

# ARCHIVED REPORT

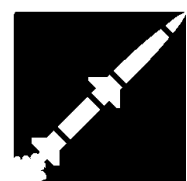
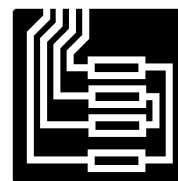
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## Kaman SH-2 Seasprite

### Outlook

- Australia has decided to retire the SH-2 rather than fix ITAS software problems
- United States funding Seasprite work for Egypt
- **Note:** Icons indicate area(s) of current and potential retrofit/modernization activity



### Orientation

**Description.** Twin-turboshaft-engine multipurpose naval helicopter.

**Application.** Anti-submarine warfare, anti-ship defense, search and rescue, utility.

**Current Status.** The last new-production SH-2 helicopter was completed in 1992. The SH-2G remains available for order as either a new-build aircraft or a conversion of an existing SH-2F.

**Price Range.** The FY86 unit cost of an SH-2F was \$9.6 million. The price of an SH-2G conversion is \$12-\$15 million, fully equipped.

**Total Produced.** A total of 190 UH-2s were produced, in addition to 54 new-production SH-2Fs and six new-production SH-2Gs.

### Contractors

#### Prime

<b>Kaman Aerospace Corp</b>	<a href="http://www.kamanaero.com">http://www.kamanaero.com</a> , Old Windsor Rd, PO Box 2, Bloomfield, CT 06002-0002 United States, Tel: + 1 (860) 242-4461, Fax: + 1 (860) 243-7514, Prime
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### Technical Data

(SH-2G)

Metric

U.S.

Dimensions

## Kaman SH-2 Seasprite

	<u>Metric</u>	<u>U.S.</u>
Length	16.0 m	52.50 ft
Height	4.10 m	13.50 ft
Main rotor diameter	13.50 m	44.29 ft
Tail rotor diameter	2.44 m	8.0 ft
<b>Weight</b>		
Gross weight	6,441 kg	14,200 lb
<b>Performance</b>		
VNE	278 kmph	150 kt
Service ceiling	6,218 m	20,400 ft
Max range	1,002 km	540 nm
<b>Propulsion</b>		
Two General Electric T700-GE-401 turboshafts		
Thrust (each)	1,285 kW	1,723 shp

**Armament.** One or two Mk 46 torpedoes. Provision for pintle-mounted 7.62mm machine guns in both cabin doorways.

## Program Review

The U.S. Navy initiated a design competition in 1956 for a high-speed, all-weather utility helicopter. Kaman's design was declared the winner of the competition later that year, and the company received a contract in November 1957 for four prototype aircraft and 12

production helicopters. The original Navy designation of the Seasprite was HU2K-1, which was changed in 1962 to UH-2A. The initial prototype flew for the first time in July 1959.

## Variants

**UH-2A.** Kaman produced 88 of the UH-2A version. It was powered by a single T58-GE-8B turboshaft rated at 932 kW (1,250 shp). The UH-2A entered service in December 1962.

**UH-2B.** In 1963, Kaman introduced the UH-2B with reduced navigation avionics. The U.S. Navy acquired 102 UH-2Bs. UH-2Bs were also powered by a single T58-GE-8B turboshaft engine.

**UH-2C.** The desirability of increased power for the UH-2 series became apparent. As a result, the U.S. Navy retrofitted UH-2A/Bs to the twin-engine UH-2C configuration. The service began taking delivery of the upgraded aircraft in August 1967.

**NUH-2C.** A single UH-2C modified to fire Sparrow and Sidewinder air-to-air missiles. It was tested at the U.S. Navy's Pacific Missile Range, Point Mugu, California, by the Naval Air Test Center and Raytheon Company, and later uprated and redesignated the NHH-2D. In this configuration, the aircraft was used for special test programs.

**HH-2C.** Six UH-2Cs converted to armored gunships and used for search-and-rescue missions. All HH-2Cs were later converted to the SH-2 configuration.

**HH-2D.** This variant was similar to the HH-2C but lacked armor and armament. Sixty-seven HH-2Ds were produced in the early 1970s. These were converted from earlier single-engine models.

