torque pattern. Then torque the nuts a second time to the final torque value per the table using a cross-torque pattern.

Thread Size	Torque Value (in-lbs)
Lyc or Titan (1/4-20 thread)	80±5
Continental (1/4-28 thread)	95±5

### CAUTION

Take care to observe the proper torque values when securing the SF301 to the accessory adapter drive pad. ***Failure to ensure the proper torque values (resulting in over-tightening or under-tightening) may lead to oil leaks, alternator damage, or both.*** Such an installation error will invalidate the limited warranty. See the Appendix on page D-1 for an overview of the correct torquing procedure and tools.

- Step 7. Install the FC2-ASSY connector assembly on the SF301 and route the wire aft to the alternator switch. 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 terminal on the unfinished end of the harness and connect to the alternator switch terminal. The switch will provide power from the aircraft bus and requires about 60mA of current. Use appropriate circuit protection to provide power to the switch.



- Step 8. Wire the output of the SF301 to a suitably-sized current limiter or circuit breaker, per the latest revision of AC 43.13. Along the wiring path, use suitable anchor points, 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 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

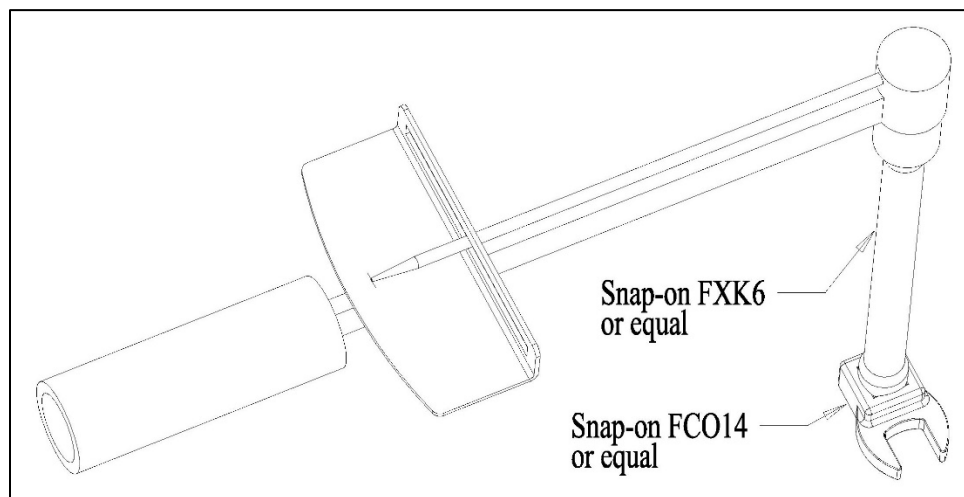
- Step 1. The magneto switch should remain OFF.
- Step 2. Close the alternator “Main” and “Control” circuit breakers (if so equipped).
- Step 3. Turn ON the battery and alternator master switches. Check that none of the alternator breakers trip.
- Step 4. Using a voltmeter (preferably digital), check the voltage at the alternator connector assembly. The observed voltage should match the aircraft bus voltage.
- Step 5. Using engine ground as negative reference, check the voltage at the “B” post (output terminal) of the alternator. The voltage should be equal to the bus voltage.
- Step 6. Turn OFF the battery and alternator master switches.

## FINAL TEST

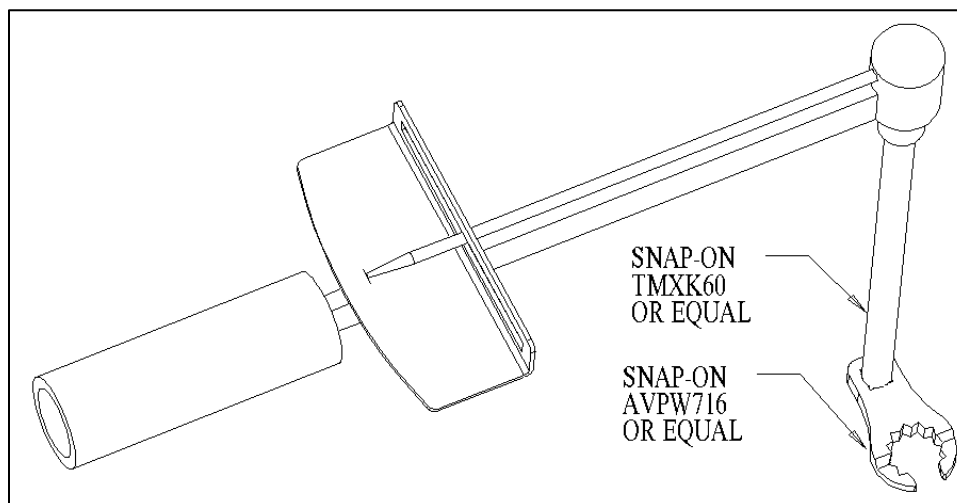
- Step 1. Perform a normal preflight inspection.
- Step 2. Move the aircraft to an area safe for engine start.
- Step 3. Ensure that alternator circuit breakers are closed.
- Step 4. Turn ON the battery master and alternator master switches. Observe system voltage.
- Step 5. Perform a normal engine start and allow the engine to reach proper temperature for run-up RPM.
- Step 6. Set engine to approximately 2100 RPM minimum. Check for a bus voltage near 14.0 volts.
- Step 7. Increase electrical load using Nav lights, landing lights, etc. and check to see that the load is being supported and that the voltage stays above the voltage observed prior to starting. 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.

