

LORAL LIBRASCOPE'S ADVANCED SUBMARINE INTEGRATED COMBAT SYSTEM SUBICS 900

THE MOST ADVANCED SUBMARINE COMBAT SYSTEM AVAILABLE

- Performs Sonar Surveillance, Multi-Contact Tracking and Multi-Mission Tactical Operations
- High Speed, Touch Interactive Colorgraphic Workstations and User Adaptive Software
- Transfer of Full Logistics Program

Loral Librascope Submarine Combat and Weapon Control Systems are used in the U.S. and International Navies



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INTRODUCTION TO SUBICS-900

Loral Librascope's most recent development is the Submarine Integrated Combat System (SUBICS)-900, an advanced totally integrated combat system that meets the multi-mission requirements of modern diesel submarines. This advanced combat system is the result of Loral Librascope's extensive submarine combat system design experience. Librascope is located in Glendale, California and has produced tactical command and control systems for U. S. Navy submarines and international submarines for over four decades.

SYSTEM FUNCTIONAL DESCRIPTION

SUBICS-900 provides the Tactical Functions required for effective Multi-mission Operations illustrated in Figure 1. Central to operational effectiveness is Tactical Evaluation and Planning which provides the capability to compare ownship's "capabilities and mission" with a contact's "capabilities and perceived intentions" and to plan appropriate actions. Tactical Evaluation and Planning, therefore, provides a framework for Integrated Surveillance and Threat Prosecution operations. Integrated Surveillance provides the capability to simultaneously collect data from all sensors and to process that data into contact information. Threat Prosecution provides the capability to execute simultaneous weapon attacks on multiple threats when required by ownship's mission. Finally, successful Integrated Surveillance and Threat Prosecution operations begin with effectively planned and executed Combat Navigation.

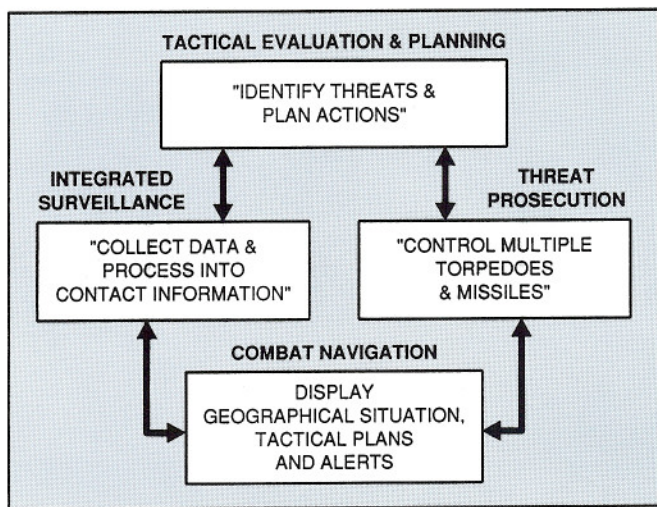


Figure 1. SUBICS-900 Tactical Functions

SYSTEM OPERATION

The system operational effectiveness of SUBICS-900 is enhanced by the unique features used to implement the man/machine interface. The system operates on the principle of management by exception. Most functions are performed without the necessity of operator intervention. The operator's role is to monitor system operation and to evaluate and overrule the automatic operations, as required.

Operator interaction with the dual CRT workstations has been optimized by fixing the usage of each CRT to specific functions, and by keeping the displays simple and uncluttered. In general, information is displayed pictorially rather than as numerical tables, however, numerical tables are available upon operator request.

SYSTEM FEATURES

SUBICS-900 provides the following features:

- Tactical Evaluation and Planning for Integrated Surveillance and Threat Prosecution operations.
- Integrated Surveillance using acoustic, electromagnetic, and optronic sensors including the capability to track 68 contacts simultaneously.
- Threat Prosecution of four targets simultaneously using three wireguided torpedoes and a salvo of underwater launched missiles.
- Combat Navigation support including the display of navigation charts, ownship position fixing and dead reckoning, recommended course and speed maneuvers based on the tactical plans, and automatic alerts to natural and man-made hazards.
- Performance Monitoring and Fault Localization.
- On-board training both in-port and at-sea.
- Data logging and retrieval of digital, audio, and video data.