**SH-2D.** Initial SH-2 Light Airborne Multi-Purpose System (LAMPS) configuration for the U.S. Navy. Designed primarily for anti-submarine warfare (ASW) missions, the SH-2D carried the following: a Canadian Marconi LN-66 high-power surface search radar, a Texas Instruments ASQ-81 magnetic anomaly detector (MAD), 15 SSQ-47 active or SSQ-41 passive sonobuoys, an ALR-54 electronic support measures (ESM) system, and Mk 44 or Mk 46 ASW homing torpedoes. It was powered by twin General Electric T58-GE-8F engines rated at 1,350 shp each. All SH-2Ds were converted from earlier aircraft.

**SH-2F.** In May 1973, a further modified version, the SH-2F LAMPS Mk I, was first delivered to the U.S. Navy, and Kaman delivered 88 conversions of earlier H-2s to this standard. In a program completed in March 1982, earlier SH-2Ds were upgraded to SH-2Fs. In addition, Congress authorized the procurement of 54 new-production SH-2Fs.

## Kaman SH-2 Seasprite

The SH-2F was equipped with an improved LN-66HP surveillance radar, the General Instruments ALR-66 ECM system, the Teledyne ASN-123C tactical navigation system, Collins ARC-159(V)1 UHF radios, a Texas Instruments ASQ-81(V)2 MAD, 15 DIFAR and DICASS sonobuoys, and one or two Mk 46 torpedoes.

**SH-2G.** In June 1987, Kaman received an \$88 million contract from the U.S. Navy for a new version of the SH-2, designated the SH-2G Super Seasprite. This version is powered by General Electric T700-GE-401

turboshaft engines. Delivery of six new-build SH-2Gs to the Navy began in 1992. The service also ordered conversions of 18 SH-2Fs to the SH-2G standard. The SH-2G features new avionics, including a 1553B digital databus, an onboard acoustic processor, upgraded tactical navigation equipment, and a 99-channel sonobuoy receiver. The initial converted SH-2G was delivered to the Navy in 1991.

## Funding

The U.S. Navy last received funding for H-2 series modifications in FY93. The H-2 has been retired from U.S. Navy service.

## Milestones

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1956	Kaman declared winner of U.S. Navy design competition for high-speed, all-weather utility helicopter
Nov	1957	Kaman receives initial Seasprite contract
Jul	1959	First flight of Seasprite prototype
Dec	1962	UH-2A enters U.S. Navy service
Aug	1963	UH-2B enters shipboard service
Aug	1967	First deliveries of UH-2Cs
Oct	1970	Kaman awarded contract for LAMPS conversion (SH-2D)
May	1973	First SH-2F deliveries
Jun	1987	Kaman awarded SH-2G contract by U.S. Navy

## Worldwide Distribution/Inventories

<b>Operator</b>	<b>Designation</b>	<b>Quantity</b>	<b>Average Age</b>
Egypt Air Force	SH-2G	12	22.50
New Zealand Navy	SH-2G	5	21.00
Poland Navy	SH-2G	4	16.00

## Identified Retrofit & Modernization Contractors

### Airframe

<b>Kaman Corp</b>	<a href="http://www.kaman.com">http://www.kaman.com</a> , 1332 Blue Hills Ave, PO Box 1, Bloomfield, CT 06002-001 United States, Tel: + 1 (860) 243-7100, Fax: + 1 (860) 243-6365, Email: <a href="mailto:info.kaman-corp@kaman.com">info.kaman-corp@kaman.com</a> (Upgrade; Rotor Blades Upgrade)
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### Armament

<b>Kaman Corp</b>	<a href="http://www.kaman.com">http://www.kaman.com</a> , 1332 Blue Hills Ave, PO Box 1, Bloomfield, CT 06002-001
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## Kaman SH-2 Seasprite

	United States, Tel: + 1 (860) 243-7100, Fax: + 1 (860) 243-6365, Email: info.kaman-corp@kaman.com (Anti-Ship Missiles Upgrade)
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## Related News

**Seasprites to Face the Axe** – The Australian Navy's troubled fleet of SH-2 Seasprites is to be axed, according to Australian defense industry reports. The program, which is running more than six years late, will be abandoned and additional MRH-90 helicopters procured to take the SH-2's place. The Australian Defence Department has estimated that the Seasprites won't be fully operational until 2010 at the earliest. Nine Seasprites have been provisionally handed over to the Navy, but the fleet has been grounded while software problems and air certification issues are sorted out. (*The Australian News*, 2/08)

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## Opportunities

Though the SH-2 is still operated by several nations, Australia's highly publicized trouble with the aircraft has done little to help its reputation.

that were converted to the SH-2G standard and six new-production SH-2Gs. Delivery began in 1991. In 1990,

### AIRFRAME

**SH-2G Upgrade.** During the 1990s, the U.S. Navy took delivery of 18 conversions of SH-2F helicopters to the SH-2G configuration. The service also took delivery of six new-production SH-2Gs.

