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**A GAS TURBINE ENGINE BACKUP BEARING OPERATING BEYOND  
2.5 MILLION DN**

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**ABSTRACT**

Gas turbine engines and high speed rotating machinery using magnetic bearings require auxiliary and backup bearings for reliability and safety of operation. A 140 mm diameter Zero Clearance Auxiliary Bearing (ZCAB) capable of supporting radial and/or thrust loads of up to 4500 N was designed for an advanced gas turbine engine. The ZCAB was fabricated and tested successfully up to the expected maximum operating speed of 18,000 rpm in a specially configured test rig. The test rig included a 36,000 rpm capable drive motor, a 64 kg rotor which simulates a gas turbine engine shaft dynamics, a damped ball bearing at the drive end and an active magnetic bearing next to the ZCAB. Operation in excess of 240 minutes and 20 transient engagements simulating magnetic bearing failures were completed in the initial tests. Post test inspection revealed minimal wear to the shaft and the ZCAB rollers, whereupon the ZCAB was reassembled for shipment. These preliminary tests confirm the operation and durability of the ZCAB in maintaining rotor support and continued operation even if the primary magnetic bearing support is overloaded or encounters a failure.