

## An Aeroballistic Diagnostic Fuze (DFUZE 2000)

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The present invention, an Aeroballistic Diagnostic Fuze (DFUZE2000), represents a high-g (g equals the force of the earth's gravity) projectile-based on-board measurement system, packaged in a North Atlantic Treaty Organization (NATO) compatible artillery fuze, for obtaining the continuum of in-bore and in-flight ballistic and aerodynamic data. The device is a system of sensors, microelectronics, field programmable gate array (FPGA) data acquisition, telemetry components, signal and power conditioning circuits boards, mechanical hardware, and a power supply. The device maintains the approximate exterior dimensions of a standard artillery fuze, which allows for easy installation by the use of threads onto any NATO-compatible artillery projectile. The device can endure acceleration loads at least to 30,000 times the earth's gravity, aerodynamic heating from cannon launching at Mach 3, and the associated spinning loads with a spin rate of 300 revolutions per second or higher.

The invention, activated by a g-switch upon launch, stores the in-bore measurements and repeatedly transmits them in parallel with the real time in-flight data by means of a telemetry link to a ground receiving station. The device allows a way to accurately measure the in-flight projectile motion via body-fixed sensors. These measurements can significantly contribute toward the design, development, and failure diagnostics of artillery projectiles without any modification to the projectile. If desired, tank rounds, munitions, rockets, missiles, submunitions, bullets, and other weapon systems, can be modified to accept the DFUZE or the DFUZE can be repackaged in a useable form factor. The device is patent-pending by the U.S. Army Research Laboratory.