Under the SH-2G conversion program, the T58 engines of the SH-2F were replaced by two General Electric T700-GE-401 turboshaft engines, rated at 1,285 kW (1,723 shp) each. These powerplants increased the time-on-station of the aircraft by 55 percent. Other modifications included installation of new avionics, replacement of the aircraft roof structure with a redesigned assembly to assure structural integrity, rework of severely corroded areas, installation of modified webbing in the aircraft structure to alleviate cracking, a complete rewiring of the electrical system, and replacement of door tracks and the sensor window assembly.

A tailored standard depot-level maintenance (SDLM) was performed concurrent with the modification. Completion of the upgrade resulted in a zeroing of the service period of the aircraft, the establishment of a new service life of at least 10,000 flight hours, and redesignation as an SH-2G helicopter.

In June 1987, Kaman was awarded an \$88 million contract, with initial funding of \$55 million, for the block upgrade effort. The contract covered design, development, and qualification to incorporate the engines and avionics in the helicopters, ground and flight testing, and installation in eight aircraft previously ordered by the Navy. These eight included two SH-2Fs

## Kaman SH-2 Seasprite

Kaman was awarded a \$79 million follow-on contract by the Navy to upgrade 12 additional SH-2Fs to the SH-2G standard. In August 1991, the company received a \$30.2 million contract from the Navy to convert four additional SH-2Fs to the SH-2G configuration.

The T700 engine and drivetrain demonstration was completed in FY85. An initial drivetrain qualification program was completed in FY88. Developmental testing of the integrated system software commenced in November 1989. First flight of the prototype aircraft occurred in December 1989. A Critical Design Review was conducted in January 1990.

In 2003, Kaman essentially completed the production of 11 SH-2G(A) helicopters that are to be operated by the Royal Australian Navy (RAN) from a number of its ships. The SH-2G(A)s were converted from ex-U.S. Navy SH-2s.

In addition to Kaman, other companies involved in the Australian SH-2G(A) program include CSC Australia Pty Ltd, GE Transportation Aircraft Engines, Northrop Grumman Information Technology, Safe Air Ltd, Scientific Management Associates, and Transfield Defence Systems.

Originally, Litton Guidance and Control Systems was to supply the SH-2G(A)s Integrated Tactical Avionics System (ITAS) software. However, the company later exited the program. In 2002, Kaman selected Northrop Grumman Information Technology and CSC Australia to complete development of the software. The need to select new subcontractors for this work resulted in schedule delay.

In July 2003, Kaman announced that, following the successful completion of an important performance milestone for the ITAS software, the Australian government had agreed to proceed with provisional

acceptance of the SH-2G(A)s. The RAN intended to use the aircraft for training purposes until the full ITAS was installed.

### *A Little Turbulence*

However, an "important milestone" could only hold off criticism for so long. In mid-2006, Australia grounded all SH-2Gs pending completion of the ITAS software, and applied intense pressure to Kaman through threats of contract cancellation. Kaman countered with a threat of legal action, but the conflict cooled in May 2007 when the Department of Defense pledged another \$82 million for the program.

This hardly settled the controversy and, by February 2008, the Seasprite was on the chopping block again. This time, the Australian Defence Department decided to abandon the SH-2 entirely and instead purchase additional MRH-90s.

The Royal New Zealand Navy (RNZN) currently operates five SH-2G(NZ) helicopters. The SH-2G(NZ)s combine refurbished dynamic components with new airframes. Delivery of the initial four helicopters occurred in 2001, followed by the fifth in 2003.

In September 2004, Kaman and BAE Systems Avionics Group began cooperating on development of a maritime helicopter package based on the SH-2G and a BAE mission system and sensor suite. Initial efforts were to focus on NATO-interoperable communications and navigation systems, autonomous self-protection suites, sensor and target acquisition packages, and anti-submarine and anti-surface weapons.

