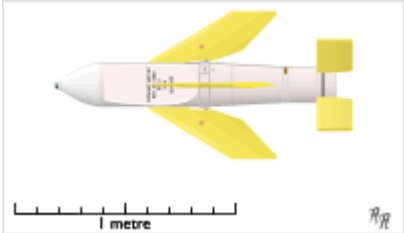
Seacat (missile)

Seacat was a British short-range surface-to-air missile system intended to replace the ubiquitous Bofors 40 mm gun aboard warships of all sizes. It was the world's first operational shipboard point-defence missile system and was designed so that the Bofors guns could be replaced with minimum modification to the recipient vessel and (originally) using existing fire-control systems. A mobile land-based version of the system was known as **Tigercat**.

Seacat	
 Seacat GWS-20 series missile	
Type	Surface-to-air missile
Place of origin	United Kingdom
Service history	
In service	1962
Used by	See *operators*
Wars	1971 Indo-Pakistani War Iran-Iraq War Falklands War South African Border War
Production history	
Designer	Short Brothers
Manufacturer	Short Brothers
Variants	See *variants*
Specifications	
Weight	68 kg
Length	1.48 m
Diameter	0.22 m
Warhead	40 lb (18 kg) continuous-rod warhead
Detonation mechanism	Proximity
Engine	2 stage motor
Wingspan	0.70 m
Operational range	500–5,000+ m
Speed	Mach 0.8
Guidance system	CLOS and radio

Contents

History

Seacat traces its history ultimately to the Short Brothers of Belfast SX-A5 experiments to convert the Malkara anti-tank missile to radio control as a short-range surface-to-air missile. This led to further modifications as the "Green Light" prototype,[1] and finally emerged as Seacat.

As it was based on an anti-tank weapon, the Seacat was small and flew at relatively slow subsonic speeds. It was thought to be useful against first and second generation 1950s jet aircraft of Hawker Sea Hawk performance, that were proving to be too difficult for the WWII-era Bofors 40/L60 guns to successfully intercept. It ultimately replaced the "Orange Nell" development programme for a lighter weapon than the enormous Sea Slug missile.

The first public reference to the name *Seacat* was April 1958, when Shorts was awarded a contract to develop a close-in short-range surface-to-air missile. Royal Navy acceptance of Seacat as a point defence system,[2] to replace the 40/L60 or the newer and more effective Bofors 40/L70 with proximity fuzed shells. It would also be useful against large, slow anti-shipping missiles like the Styx that was being

deployed by the Warsaw Pact and various clients of the Soviet Union. It was also seen as offering useful secondary roles as a lightweight weapon to use against light commercial shipping and fast attack craft.

Seacat was mounted on a powered four-round launcher which was smaller than the Mark 5 Twin Bofors and STAAG type mountings it replaced. It was also lighter, easier to maintain, and very easy to use.[3]

	link
Steering system	Control surfaces
Launch platform	Ship

The missile was shown for the first time to the general public at the 1959 Farnborough Air Show. The first acceptance trials of the Seacat on a warship was in 1961 aboard HMS *Decoy*. The Seacat became the first operational guided missile to be fired by a warship of the Royal Navy. Later it was adopted by the Swedish Navy, making it the first British guided missile to be fired by a foreign navy.[4]

Design features

The Seacat is a small, subsonic missile powered by a two-stage solid fuel rocket motor. It is steered in flight by four cruciformly arranged swept wings and is stabilised by four small tail fins. It is guided by command line-of-sight (CLOS) via a radio-link; i.e., flight commands are transmitted to it from a remote operator with both the missile and target in sight.[5] In some senses it was no more than an initially unguided subsonic rocket that took the controller about 7 seconds, or 500 yards flight time, to acquire and lock onto radar tracking and optical direction, making it useless for close in AA compared with 20/40mm guns.[6]

Variants

All Seacat variants used a common 4-rail, manually loaded, trainable launcher that incorporated the antennas for the radio command link. All that was required to fit the system to a ship was the installation of a launcher, the provision of a missile handling room and a suitable guidance system. Seacat was widely used in NATO and Commonwealth navies that purchased British equipment and has been used with a wide array of guidance systems. The four systems used by the Royal Navy are described below