## APPENDIX

A known challenge on the AND20000-spec accessory drive pads involves the very limited access to one of the four mounting nuts on some installations. We recommend tools as shown in the drawing(s) below for assuring the proper torque on all mounting nuts. Notice that the axis of the “crow’s foot” portion of the assembly is a 90° to the beam of the torque wrench. This is done to make sure that the actual torque applied is very close to the value displayed on the torque wrench. The crow’s foot may be in either 90° position but must not be aligned with the torque wrench in either the outward or inward direction.



A tool specifically designed for use on aircraft vacuum pumps (or similar devices) may also be used. One such item, introduced by Snap-On, is shown in the drawing that follows.



The type of torque wrench is optional as long as accuracy can be verified.

## TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	SUGGESTED ACTION
Charging system off-line (no output)	Shear coupling broken	Replace shear coupling.
	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)	Engine at idle or low RPM	Reduce load until increased engine RPM possible.
	Electrical system load exceeds alternator capacity	Evaluate “continuous” power requirements and reconfigure load management practice.
	Alternator stator or diodes failing	Repair or replace alternator.
Alternator over-voltage condition indicated	Inadequate aircraft Ground reference, or loss of connection to aircraft Ground	Confirm resistance between the battery negative (-) terminal and the alternator case 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.
	Internal regulator/over-voltage module failure	Repair or replace alternator.
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.
Oil leaking from alternator mounting flange or from alternator case	Accessory pad oil seal failure	Replace accessory pad seal. Consult engine manual.
	Alternator mounting flange damaged	Repair or replace alternator.





123 East 4th Street, Newton KS 67114  
Telephone (316) 283-8000 · Fax (316) 283-7400 · BandC.com

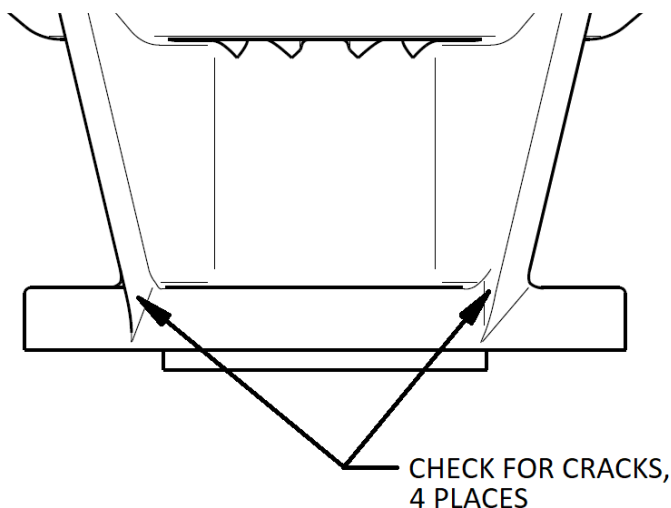
---

### **Instructions for Continued Airworthiness For B&C Specialty Products SF301 Alternator**

The B&C SF301 alternator requires no recurrent maintenance during its service life of 1700 hours. It is recommended that at 1700 hours or less time in service or during engine overhaul the alternator be returned to B&C Specialty Products for factory overhaul.

At each Annual, Condition Inspection or 100 hour inspection, make the following inspections:

1. Note during a normal run-up whether the alternator vibrates or is mechanically noisy. If so, suspect a bearing failure. Bearing failure may also be indicated by gray dust residue around the rear housing cooling slots. If bearing failure is suspected, return alternator to the factory for repair or replacement.
2. Check the alternator externally for security of mounting. If oil is leaking around the alternator base, check the torque of the mounting nuts and compare to the values listed in the table in Section B. Re-torque the nuts if needed. If there is still a leak, try replacing the gasket. Do not over-torque the mounting nuts.
3. Clean the area around the mounting flanges and the casting webs between the mounting flanges and the alternator housing. Check for cracks in the webs as shown in the figure below.



Normal tooling parting lines should not be mistaken for cracks. Any alternator identified as having cracks in any of the four webs must be returned to the factory for repair or replacement.

4. Check for security of alternator wiring. Look for dark discoloration of the output stud and nut. If it is discolored or corroded, be suspicious of a poor terminal crimp on the output wire.

Disconnect the terminal and clean the output post and nut with a brass wire brush. Replace the crimp terminal by removing enough conductor length to obtain a clean, bright stripped conductor before crimping on a new ring terminal. Re-install the terminal on the output post and torque the nut to 50 in-lbs.

5. Perform the "FINAL TEST" described in Section C of this document.

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. A broken shear coupling may be replaced in the field. 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**