### **ELECTRONICS**

Avionics Upgrade. In February 1995, Kaman received a \$31 million contract from the U.S. Navy to provide long-lead materials and services to upgrade 10 SH-2Fs to the SH-2G(E) configuration for Egypt under the Foreign Military Sales program.

Kaman remanufactured 10 SH-2Fs from the U.S. Navy inventory into the G configuration for Egypt. The total value of this work was approximately \$150 million. The helicopters are operated from leased U.S. Navy Knox class frigates. Deliveries of the SH-2G(E)s to Egypt began in October 1997 and were completed in October 1998.

In mid-2006, the U.S. Naval Air Systems Command awarded Kaman a \$3.6 million contract modification for upgrades to the automated flight control systems of Egypt's Super Seasprites.

### **PROPULSION**

## Kaman SH-2 Seasprite

Composite Main Rotor Blade Upgrade. In 1999, Kaman completed flight tests of new Composite Main Rotor Blades (CMRB II) aboard an SH-2G. The new blades were intended to reduce life-cycle costs for the SH-2G, and provide the opportunity to increase the gross weight of the helicopter (if desired). The blades are designed for greater durability and damage tolerance. They also lend themselves to faster field repairs.

Compared to the previous aluminum Dash 101 main rotor, the CMRB II improves hover performance and acts to reduce fuel consumption. The CMRB II has a service life of more than 15,000 flight hours, depending on use. By comparison, the Dash 101 rotor has a life of 3,700 hours.

The new blades are now the production standard for the SH-2G. They were installed on the 11 SH-2G(A)s built for the Royal Australian Navy. The five SH-2G(NZ)s in the Royal New Zealand Navy fleet are also fitted with the blades. The new blades could be retrofitted to other existing SH-2s.

### **ARMAMENT**

Air-to-Surface Missile Integration. In September 1991, BAE released details of its proposal to arm SH-2G and SH-60B helicopters with the Sea Skua anti-ship missile. The Sea Skua installation for the SH-2G features a duplication of the starboard-mounted pylon (used to deploy a dipping sonar) on the aircraft's port side, permitting the carriage of two Sea Skuas on each pylon. The RAN asked Kaman to clear the Sea Skua for the SH-2G as part of the company's bid for that service's frigate helicopter program. However, the Kongsberg Penguin anti-ship missile was eventually selected to arm the RAN's SH-2G(A)s.

In early 2005, Kaman successfully completed safe separation jettison testing of the SH-2G(A)'s Penguin missile at the U.S. Naval Air Station in Patuxent River, Maryland. The testing is a step in completing full certification of the weapon on the SH-2G(A).

The five SH-2G(NZ)s in the Royal New Zealand Navy fleet are armed with Raytheon Maverick air-to-surface missiles. At the U.S. Army's Yuma Proving Grounds in February 1996, an SH-2G successfully fired three Mavericks.

## Kaman SH-2 Seasprite

## FI's Opportunity Outlook

PROPULSION													
		High Confidence				Good Confidence			Less Confidence				
Status		Thru 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Estimated Potential Candidates	32	<b>Composite Main Rotor Blade Upgrade</b> <> SH-2 <> Worldwide											
<b>Planned/In Progress</b>		0	0	0	0	0	0	0	0	0	0	0	0
<b>Speculative</b>			3	3	3	3	2	1	0	0	0	0	15
ELECTRONICS													
		High Confidence				Good Confidence			Less Confidence				
Status		Thru 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Estimated Potential Candidates	23	<b>Avionics Upgrade</b> <> SH-2 G <> Egypt <> Air Force											
<b>Planned/In Progress</b>		9	1	0	0	0	0	0	0	0	0	0	1
<b>Speculative</b>			2	2	2	1	0	0	0	0	0	0	7
ARMAMENT													
		High Confidence				Good Confidence			Less Confidence				
Status		Thru 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Estimated Potential Candidates	32	<b>Air-to-Surface Missile Integration</b> <> SH-2 <> Worldwide											
<b>Planned/In Progress</b>		0	0	0	0	0	0	0	0	0	0	0	0
<b>Speculative</b>			4	4	4	4	2	1	0	0	0	0	19