

# ARCHIVED REPORT

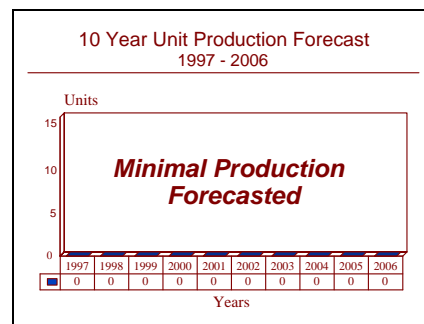
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## Mk 23 TAS - Archived 5/98

### Outlook

- In service and in production, with ongoing logistics support and upgrades
- Has been US-only program, but Hughes is marketing it to Denmark, Norway and Germany
- Other potentials include Belgium, Canada, the Netherlands and Spain
- No new orders from US DoD; production probably coming to an end



### Orientation

**Description.** Seaborne Target Acquisition System, combined search radar and combat control system for the NATO Sea Sparrow point defense system.

#### Sponsor

US Navy  
Naval Sea Systems Command (NAVSEA)  
2531 Jefferson Davis Highway  
Arlington, Virginia (VA) 22202  
USA  
Tel: +1 703 602 3381

#### Contractors

Hughes Aircraft Co  
Radar & Communications Systems  
P.O. Box 92426  
El Segundo, California (CA) 90009-2426  
USA  
Tel: +1 310 334 1665  
Fax: +1 310 334 1679  
[Acquisition by Raytheon in process]

**Status.** In service, in production, ongoing logistic support.

**Total Produced.** Through 1996, an estimated 100 units had been produced or contracted.

**Application.** Naval vessels carrying the Sea Sparrow surface-to-air missile system.

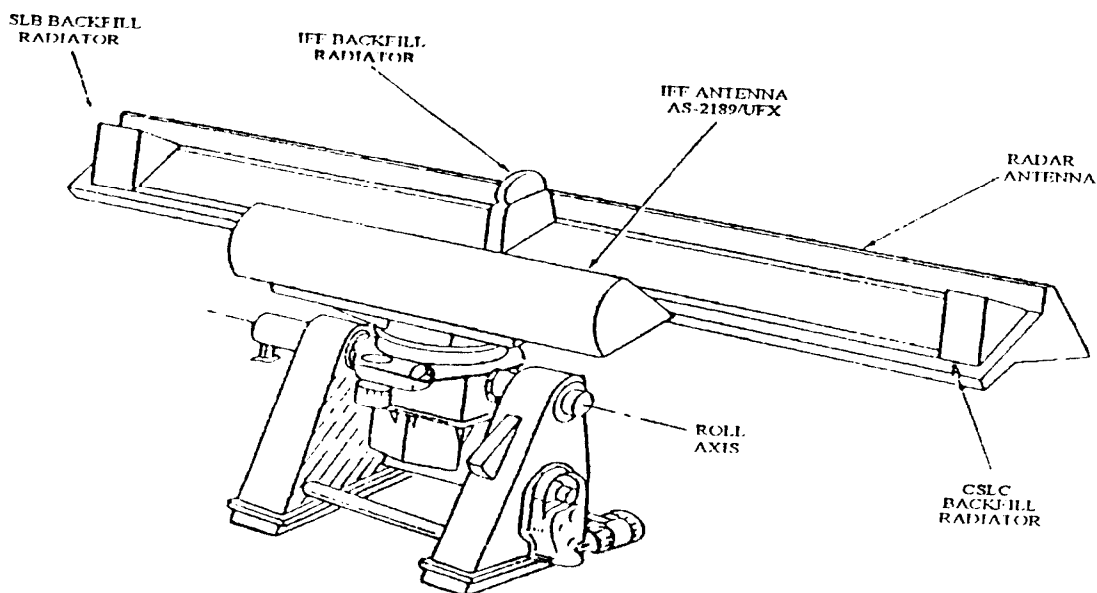
**Price Range.** The Navy listed a unit price of US\$9.5 million in FY93.

## Technical Data

Dimensions	<u>Metric</u>	<u>US</u>
Antenna		
Height:	328 cm	129 in
Width:	815 cm	231 in
Depth:	193 cm	76 in
Weight:	908 kg	2,000 lb
Weight (total):	4,540 kg	10,000 lb

### Characteristics

Frequency:	1-2 GHz
Power:	200 kW (peak)
Scan rate:	15 or 30 rpm
Elevation coverage:	0-75°
Azimuth coverage:	360°
Vertical coverage:	90°
Range:	20 nm (1 m <sup>2</sup> target) 100 nm (secondary surveillance)
Target capacity:	54 simultaneous targets
Modes:	Point defense Surveillance & air control Mixed/dual mode Selective/emissions control
Subsystems:	Pulse-Doppler radar Computer unit UYK-20 or UYK-44 UYA-4 display Mk XII IFF system Antenna group



TARGET ACQUISITION SYSTEM (TAS) ANTENNA

Source Forecast International

**Design Features.** The Mk 23 Target Acquisition System (TAS) combines search, acquisition, and combat control capabilities into a single unit. Hughes incorporated several upgrades that improved response times, expanded radar coverage and increased overall system flexibility and reliability, incorporating Very High Speed Integrated Circuit (VHSIC) components. This change reduced the digital signal processor system response time by at least 35 percent.

