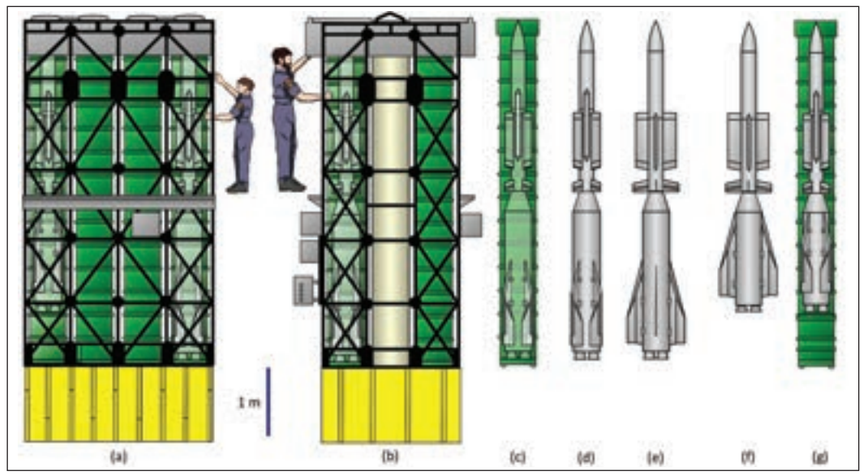
ABOVE Sea Viper silo bay and medium-calibre gun seen from bridge of HMS *Dauntless* in rough weather. *(Crown Copyright, 2012 LA(Phot) Nicola Wilson)*

RIGHT Artist's impression of the assembly of six eight-cell Sylver modules. *(Alex Pang)*



RIGHT Sylver A-50 launcher (a) side and (b) end; (c) Aster-30 missile in canister; (d) Aster-30 wings folded; (e) Aster-30 wings deployed; (f) Aster-15 wings deployed; and (g) Aster-15 wings folded on adaptor. *(Author from MBDA information)*

conventional radars because Sampson MFR requires neither a rotating waveguide joint nor high-voltage components that are mechanical and electrical weak-points prone to failure. The antenna is cooled by air chilled in the masthead room immediately below the antenna.

Aster missiles and Sylver A50 launcher

Sea Viper's Aster missiles are stored on board in six Sylver A50 launcher modules each of which can accommodate eight missiles, allowing the destroyers to carry up to 48 missiles. The Sylver launchers are protected behind a raised coaming. Looking forward from the bridge these can be seen as two pairs of 12 missile cells running fore and aft.

A mixture of two types of anti-air missiles can be carried: Aster-15 missiles and Aster-30 missiles. Both types have two stages: a booster and a common terminal stage (the Dart). The booster of Aster-30 is taller, giving these missiles a longer range and higher speed than the Aster-15. Aster missiles are highly manoeuvrable, with an acceleration of 60g – 20 times more than a Formula One racing car. Within the launcher and for transport, each missile is contained within a nitrogen-filled canister that is rectangular in cross-section. As the Sylver launcher is tall enough for Aster-30 missiles, the shorter Aster-15 missiles are mounted on an adaptor. Within the canisters

Sylver A50 vertical launch module characteristics	
Dimensions (L x W x H)	6m x 2.6m x 2.3m
including maintenance envelope	6m x 4.2m x 3.1m
Capacity	Eight Aster-15 or Aster-30 (or mixture)
Reloading time	< 90min for eight missiles

the booster wings are folded, but are deployed once the missile is launched from the canister.

The Aster Dart is a long, slim cylinder with a sharply pointed nose. It has four slim, narrow chord wings in cruciform configuration and cropped-delta tail fins. Initial acceleration is provided by the booster, and when this has burnt its fuel the Dart uses its own sustainer motor to maintain flight towards its target.

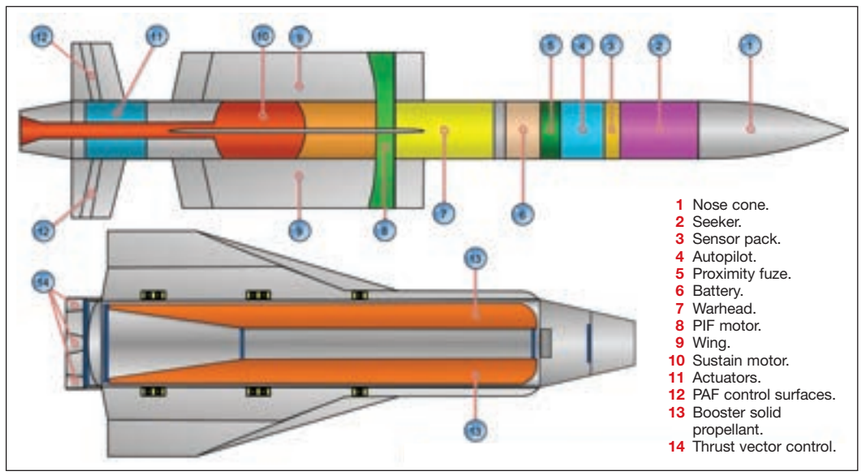
The nose of the Dart contains a radar seeker with a high-power transmitter and wide-angle antenna. In the final approach this active radar searches for the designated target. Once it acquires the target the radar then locks on to and continuously tracks it to provide data on the target's relative position and motion for terminal guidance.

The Dart is controlled by a computer processing unit ('autopilot') that gathers data from the Dart's inertial guidance unit and from the sensors monitoring its functions. Mid-course it is provided with command up-link signals from

Aster-15 and Aster-30 characteristics		
	Aster-15	Aster-30
Dart length	2.7m	
Dart diameter	0.18m	
Dart wingspan	0.49m (main fins) 0.62m (rear fins)	
Dart weight	140kg	
Dart seeker	Active pulse-Doppler	
Dart warhead	10 to 15kg focused fragmentation	
Overall weight	310kg	450kg
Overall length	4.2m	4.9m
Booster diameter	0.36m	
Booster wingspan	0.42m (folded) 0.93m (unfolded in flight)	
Propulsion	solid propellant, two-stage	
Terminal speed	Mach 3 (1,000m/sec)	Mach 4.5 (1,500m/sec)
Manoeuvrability	> 60g	
Guidance	Data up-link and terminal phase active radar seeker	
Intercept altitude	13km	20km
Range	1.7km to over 30km	3km to over 100km
Canister weight	360kg	
Canister dimensions	5.0m x 0.55m x 0.55m	

the warship and, as it approaches its target, inputs from its radar and proximity fuze. The autopilot processes the data and produces control signals for flight control, guidance and the sequencing of the missile's flight. When the proximity fuze senses the target it also initiates the firing of the warhead after a delay calculated to guarantee detonation at the optimum position. If necessary, on receipt of a correctly coded signal the unit commands the missile to self-destruct.

On the destroyer, Sea Viper has its own



LEFT Cutaway of common Aster missile Dart and booster for Aster-30. *(Author from MBDA information)*