SYSTEM DESIGN DESCRIPTION

The SUBICS-900, shown in Figure 2, is based on the use of production hardware and software for the primary elements of the system design. The system is centered around a Combat Data Manager, four Multi-function Workstations, and a Weapon Control Manager (shown in Figure 3). These system components are used to integrate sensor data, convert the data into contact information, identify threats to ownship's mission, and control torpedoes and underwater launched missiles, as required, against those threats. The sensor data are provided by navigation, acoustic, electromagnetic, and optronic sensors which are an integral part of the system. Using this equipment, SUBICS-900 provides Combat Navigation, Tactical Planning, Integrated Surveillance, Threat Prosecution, Performance Monitoring/Fault Localization, On-Board Training, and digital, audio, & video data Logging and Retrieval.

Navigation Sensors

Transit/Omega/GPS Navigator - Provides the position and velocity of ownship when surfaced or at periscope depth.

Inertial Navigator - Provides position, heading, velocity, attitude, and attitude rate of ownship when surfaced or submerged.

Gyrocompass - Provides heading of ownship.

ElectroMagnetic (EM) Speed Log - Provides speed of ownship.

Echo Sounder - Provides ownship depth, ocean depth, and pressure and velocity of sound at ownship depth.

Navigation Plotting Table - Sensor bearing and range measurements and contact motion analysis positions are provided to the plotting table by the Combat Data Manager.

Acoustic Sensors

Ownship Cavitation and Self-Noise Monitoring Equipment - Aids in preventing detections of ownship and in optimizing sonar operation by monitoring the acoustic energy generated by ownship.

Flank Array Sonar - Provides long range passive ocean surveillance. This includes broadband/narrowband detection, narrowband classification, and broadband/narrowband tracking for up to eight contacts.

Cylindrical Array Sonar - Provides medium range passive ocean surveillance. This includes broadband/narrowband detection, narrowband and DEMON

classification, and broadband/narrowband tracking for up to eight contacts.

Passive Ranging Sonar - Provides passive range estimates on contacts that have been detected using the cylindrical array sonar.

Acoustic Intercept Sonar - Intercepts active sonar transmissions from other vessels. Bearings, classification cues, and audio are provided for use in the detection, tracking, and classification of contacts and generating hostile weapon alerts.

Active Ranging Sonar - Provides active range estimates on contacts. Either 360 degree omnidirectional/rotational directional continuous wave, or frequency modulated transmissions may be used for detection and tracking of contacts.

Electromagnetic Sensors

Electromagnetic Surveillance Measures (ESM) - Intercepts electromagnetic transmissions from other vessels. Bearings, classification cues, and audio are provided for use in the detection, tracking, and classification of contacts.

