

# NASA TECH BRIEF



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## Design and Evaluation of Brushless Electrical Generators

As part of an analytical study of auxiliary electrical power systems, ten design manuals were assembled and nine computer programs were developed for evaluating proposed designs of brushless rotating electrical generators. The ten design manuals represent the results of an effort to assemble in one package the sum total of all information needed in the design of brushless rotating electrical generators. The nine computer programs permit calculation of the performance of specific designs including effects of materials. Both the design manuals and computer program listings are contained in the original report entitled "Brushless Rotating Electrical Generators For Space Power Systems," which consists of five volumes as listed in Note 2. The nine computer programs include:

1. Homopolar Inductor A-C Generator
2. Two Coil and Single Coil Outside Coil, Lundell A-C Generator
3. Salient-Pole Wound Pole Synchronous Generator Computer Program and Test Data
4. Generator Thermal Analysis
5. Non-Salient-Pole Wound Rotor Synchronous Generator
6. Rotating-Coil Lundell A-C Generator
7. Inside-Single-Coil, Stationary Coil Lundell A-C Generator
8. Inside, Two-Coil Stationary Coil Lundell A-C Generator
9. Permanent Magnet A-C Generator

### Notes:

1. The computer programs were written for a 1620

computer. They have not been fully verified for accuracy and completeness.

2. The basic report of the original study, in five volumes, is available from:

Clearinghouse for Federal Scientific  
and Technical Information  
Springfield, Virginia 22151  
Single document price \$3.00  
(or microfiche \$0.65)

### References:

NASA-CR-54320, Brushless Rotating  
Electrical Generators for Space  
Power Systems  
N65-29717 - Topical Report Volume 1,  
Selection Criteria  
N65-30693 - Topical Report Volume 2,  
Design Manuals  
N65-30694 - Topical Report Volume 3,  
Design Manuals  
N65-30695 - Topical Report Volume 4,  
Test Data & Computer Programs  
N65-30696 - Topical Report Volume 5,  
Appendix

### Patent status:

No patent action is contemplated by NASA.

Source: J.N. Ellis and F.A. Collins of  
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Lewis Research Center  
(LEW-10124)

Category 02

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## Design and Fabrication of a High-Speed Turbine

The design and fabrication of a high-speed turbine for use in a gas turbine engine is described. The turbine is of the axial flow type and is designed to operate at a speed of 10,000 rpm. The design is based on the use of a single-stage axial flow turbine with a pressure ratio of 1.5. The turbine is fabricated from a high-strength alloy steel and is tested in a gas turbine engine.

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