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Powerful, efficient, robust, electro-acoustic transducers

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The STARTM resonant, reciprocating transducer began as a lightweight linear alternator design for a space-power free-piston Stirling engine in the early 1990's. It has since been developed into a range of commercially available motors and alternators with rated powers from 100 to over 10,000 watts (acoustic). As motors, these are acoustic pressure drivers with unlimited operating life and typical transduction efficiencies of 80-90 percent. This paper explains the electrodynamics and operation of these moving- magnet Lorentz-force devices and the unique geometric configuration that has allowed scaling over such a wide range. We discuss the design and function of the unique single-degree-of-freedom flexure suspension that enables both the compact geometry and unlimited service life without wear. Data is presented from a large sample of units placed in service during the last decade, demonstrating the durability and performance of these remarkable devices.