

National AirParts, Inc.
1140 AirPort Terminal Drive.
DeLand, Florida 32724 U. S. A.

Brush Inspection & Change Instructions For



National AirParts Model N300 Alternators

<http://www.nationalairparts.com>

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(386) 734-3365

Price: \$25

Model N300 Alternator Brush Inspection & Change Instructions

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NOTE: Refer to National AirParts, Inc. *Belt Driven Alternator Installation Manual AI-1*, as amended, for alternator application, identification and installation information.

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INTRODUCTION

A. N300 Alternator Brush Inspection & Change Requirements:

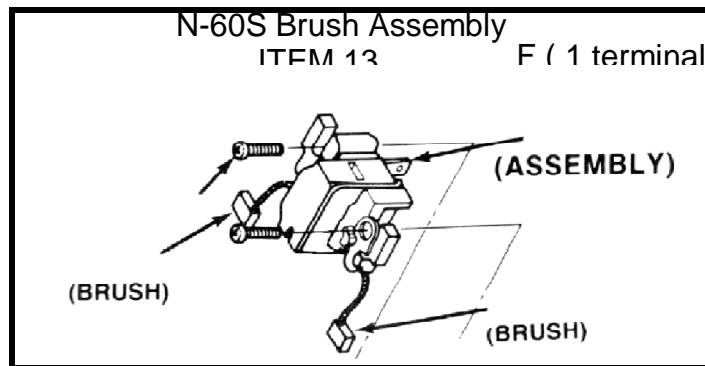
National AirParts alternators use machined brushes of a special composition which is specifically intended for aircraft use. The brushes provide excellent operating characteristics to altitudes of 35,000 feet or more, and have a makeup which also allows better efficiency and extended life at lower altitudes. Only genuine National AirParts N-60S or N-61S brush sets should be used for brush replacement in order to maintain proper performance and minimal slip ring wear.

N300 alternator brushes should normally be inspected for wear each 500 hours of operation. If they are cracked, chipped, broken, oil soaked or worn, they must be replaced. It is advisable to replace any brush assembly in which brushes are found to be less than 0.25" long (0.2" MINIMUM SERVICE LENGTH). Brush replacement after 1,000 hours of use should be considered standard procedure.

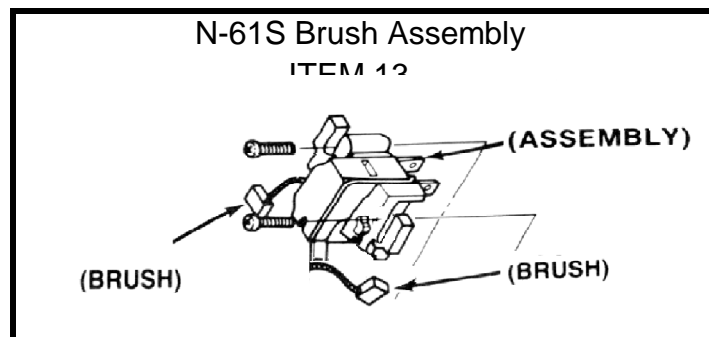
B. Brush Identification:

Two different brush assemblies are used in the National AirParts N300 alternators, as shown by the drawings below: Identify the correct P/N for each alternator type having brushes replaced.

C312, F312 & F324 Alternators: Connection for "F" Terminal, only



P312 & P324 Alternators: Connection for both "F" and "R" Terminals



C: BRUSH INSPECTION & CHANGE INSTRUCTIONS

The following sequence and procedures should be strictly adhered to when inspecting or replacing the brush assembly on National AirParts N300 alternators.

1. Place the alternator on a working surface, pulley down. Remove the four P/N 13-B through bolts. Retain the P/N 13-A and P/N 13-BB (AN-960-C10) washers for reuse, if desired. Discard the 4 P/N 13-BBB (MS21042-3) locknuts if they have had more than three uses or appear to have lost locking capability.
2. Lift the Slip Ring End case from the alternator, complete with the STATOR ASSEMBLY. It is permissible to use a suitable tool to lightly pry the assembly apart at the dividing line between the STATOR STACK and the alternator Drive End case.
3. As the Slip Ring End is lifted from the alternator, the two brush springs will be released and tend to fall from the alternator. Be certain to recover both springs, and insure that none stays caught in the case. **DISCARD BOTH SPRINGS IF THE ENTIRE BRUSH ASSEMBLY IS TO BE REPLACED, OR IF THE SPRINGS APPEAR DISTORTED OR DAMAGED.**
4. Identify the installed Brush Holder Assembly, Item # 13, Page 1.
5. **FOR INSPECTION and REUSE of brushes, ONLY, PERFORM THE FOLLOWING CHECKS, Items "a" thru "c";** then continue with Step #9. For **BRUSH REPLACEMENT**, continue with Step #6.
 - a. Carefully clean both brushes, and inspect them for proper length and condition; disassembly of the alternator generally deposits grease from the SRE bearing on the surface of the brushes, and all of this grease must be removed before reassembly. Brushes that are under limits (0.2" O.A.), chipped or cracked must be replaced.
 - b. Inspect and clean the brush holder and the brush springs using toluene or mineral spirits.
 - c. Reassemble the brush assembly by inserting the springs in the brush slots and then replacing the brushes. The "F" terminal brush is installed in the slot nearest the rotor pole pieces. Hold the brushes in place by inserting a retaining pin (similar to a straightened paper clip) through the rear of the alternator case and through the retaining pin holes in the brush block assembly. Insure that the retaining pin extends into the case only far enough to hold the brushes securely in place.
6. **FOR BRUSH REPLACEMENT** : Note the mounting position of the brush block assembly as a guide for installation of the replacement part. Remove the two brush holder assembly retaining screws, Item 23, and discard them. Lift out the old Brush Holder Assembly, Item # 13, and discard it.
7. Select a new brush holder assembly, Item 13, Part Number N60S or N61S. (The brushes should be held in the assembly with a piece of retaining wire .) Position the new assembly in the proper mounting position, as determined in Step #4 above. The brush retaining wire should protrude through the slot in the back of the Slip Ring End case and NOT extend into the case any further than necessary to hold the brushes in place.
8. Select 2 new Brush Holder mounting screws and 2 Brush Retainer Washers, Parts List Items #23 and 24. Run a bead of Loctite 271® on each screw, and install these screws through the brush holder mounts into the SRE case in the manner of the previously removed screws. Verify the correct mounting position for the Brush Block Assembly (normally fully AWAY FROM the alternator axial center line), and torque the screws to the required torque of 24 to 25 inch lb. Apply Torque Seal to the screw heads.

