OBJECTIVE: The Army is interested in improving its power electronics systems for aviation. Industry is currently taking advantage of breakthroughs in Silicon Carbide (SiC) and Gallium Nitride (GaN) power electronic systems that can produce considerable efficiency gains. The Army would like to explore ways to utilize these systems on current rotorcraft platforms and Future Vertical Lift (FVL).

DESCRIPTION: Current legacy power electronic equipment are inefficient in comparison to modern equipment. By taking advantage of newer technologies, the Army hopes to reduce the size and weight of these systems while providing more capability to the warfighter.

The SBIR is intended to explore opportunities for the Army to utilize emerging technologies to improve electrical distribution. Systems such as the Regulated Transformer-Rectifier Unit (RTRU), which typically have an efficiency of 70~80% is a prime example of where gains can be made.

Classified proposals are not accepted under the DoD SBIR Program. In the event DoD Components identify topics that will involve classified work in Phase II, companies invited to submit a proposal must have or be able to obtain the proper facility and personnel clearances in order to perform Phase II work.

PHASE I: Under phase I, the electrical system in Army Rotorcraft should be researched and trades analyzed to determine what benefits could be realized by the Army. The Army would like to have an understanding of trade spaces and areas of improvement that can be realized for power electronics on aircraft. The Army currently utilizes systems within the following specifications: AC Generators: 40KVA-60KVA, 115VAC, 400Hz, at ~85% efficiency (min) RTRU: 28VDC output @ 250-400A ~85% efficiency (min) The Army desires to explore systems with the following specs: AC Generators: 45-70KVA, 115-270VAC, 400Hz, at 95+% efficiency RTRU: 28-270VDC @ +400A +95% efficiencies Note: If a DC voltage bus is utilized the Army will also need a way to supply 28VDC to its legacy systems. Current systems also have a MIL-STD-810G environmental requirement. A report should be delivered to the Army with documenting the design decisions the Army could make when utilizing a more advanced system. If possible, a demo would be desired.

PHASE II: Under phase II, the Army would desire working prototypes with actual simulated aircraft electrical loads. A laboratory environment would need to be setup that would simulate the aircraft loads. Additionally, this phase should include qualification testing to ensure ability to comply with Army requirements. The Army would like testing conducted to show the optimal setup that would be required for facilitate Army rotorcraft power needs. The final deliverable would be a report with testing and design data that would give the Army a path forward to utilize modern power electronics equipment.

PHASE III DUAL-USE APPLICATIONS: Under phase III, the Army desires to pursue full qualification of the components and aircraft integration/testing on UH-60, AH-64, CH-47, and/or FVL. Additionally it is envisioned that this technology will have applicability to the commercial aircraft market.

The final deliverable for this effort would be a qualified modern, integrated power electronics.

REFERENCES:
1. MIL-STD-810G
2. MIL-STD-704
3. RTCA/DO160
4. MIL-STD-461

KEYWORDS: Generator, Regulated Transformer-Rectifier Unit (RTRU), Power Electronics, Power Distribution, Power