GWS-20

GWS-20 Seacat launcher aboard HMS *Cavalier*

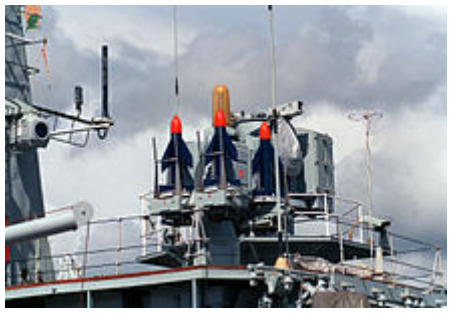
This - "Guided Weapon System 20" - was the initial system, which was intended to replace the twin 40 mm Bofors Mark V gun and its associated fire-control systems. The original director was based on the STD (Simple Tachymetric Director) and was entirely visual in operation. The target was acquired visually with the missile being guided, via a radio link, by the operator inputting commands on a joystick. Flares on the missile's tail fins aided identifying the missile. The more advanced CRBF (Close Range Blind Fire) director equipped with spin-scanning radar Type 262 for automatic target tracking could also be used.

HMS *Eagle*'s GWS-20 was trialled on board HMS *Decoy*, a *Daring* class destroyer, in 1961; it was subsequently removed. It was carried in active service by the *Fearless* class landing ships, the Type 12I *Rothesay* class frigates, the Type 61 AD frigates HMS *Lincoln* and HMS *Salisbury*, and the first group of *County* class escorts. HMS *Kent* and HMS *London* updated to GWS22 in the early 1970s. It was originally intended that all *C* class destroyers should receive GWS20 and the class were prepared accordingly. In the event only HMS *Cavalier* and HMS *Caprice* received it, in 1966 refits.

GWS-20 saw active service in the Falklands war on board the *Fearless* class and the *Rothesay* frigates HMS *Plymouth* and HMS *Yarmouth*, who retained the GWS-20 director when upgraded to GWS-22.

GWS-21

GWS-21 was the Seacat system associated with a modified Close Range Blind Fire analogue fire control director (CRBFD) with Type 262 radar. This offered manual radar-assisted (*Dark Fire*) tracking and guidance modes as well as 'eyeball' visual modes. It was carried as the design anti-aircraft weapon of the Type 81 *Tribal* class frigate, the 4 Battle class AD conversions, on the first four County class destroyers, HMNZS Otago and Taranaki and HMS Eagle. It was last used after sale to the Indonesian Navy and refit by Vospers Thornycroft in 1984 of, T81 Tartar, Ashanti and Gurkha.



Seacat launcher and GWS-22 director on HMNZS *Wellington*, a *Leander*-class frigate. Notice the operator's CCTV camera on the director and the orange dome, housing the antenna for transmitting commands to the missile

GWS-22

GWS-22 was the Seacat system associated with the full MRS-3 fire control director with Type 903 radar and was the first *ACLOS*-capable (Automatic, Command Line-Of-Sight) Seacat. It was fitted to most of the *Leander*, *Rothesay* and *County* class escorts as they were refitted and modified in the 1970s, as well as the aircraft carrier HMS *Hermes*. It could operate in automatic radar-guided (*Blindfire*), manual radar-guided, manual CCTV-guided or, in an emergency, 'eyeball' guided modes. It saw active service in the Falklands onboard all these classes.

GWS-24

The final Royal Navy Seacat variant, this used the Italian Alenia Orion RTN-10X fire control system with Type 912 radar and was fitted only to the Type 21 frigate. This variant saw active service in the Falklands.

Tigercat

A land-based mobile version of Seacat based on a three-round, trailer-mounted launcher towed by a Land Rover, and a second trailer carrying the fire control equipment. **Tigercat** was used exclusively within HM Forces by 48 Squadron RAF Regiment between 1967 and 1978 with 12 Launcher Units, being replaced in service by Rapier. Tigercat were also operated by Argentina, a total of 7 fire units were captured by the British, some being ex RAF units bought by Argentina. India, Iran, Jordan, South Africa[7] and Qatar. Argentina deployed it operationally during the Falklands conflict. No kills or any kind of success were initially believed to have been achieved by the marine-manned Tigercats, but according to more recent work a Tigercat missile scored a near-miss on 12 June, which scored substantial damage to RAF Harrier *XW 919*, spraying the local powerhouse roof with shrapnel and leaving the aircraft with category 4 damage.[8]

Tigercat three-missile launcher with inert training round (right) and transit covers in place

Hellcat

'Hellcat' an air-to-surface version to give light helicopters a capability against Fast Attack Craft and other high-speed naval targets was considered in the late 1960s.[9] Two missiles would be carried on a pair of pylons on the helicopter, with an optical sight mounted through the cabin roof. Hellcat was also considered for COIN purposes, with four missiles carried on a militarised Short Skyvan.[10] Despite being offered by Shorts for some years, it does not seem to have been sold.