The acquisition radar operates as a range-gated, pulse-Doppler system. The IFF antenna is mounted back-to-back with the search antenna. Transmitted energy is concentrated in the lower elevations of a fan-shaped beam to be especially sensitive to low-level, sea-skimming targets. The feed system uses up of 26 flared feed horns and has a side-lobe blanking system.

A phased array antenna could give the Mk 23 TAS a 4-D capability (bearing, range, elevation angle, and range rate). This could reduce weapons response time and enable the system to function as a designation radar for new fire-and-forget weapons such as the RIM-116A rolling airframe missile.

**Operational Characteristics.** The Mk 23 is a sea-based, two-dimensional, D-band, pulse-Doppler radar, part of the Improved Point Defense Missile System (IPDMS). IPDMS is a surface-to-air system, that provides a ship with defense from an anti-ship missile threat. It reacts automatically to threats in a variety of environmental and weather conditions. It improves the point defense capability of major combatants and auxiliary warships in carrier battle groups and surface action groups.

IPDMS is formed through the integration of the RIM-7 NATO Sea Sparrow point defense missile system

(PDMS), fire-control unit, launch system and the Mk 23 TAS. Although developed as a subsystem to the IPDMS, the Mk 23 can designate targets for other weapon systems, such as guns.

The TAS can detect targets in clutter and discriminate between targets in an ECM environment. The UYA-4 console contains the controls and indicators for launch system assignment, missile frequency assignment, missile run-up, firing orders and status monitoring. This console allows the firing officer to override the automatic operation at any time during the target engagement sequence.

The Mk 23 TAS can track friendly ships in the area as well, allowing for safer gun operations. With a modification, the system can be tied directly into the SLQ-32 ESM system, providing correlation of ship sensor reports, electronic warfare system angle-of-arrival reports, and radar data.

The system has four operating modes:

The normal point defense mode is used to detect, identify and track missiles at a range beyond 20 miles and engage them with anti-missile missiles.

The surveillance, or medium range mode offers a 90+ mile detection range for surveillance and air traffic control.

Mixed mode is a combination of normal point defense and long-range modes.

Emission Control (EMCON) permits the operator to scan selected corridors. It automatically switches the system on and off to avoid detection by hostile RF collection systems.

## Variants/Upgrades

**Mod 1** provides direct computer-to-computer interface with the NATO Sea Sparrow missile and with a ship's tactical data system.

**Mod 2** is used aboard ships that do not have the Navy Tactical Data System (NTDS). Both versions are fully automatic from detection to weapon designation and

missile launch. The system can be overridden by the operator for performing other functions such as sector surveillance.

**Mk 23M** An improved version with a reported maximum detection range of over 150 nm.

## Program Review

**Background.** Hughes started development of the Mk 23 in the early 1970s. Then known as the TAS, the system was developed under a three-year, US\$30 million contract. The Mk 23 first went to sea aboard the frigate USS

*Downes* (FF-1070) in 1975 for three years of sea trials. These were held in conjunction with sea trials of the RIM-7 NATO Sea Sparrow.

During FY83, Hughes initiated a company-funded program to modify the two-dimensional Mk 23 into a 3-D system. This allowed the Mk 23 to provide target elevation, an important parameter for close-in defense weapons. Other modifications included a new antenna and changes to the transmitter. The improved system was designated the Mk 23M and reportedly has a maximum detection range over 150 nm.

US Navy procurement of the Mk 23 continued. Production systems were equipped with the new UYK-44 32-bit computer in late 1984 to increase throughput speed and expand memory from 60K to 512K words.

The upgraded system was programmed for fleetwide operational service in FY90. Hughes continues other Mk 23 TAS modification and upgrade efforts. Computer capacity and processing speed as well as expanded memory capacity are among the major enhancements planned.

Generic Simulator Program. In March 1995, the Naval Sea Systems Command announced that they were conducting a market survey to identify sources to provide Generic Navy Stimulators/Simulators (GNSS). The GNSS is to be built to Open System Architecture (OSA) standards incorporating a functionally modular design using non-developmental items and commercial off-the-shelf products as well as industry-defined software and communication interface standards. An overall objective in the design and development of the

GNSS is to provide the Navy with the most cost effective system which makes maximum use of the inherent Battle Force Tactical (BFTT) System capabilities, while allowing as much flexibility as possible for future growth.

