



**Expendable Bathythermograph
Expendable Sound Velocimeter
(XBT/XSV)**
Expendable Profiling Systems



LOCKHEED MARTIN 
We never forget who we're working for™



Expendable Bathythermograph Expendable Sound Velocimeter (XBT/XSV)

A standard XBT/XSV system consists of an expendable probe, a data processing/recording system, and a launcher. An electrical connection between the probe and the processor/recorder is made when the canister containing the probe is placed within the launcher and the launcher breech door is closed. Following launch, wire dereels from the probe as it descends vertically through the water. Simultaneously, wire dereels from a spool within the probe canister, compensating for any movement of the ship and allowing the probe to freefall from the sea surface unaffected by ship motion or sea state.

The XBT/XSV system uses a sea water ground. As soon as an electrode within the nose of the expendable probe makes contact with the water, the circuit is complete and temperature or sound velocity data can be telemetered to the ship-board data processing equipment. Data are recorded and displayed in real time as the probe falls. The nose of each expendable probe is precision weighted and the unit spin-stabilized to assure a predictable rate of descent. From this rate of descent, probe depth is determined to an accuracy of $\pm 2\%$. When the probe reaches its rated depth (*a function of ship speed and the quantity of wire contained within the shipboard spool*) the profile is completed and the system is ready for another launch.

**XBT and XSV
are available in
air-launched and
sub-launched
configurations.**

Expendable Bathythermograph (XBT)

Temperature profiles and computed sound velocity data obtained by the XBT are used by ASW operators to identify the impact of temperature on sonar propagation and acoustic range prediction. The XBT also provides a quick and inexpensive means of collecting temperature data for oceanographic and geophysical studies.

The XBT contains a precision thermistor located in the nose of the probe. Changes in water temperature are recorded by changes in the resistance of the thermistor as the XBT falls through the water. The XBT is capable of temperature accuracies of $\pm 0.1^\circ\text{C}$.

The XBT has proved to be reliable in over 30 years of use. During this time, Lockheed Martin has developed several variations of the standard probe to meet the requirements of a wide range of applications.

**Lockheed Martin
expendable
profiling systems
offer antisubmarine
warfare (ASW)
specialists and
oceanographers
a fast, accurate,
cost-effective
means of collecting
environmental data
without restricting
ship operation.**

Launchers

Launchers are available in three models. Each is compatible with all XBTs, XSVs and shipboard data processing systems.



LM-2A

Deck-Mounted

The LM-2A is easily installed on the deck of any vessel.



LM-3A

Hand-Held

Provides portability, allows more flexibility in selecting launcher position and reduces interference with other equipment.

Expendable Sound Velocimeter (XSV)

Lockheed Martin also offers an XSV for the direct measurement of sound velocity. The XSV obtains accurate sound velocity profiles for the support of ASW operations, mine counter-measure operations and oceanographic research. The XSV measures the speed of sound in water using a sing around sound velocity sensor. The XSV obtains real time sound velocity data accurate to ± 0.25 meters/second at depths up to 2000 meters.

The XSV can significantly increase the accuracy of sonar propagation and acoustic range predictions, improve the accuracy of acoustic positioning systems and provide data for the study of acoustic propagation in the world's oceans. The XSV is most useful in such areas as Arctic, Mediterranean and coastal waters where high salinity variability may cause computed sound velocity data, based upon temperature profiles and assumed salinity data, to be inaccurate.

XBT provides a quick and inexpensive means of collecting temperature data . . .

XSV obtains accurate sound velocity profiles . . .



**LM-4A
Thru-Hull**

The standard launcher for all military vessels. Employs the same basic assembly as the LM-2A, however, the LM-4A is installed below deck for improved safety and increased convenience under heavy weather conditions.

Expendable Bathythermograph (XBT)

Applications		Maximum Depth	Rated Ship Speed*	Vertical Resolution
T-4	Standard probe used by the U.S. Navy for ASW operations.	460 m 1500 ft	30 knots	65 cm
T-5	Deep ocean scientific and military applications.	1830 m 6000 ft	6 knots	65 cm
Fast Deep™	Provides maximum depth capabilities at the highest possible ship speed of any XBT.	1000 m 3280 ft	20 knots	65 cm
T-6	Oceanographic applications.	460 m 1500 ft	15 knots	65 cm
T-7	Increased depth for improved sonar prediction in ASW and other military applications.	760 m 2500 ft	15 knots	65 cm
Deep Blue	Increased launch speed for oceanographic and naval applications.	760 m 2500 ft	20 knots	65 cm
T-10	Commercial fisheries applications.	200 m 600 ft	10 knots	65 cm
T-11 (Fine Structure)	High resolution for U.S. Navy mine counter-measures and physical oceanographic applications.	460 m 1500 ft	6 knots	18 cm

Expendable Sound Velocimeter (XSV)

Applications		Maximum Depth	Rated Ship Speed*	Vertical Resolution
XSV-01	ASW application where salinity varies; Naval and civilian oceanographic and acoustic applications.	850 m 2790 ft	15 knots	32 cm
XSV-02	Increased depth for improved ASW operation where salinity varies; Naval and civilian oceanographic and acoustic applications.	2000 m 6560 ft	8 knots	32 cm
XSV-03	High resolution data for improved mine counter-measures and ASW operations in shallow water; geophysical survey work; commercial oil industry support.	850 m 2790 ft	5 knots	10 cm

System Depth Accuracy: 4.6 meters or 2% of depth, whichever is larger (for XSV).

** All probes may be used at speeds above rated maximum, however there will be a proportional reduction in depth capability. All probes are shipped 12 to a case which is constructed of weather-resistat biodegradable material. Shipping weight varies from 25 lbs. to 43 lbs. depending on probe type. Dimensions of the case vary from 17" x 14" x 18" (2.3 cu. ft.) to 17" x 14" x 19" (2.6 cu. ft.).*

The XBT is capable of tempeature accuracies of $\pm 0.1^{\circ}\text{C}$.

The XSV obtains real time sound velocity data accurate to ± 0.25 meters/second at depths up to 2000 meters.

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