SADF Hilda (*Tigercat*) missiles on launcher

Service

Seacat became obsolete due to increasing aircraft speed and the introduction of supersonic, sea-skimming anti-ship missiles. In these cases, the manually guided subsonic Seacat was totally unsuited to all but head-on interceptions and then only with adequate warning. A Seacat version was tested for intercepting targets flying at high speed near the water surface. This version used a radar altimeter, which kept the missile from being guided below a certain altitude above the surface and hence prevented the operator from flying the missile into the water. This version was never ordered.

Seacat (upper) and Seawolf missiles on display in IWM Duxford

Despite being obsolete, Seacat was still widely fielded by the Royal Navy during the Falklands war. Indeed, it was the sole anti-aircraft defence of many ships. However, unlike the modern and more complex Sea Dart and Sea Wolf systems, Seacat rarely misfired or refused to respond, in even the harshest conditions. It was capable of sustained action, which compensated for its lack of speed, range and accuracy; and, more importantly, it was available in large numbers.

After the Falklands conflict, a radical and urgent re-appraisal of anti-aircraft weaponry was undertaken by the Royal Navy. This saw Seacat rapidly removed from service and replaced by modern weapons systems such as Goalkeeper *CIWS*, more modern 20 mm and 30 mm anti-aircraft guns and new escorts carrying the Sea Wolf missile, including the vertical launch version.

The missiles were fitted to the four Swedish *Östergötland*-class destroyers, replacing three Bofors L/70 guns (a more modern and heavier variant than the Royal Navy's L/60) with a single launcher on each ship. The *Östergötland*-class destroyers, which were of late 1950s origin, were retired in the early 1980s.

Seacat was mounted on all six "River"-class destroyer escorts of the Royal Australian Navy and was removed from service when the final ship of this class was decommissioned in the late 1990s. In their final variant, fire control was provided by a GWS-21 guidance system supported by a Mk 44 fire control computer. Secondary firing positions based on visual tracking of the target through binoculars mounted on a syncro-feedback mount was also available. HMAS *Torrens* was the final ship to live fire the system prior to its removal from service; and this was also the only time three missiles were on the launcher and fired in sequence, resulting in one miss and two hits on towed targets.

Operators

Map with Sea Cat operators in blue

Argentina

- Argentine Army: Four Tigercat launchers captured in the Falklands Conflict.
- Argentine Navy: Two Seacat launchers installed on the cruiser ARA *General Belgrano* in 1967.[11]
- Argentine Marines: Three Argentine Marines' Tigercat launchers captured in the Falklands Conflict. Now replaced with RBS 70.

Australia

- Royal Australian Navy

Brazil

- Brazilian Navy

Chile

- Chilean Navy

Germany
Indonesia

- Indonesian Navy now retired

India

- Indian Army - Tigercat
- Indian Navy - Seacat

Iran

- Imperial Iranian Air Force- Tigercat
- Islamic Republic of Iran Army- Tigercat
- Islamic Republic of Iran Navy- Seacat

Jordan

- Royal Jordanian Land Force- Tigercat

Libya

- Libyan Navy

Malaysia

- Royal Malaysian Navy

New Zealand

- Royal New Zealand Navy

Netherlands

- Royal Netherlands Navy

Nigeria

- Nigerian Navy

Philippines
Pakistan

- Pakistan Navy Type 21 frigate

Qatar

- Military of Qatar - Tigercat

South Africa

- South African Air Force- Tigercat, known as 'Hilda' locally[12]

Sweden

- Swedish Navy - Östergötland Class destroyers after refit

Thailand

- Royal Thai Navy

United Kingdom

- Royal Air Force - Tigercat
- Royal Navy - Seacat

Venezuela

- Navy of Venezuela

Zimbabwe

- Army of Zimbabwe - Tigercat

See also

- Rainbow Codes
- of test firings of Seacat, 1959

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2. Rear Admiral Enerble said in 1960 that Seacat was so accurate it could be directed through a small window in the Admiralty.
3. The RNZN officer sent to the UK to investigate Seacat in 1961 commented that it was "so ridiculously easy to use, we have to have it" according to ret Capt. Ian Bradley
4. Flight (1963), p. 438.
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