According to the *Commerce Business Daily* announcement, the government will solicit plans to develop, manufacture, install, and maintain standardized radio frequency (RF) and intermediate frequency (IF) stimulators and digital simulators for the surface Navy, on a variety of surface platforms. The GNSS shall consist of a GNSS controller Versa Module Eurobus (VME) and a ship-specific number (1-6) of Radar Signal Generator enclosures capable of producing, either by stimulation or simulation, modeled radar return signals and/or video signals associated with the following radar sets: AIMS Mk XII IFF, SPN-35, SPN-43, SPN-46, SPQ-9B, SPS-40 Series, SPS-48 Series, SPS-49 Series, SPS-55 Series, SPS-67 Series, TPX-42, UPX-29, UPX-30, UPX-36, Mk 23 TAS, and Mk 95 NSSMS.

The Navy anticipated issuing a final RFP in May 1996 with a cost plus incentive fee development and test contract award in the fall of 1996. The contract would contain fixed price options for five subsequent years of production equipment. In addition, product improvement engineering and engineering support would be procured throughout the contract's period of performance.

## Funding

	US FUNDING							
	FY96		FY97		FY98 (Req)		FY99 (Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
<u>Procurement</u> (USN)								
Mk 23 TAS	-	5.4	-	1.3	-	1.9	-	2.0

All US\$ are in millions.

## Recent Contracts

(Contracts over US\$5 million.)

<u>Contractor</u>	<u>Award</u> (\$ millions)	<u>Date/Description</u>
Hughes	23.1	Jul 1996 - CPFF contract for the privatization of the life-cycle maintenance support for the Mk-15 Phalanx CIWS and Mk-23 TAS programs. Options could bring the contract value to US\$149.9 million. Complete Sept 2001. (N00024-96-C-5431)

## Recent Contracts

(No recent contracts over US\$5 million recorded.)

## Timetable

1970s	Initial development
FY78	Initial production
FY81	First production delivery
1983	Mk 23M development began
1985	Phased array antenna development began
1990	Mk 23M entered service
1997	Last anticipated production

## Worldwide Distribution

The **US Navy** has installed the system on the following:

AOE-1 and AOE-6 fast combat support ships  
 AOR-1 replenishment oilers  
 CV-59, CV-63 CV-68 and CVN-65 aircraft carriers  
 DD-963 destroyers  
 LHD-1 amphibious assault ships

**Japan** has reportedly ordered the Mk 2/23 for its DDG-173 guided missile destroyers.

Hughes is marketing the system to **Denmark, Norway** and **Germany**.

## Forecast Rationale

Self-defense is a high priority, with the Navy anti-ship weapons becoming more potent and as the Fleet faces more combat in close-in situations. The Mk 23 has been installed on a variety of ships as part of the multilayered air defense system for aircraft carriers. It provides DD-963 *Spruance* class destroyers a vitally needed air defense capability for ships operating in confined, littoral areas.

The modestly priced Mk 23 TAS is compatible with a wide array of US and allied combatants. It plays a major role in the defense of many of the Navy's surface ships, both combatants and auxiliaries. In the surveillance mode, it functions as an air search radar, while in the close-in mode, it is a missile-guidance radar. Hughes expects this system, and its planned upgrades, to have detection ranges nearly as great as long-range, three-dimension air search radars such as the Hughes SPS-52C.

Japan ordered four Mk 23 systems via FMS for its new destroyers. The Mk 23 potential export market could include Denmark, Norway, Germany, Belgium, Canada, the Netherlands and Spain. All these nations operate ships with the Sea Sparrow point defense missile system and are beginning to increase their emphasis on defending their fleets. Orders have not been announced.

No naval ship can be at sea without self-protection. As threats become more sophisticated, the need for advanced target acquisition and defensive equipment increases. With the strategic climate has shifted from superpower confrontation and nuclear conflict to contingency operations anywhere and everywhere, individual ships must be able to protect themselves.

Additional procurement beyond the forecast is possible, but not likely. New ships are using other systems for their fire control systems.

## Ten-Year Outlook

		ESTIMATED CALENDAR YEAR PRODUCTION											
		<u>High Confidence</u>				<u>Good Confidence</u>				<u>Speculative</u>			
		<u>Level</u>				<u>Level</u>							Total
Designation	Application	thru 96	97	98	99	00	01	02	03	04	05	06	97-06
MK 23 TAS	Surface Ships	100	1	0	0	0	0	0	0	0	0	0	1