



# Sting Ray Mod 1 Advanced Lightweight Torpedo

Our torpedoes solutions offer unparalleled performance, assuring critical operational advantage and mission capability through life.

Developed to meet UK MOD operational requirements for the next generation of lightweight torpedo, Sting Ray Mod 1 simultaneously addresses two key user issues.

Firstly, it meets new, more arduous operational and threat requirements through software driven evolution. Secondly, it offers a maintenance-free design, further reducing cost of ownership.

Capitalising on the investment in the original Mod 0 variant of the torpedo and its supporting infrastructure, the enhanced Mod 1 weapon sustains Sting Ray's position as the world's premier lightweight, autonomous underwater weapon - for decades to come.

Currently in production for the UK MOD, Sting Ray Mod 1 has been selected by the Norwegian Armed Forces to meet the requirements of

their new anti-submarine torpedo programme.

A completely new weapon, Sting Ray set new, superior standards for software-controlled, autonomous underwater systems. It was designed to defeat the dual threats of fast, deep diving double-hulled submarines operating in the oceanic environment and the quiet, conventional submarine in coastal waters.

The enhanced performance of Sting Ray Mod 1 is underpinned by the development of new acoustic and tactical software, drawing on knowledge gained from extensive in-water trials with the Mod 0 weapon.

The tactical and processing algorithms, which incorporate leading edge technology, have been optimised using real-time hardware-in-the-loop simulation prior to in-water testing. An object orientated approach to tactical software has given greater flexibility in pursuing future developments to meet emerging threats.

Hardware improvements selected for Sting Ray Mod 1 include a substantially modified front-end array, digital signal processing, navigation and guidance computers, a new motor controller and an electro-mechanical actuation system for the control surfaces.

Other improvements, such as longer life seals and improved bearing lubrication, have been introduced in support of the maintenance free philosophy.

The existing components of the Mod 0 homing system have been replaced in Sting Ray Mod 1.

Signal processing, navigation and guidance subsystems are based on the latest Commercial Off The Shelf (COTS) hardware. These units, (which enable insertion of future software evolution, future-proofing the torpedo), include:

- A modern digital signal processor, able to execute the most advanced classification algorithms with ample capacity for further software enhancements. This enables improved target classification and better discrimination of non-target returns.
- An improved autopilot to execute the complex tactical software routines demanded by operations in shallow water environments. It is also capable of using an increased amount of data supplied by the launch platform.
- A solid-state inertial measurement unit, supporting the more complex tactical software modes employed to overcome the latest acoustic countermeasures. This new processing architecture retains 100 per cent spare capacity in terms of memory, processing throughput and bus traffic for the benefit of future performance enhancement.

The new, insensitive munition, shaped charge warhead, ensures high lethality against the most hardened submarine targets. In addition to generating a significant isotropic blast effect, the shaped charge produces a highly directional jet of molten metal to penetrate the pressure hull of the submarine and inflict catastrophic damage. The new insensitive munition Mod 1 warhead meets NATO's current and foreseeable requirements.

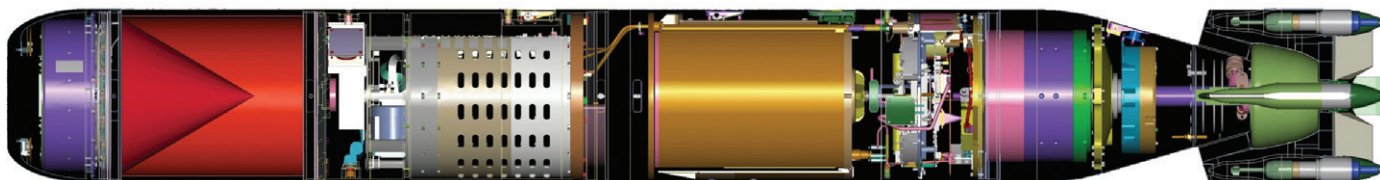
Sting Ray Mod 1's main power source is a magnesium/silver chloride

battery with a sea water electrolyte, featuring manufacture and installation improvements to the battery stack. To maximise effectiveness, Sting Ray's guidance and homing system enables precise aimpoint selection for accurate placement of the warhead at near normal incidence to the submarine pressure hull. The re-engineered nose section in Mod 1 provides optimum lethality. In trials, Sting Ray warheads produced levels of target penetration considerably in excess of that previously achieved.

The Mod 0 electro-hydraulic servo system has been replaced in Mod 1 by an electro-mechanical actuation system. The removal of seals, pumps and fluids significantly reduces support requirements.

Propulsion motor and driveshaft maintenance requirements are reduced through the incorporation of improved bearing lubrication. Longer life hull seals remove the requirement to routinely replace seals during the life of the torpedo.

Sting Ray Mod 1 has been designed to meet the requirement for a 20-year shelf life without any planned maintenance beyond periodic 'through-the-skin' testing. Building on the findings of the Sting Ray Mod 0 warstock surveillance programme, the Mod 1 weapon benefits from a series of modifications designed to improve supportability and minimise cost of ownership through the lifecycle.



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