9. Examine the alternator Drive End Assembly and insure that the rotor slip rings are clean and undamaged. Out-of-round slip rings may be trued in a lathe to .001" TIR. If slip rings are dirty, they may be cleaned with 600 grit sandpaper and finished with crocus cloth to a final finish of between 32 and 50 micro-inches. (DO NOT USE EMERY.)

10. Inspect the SRE bearing. If it is damaged, or if the grease is dirty or contaminated, a new SRE bearing should be installed. DO NOT ATTEMPT TO CLEAN AND RELUBRICATE THIS BEARING. The SRE case bearing bore limits should be between .9360" and .9372".

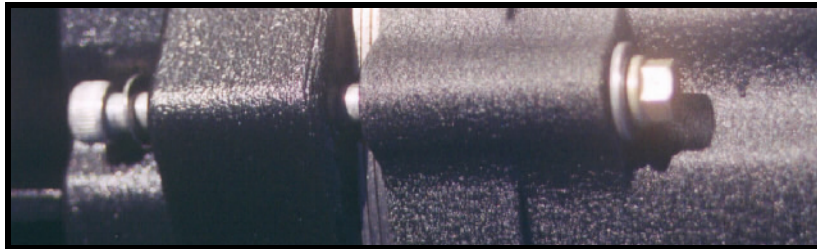
11. With the Drive End placed on the face of its pulley, the Slip Ring End may be lowered onto it IN THE CLOCKING POSITION SHOWN on the **National N300 Alternator Clocking Position Chart ACP-1** (Page 10). Lower the SRE carefully and squarely into position, and be certain that it seats properly. Note that an "air cushion" in the SRE bearing will frequently prevent the stator from seating to the bottom of the DE case until the trough bolts are torqued.

12. Install the alternator through bolts (Item 30, P/N 13-b)), from the Drive End towards the Slip Ring End. Use a P/N 13-A washer under the bolt head (use 2 ea. P/N 13-A washers for Option LW and GA) and a single P/N 13-BB (AN960-C10) washer installed under each P/N 13-BBB (MS21042-3) nut; see following illustration, Items 14A and 14B. The through bolts should initially be "cross-torqued" (torque bolts opposite one another) to approximately 30 inch pounds.

Item 14A



Item 14B



13. Rotate the alternator shaft by hand, with the alternator held in various positions, and insure that there is no rotor-to-stator interference. If there is any rotor strike, the through bolts should be loosened and the stator shifted slightly. **NOTE: Be certain that the brush holding wire is not striking the rotor**

14. Tighten the through bolts to 50 +/- 2 inch LB, as per Step 12 above, and repeat Step # 13. Reverify correct alternator rotating clearances. NOTE: "Cross Torquing" the through bolts normally provides a self-centering action for the rotor/stator fit, and tends to eliminate any rotor misalignment.

15. **Remove the brush holding wire which protrudes through the back of the SRE.** This should now allow the brushes to contact the slip rings. Use an ANALOG ohmmeter, such as a Simpson 260, and measure the resistance between the F1 and F2 terminals on the Prestolite replacement alternators, or between the F1 ("F") terminal and GROUND on the Delco, Chrysler or Ford replacement alternators. Readings should typically be between 7 and 15 ohms for the standard 24 volt alternators, 4.8 to 6 ohms for the high output 24 volt alternators, and between 2.2 and 5 ohms (4 ohms nominal) for the 12 volt alternators. Alternators with custom rotor windings can have different resistances from the above.

On Prestolite-style replacement alternators with 2-wire ISOLATED FIELD terminals, either FIELD terminal to Ground should show an infinite, or very high, reading.

16. Torque-seal the through bolt nuts to provide a visual indication of any through bolt loosening during operation.

This completes the brush inspection/change procedure

REMEMBER: All service and replacement parts for National N300 alternators are available directly from any FBO or National distributor, as well as regular order or AOG directly from the factory.

TECHNICAL ASSISTANCE PHONE #: (386) 734-3365
FAX: (386) 734-8552
e-mail: NAPI@CFL.RR.COM

Web Site: <http://www.nationalairparts.com>

PARTS ORDER NUMBER: (800) 713-1111 (U.S. Only)
(386) 734-3365

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