

# ARCHIVED REPORT

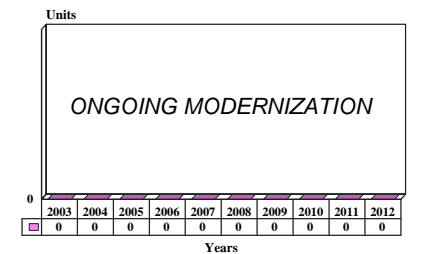
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## Lockheed S-3 Viking - Archived 4/2003

### Outlook

- Critical avionics, UHF/VHF upgrades continue
- Navy is flight-testing new APS-137 SAR on S-3B, possibly refitting inventory with higher capability system
- New APS-137 may also be featured in new surveillance system upgrade

10 Year Unit Production Forecast  
2003 - 2012



### Orientation

**Description.** Twin-turboprop-powered, special-purpose military aircraft.

**Sponsor.** US Navy Naval Air Systems Command, Washington, DC.

**Contractor.** Lockheed Martin Corp, Lockheed Aeronautical Systems Co, Burbank, California, USA.

**Status.** Series production ended in 1978. Mission upgrades continue.

**Total Produced.** A total of 187 S-3A Vikings were produced; 112 US/S-3Bs remain in the active inventory.

**Application.** S-3, carrier-based anti-submarine warfare; US-3, carrier onboard delivery; ES-3, monitoring of hostile communications.

**Price Range.** S-3A to S-3B conversion, approximately \$5 million. The cost of the mission avionics for the ES-3A conversion was approximately \$12 million per aircraft, and the modification kit cost approximately \$4 million per aircraft.

### Technical Data

(S-3A)

	<u>Metric</u>	<u>US</u>
<b>Dimensions</b>		
Length overall	16.26 m	53.33 ft
Height overall	6.93 m	22.73 ft
Wingspan	20.93 m	68.65 ft
Wing area, gross	55.56 sq m	598.0 sq ft
<b>Weight</b>		
Empty	12,088 kg	26,650 lb
Max design gross weight	23,832 kg	52,539 lb
Normal ASW T-O weight	19,278 kg	42,500 lb

### Performance

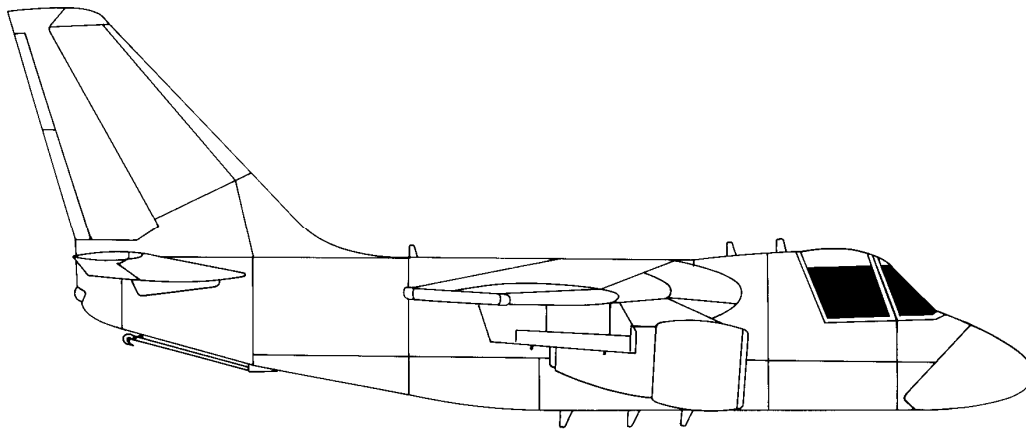
Max level speed	834 kmph	450 kt
Service ceiling	10,671+ m	35,000+ ft
Ferry range	5,558+ km	3,000+ nm

**Propulsion**

S-3 (2) GE Aircraft Engines TF34-GE-400A/B high-bypass-ratio turbofan engines rated 41.26 kN (9,275 lbst) each.

**Armament**

Split weapons bays with BRU-14/A bomb racks able to dispense four Mk 36 mines, four Mk 46 torpedoes, four Mk 50 torpedoes, four Mk 82 bombs, two nuclear B57 or four B54 depth bombs, or four Mk 53 mines. Racks on pylons can dispense additional ordnance, including bombs, flares, mines, and cluster bombs, and the racks can carry auxiliary fuel tanks and rocket pods. The aircraft also carries in its complement the following search stores: SSQ-41A (LOFAR), SSQ-53 (DIFAR), SSQ-50 (CASS), SSQ-62 (DICASS), SSQ-74B, and SSQ-36 (BT) sonobuoys. The S-3B also carries Harpoon anti-ship missiles.



LOCKHEED S-3A

Source: Forecast International



LOCKHEED S-3B

Source: US Navy

## Variants/Upgrades

S-3A. The US Navy's carrier-based, fixed-wing ASW aircraft. A total of 187 were built between 1972 and 1978.

S-3B. Upgraded version of the Viking developed under the S-3A Weapon Systems Improvement Program (WSIP). Involved the installation of state-of-the-art electronics (see **Program Review**) aboard 97 inventory S-3As and was completed in late 1994.

US-3A. Carrier on board delivery (COD) version. Converted from S-3A airframes. Five are in service.

KS-3A. Proposed tanker version derived from an S-3A for Navy evaluation. Eventually converted to US-3A.

ES-3. Designation for 16 S-3As converted for the E-X electronics intelligence role through the addition of the mission equipment used on the Lockheed EP-3E. Replaced the EA-3.

## Program Review

**Background.** Development of the Lockheed S-3A Viking stemmed from a late 1960s US Navy requirement for a replacement for the aging Grumman S-2 ASW (anti-submarine warfare) aircraft. Lockheed's four-man, twin-turbofan design was selected over a General Dynamics entry in a 1969 evaluation. A total of 187 aircraft were produced by Lockheed-California between 1972 and 1978, with approximately 160 aircraft currently remaining in the Navy's inventory.

Development of the S-3 was undertaken by Lockheed in partnership with LTV Corp's Vought Systems Division and Sperry Rand's Univac Federal Systems Division. Vought designed and built the wing, engine pods, tail unit, and landing gear. Univac designed and built the digital computer. First prototype flight took place in January 1972, and initial deliveries to the Navy were made by February 1974.

For its ASW role, the Viking carries a variety of sonobuoys and an ASQ-81 magnetic anomaly detection boom which can be extended from the rear fuselage. Other equipment includes a Texas Instruments APS-116 high-resolution radar, a forward-looking infrared (FLIR) scanner in a retractable turret, and passive electronic countermeasures (ECM) in wingtip pods.

Critical Structures Upgrade (SLAP). The US Navy is upgrading several airframe components of its S-3B and ES-3A aircraft to ensure their operational capabilities into the year 2015. This project replaces the windshield temperature controller and modifies the wing fold lug, horizontal stabilizer hinge fitting, flight control elements, fuel flow/bleed air select vent valves, counterweights, flap track ribs, wingfold actuator lug, and Kapton wiring. Kit installations, scheduled aboard 111 aircraft through early FY04, were begun in FY00.

The S-3 SLAP (service life assessment program) was funded at \$49 million through FY02, and the Navy will

seek an additional \$3 million in FY03-04 to complete the effort.

UHF/VHF Upgrade. The ARC-156 UHF radio aboard the S-3B is being replaced with the improved ARC-187, which will also meet JCS (Joint Chiefs of Staff) requirements for UHF SATCOM users. The Viking currently lacks a VHF set, but will be fitted with the ARC-182. The Navy plans to refit 111 S-3Bs; installations are being performed in FY00-06.

Through FY01, this project was funded at \$83.1 million; total program cost is estimated at \$153 million.

The service had modified 35 aircraft through FY02 and plans to complete the project in the FY07-08 time frame.

S-3B Critical Avionics Upgrade. The Navy is replacing/ upgrading critical systems approaching obsolescence aboard its S-3Bs. The aircraft's Flight Data Computer, tactical displays, armament control system (ARMCOS), and electronic flight instruments (EFI) are to be replaced, while the current ASN-92 CAINS I inertial nav system is to be replaced with the ASN-139 CAINS II system. Lockheed Martin is performing the CAINS upgrade.

The service plans to retrofit 111 aircraft at a total cost of \$203 million. Kit installation was initiated in FY01 and will be completed at the end of FY03.

Co-Processor Memory Unit. A new start in FY96, funded at \$4.29 million, this project replaces the current MU-576 drum memory storage unit to permit the S-3B to fully perform its tactical mission. The Navy plans 66 kit installations, 56 of which had been completed through FY02. The final installations will take place in early FY04.

The Navy had funded this project at \$47.8 million through FY02. Total program costs are estimated at \$50.4 million.

Surveillance System Upgrade (SSU). During the initial stages of the air campaign in Afghanistan, the US Navy deployed an S-3B fitted with a prototype surveillance system upgrade (SSU) package to provide real-time precision targeting data to friendly strike aircraft as well as to command and control units.

The SSU kit features upgrades to the aircraft's APS-137 radar, plus a pair of datalinks and an electro-optical IR

sensor. The package was developed by the Navy, Wescam, and Raytheon TI Systems, and each system costs about \$6.5 million.

The Navy reported that use of the S-3B/SSU resulted in a 50-75 percent reduction in the time required to detect and engage mobile targets.

The Navy is hoping for funds to equip four more S-3Bs with the SSU. The service has described this as "a perfect interim platform where the follow-on (intelligence, surveillance and reconnaissance) platforms will be able to pick up this role."

## Funding

	<u>US FUNDING</u>							
	<u>FY00</u>		<u>FY01</u>		<u>FY02</u>		<u>FY03 (Req)</u>	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
S-3 Mods		80.2		68.2		42.7		45.1

All \$ are in millions.

## Recent Contracts

None noted.

## Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1969	Lockheed S-3A selected over General Dynamics design for S-2 replacement
Jan	1972	Initial prototype flown for first time
Feb	1974	Initial deliveries to US Navy
Sep	1974	DSARC II approves US-3A
	1975	S-3A IOC
	1977	US-3A canceled
	1978	Last production aircraft delivered
Sep	1984	First flight of S-3B prototype
Jan	1988	First production S-3B kits delivered
Mar	1988	ES-3A mod contract awarded to Lockheed
Sep	1989	First flight of ES-3A prototype
	1992	Redeliveries of ES-3A begin
	1993-94	S-3B, ES-3 conversions completed
Late	1999	Retirement of ES-3 contingent

## Worldwide Distribution

(As of October 1, 2002)

United States Navy      111      S-3B

## Forecast Rationale

The US Navy's S-3Bs are undergoing a critical structures upgrade intended to ensure the aircraft's effectiveness through the year 2015. A replacement aircraft has not been designated, although a yet-to-be-defined Common Support Aircraft (CSA) was being considered several years back. The CSA has since been shifted to the back burner.

The aircraft's core avionics subsystems are also being upgraded: satellite communications are replacing UHF radios and new VHF systems are also being installed.

The Navy may seek funds to install an upgraded version of Raytheon's APS-137 radar aboard the S-3B. This system would also be featured were the service to obtain funds to equip several more S-3Bs with a surveillance system upgrade package, which reportedly performed very well over Afghanistan last year.

## Ten-Year Outlook

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No further production.

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