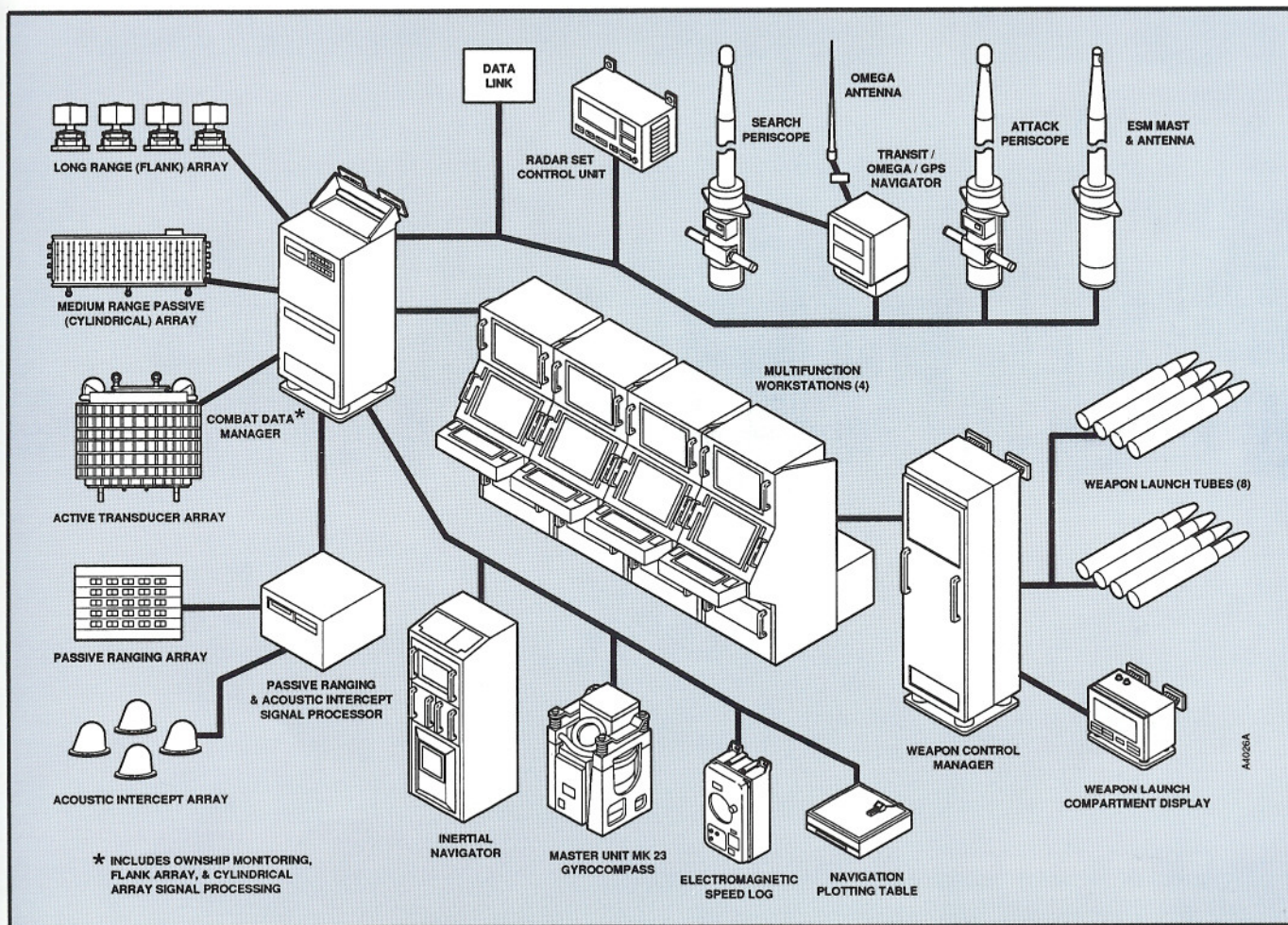


Figure 2. Advanced Submarine Integrated Combat System (SUBICS) - 900

Surface Search Radar - Provides video displays (on the Multi-function Workstations) of the shoreline, aids-to-navigation, and other vessels, and provides capability to estimate range and bearing of any point on the display.

Communication Data Link - Provides for passive receipt of radio messages containing location, direction and speed of motion, and classification of vessels which may pass near ownship.

Optronic Sensors

Search Periscope - Provides visual and thermal imaging of surface ships and aircraft in order to passively estimate the bearing and optical range of contacts and to aid in contact classification. Images can be viewed directly through the periscope and indirectly on Multi-function Workstation video (TV) displays.

Attack Periscope - Provides visual imaging and adds the capability for low light level imaging.

Combat Data Manager

The Combat Data Manager combines the data from the navigation sensors, acoustic sensors, electromagnetic sensors, and optical sensors and processes it into contact information. The unit also provides audio tape recording and distribution of acoustic and electro-

magnetic audio and periscope video to the Multi-function Workstations.

Multi-function Workstations

The Multi-function Workstations provide system operators with interactive displays for Combat Navigation, Tactical Planning, Integrated Surveillance, Threat Prosecution, Performance Monitoring/Fault Localization, On-Board Training, and Logging/Retrieval. Information is displayed on two 19-inch diagonal, 1280 by 1024 picture element resolution, 60 Hertz refresh rate, touch interactive color CRT's.

Weapon Control Manager

The Weapon Control Manager provides automatic threat prosecution to aid operators in the control of torpedoes and missiles during an attack. Operators can set torpedoes and missiles prior to launch, control their launch, and monitor and guide torpedoes after launch. The launch tube interface includes switching circuitry for interfacing with either torpedoes or missiles in each of eight launch tubes. The processing computes trajectories for three torpedo attacks and one missile salvo of one to four missiles, simultaneously. Post launch control includes telemetry from the torpedoes and automatic and interactive guidance commands to the torpedoes. Finally, emergency threat prosecution displays are provided on the Weapon Launch Compartment Display.

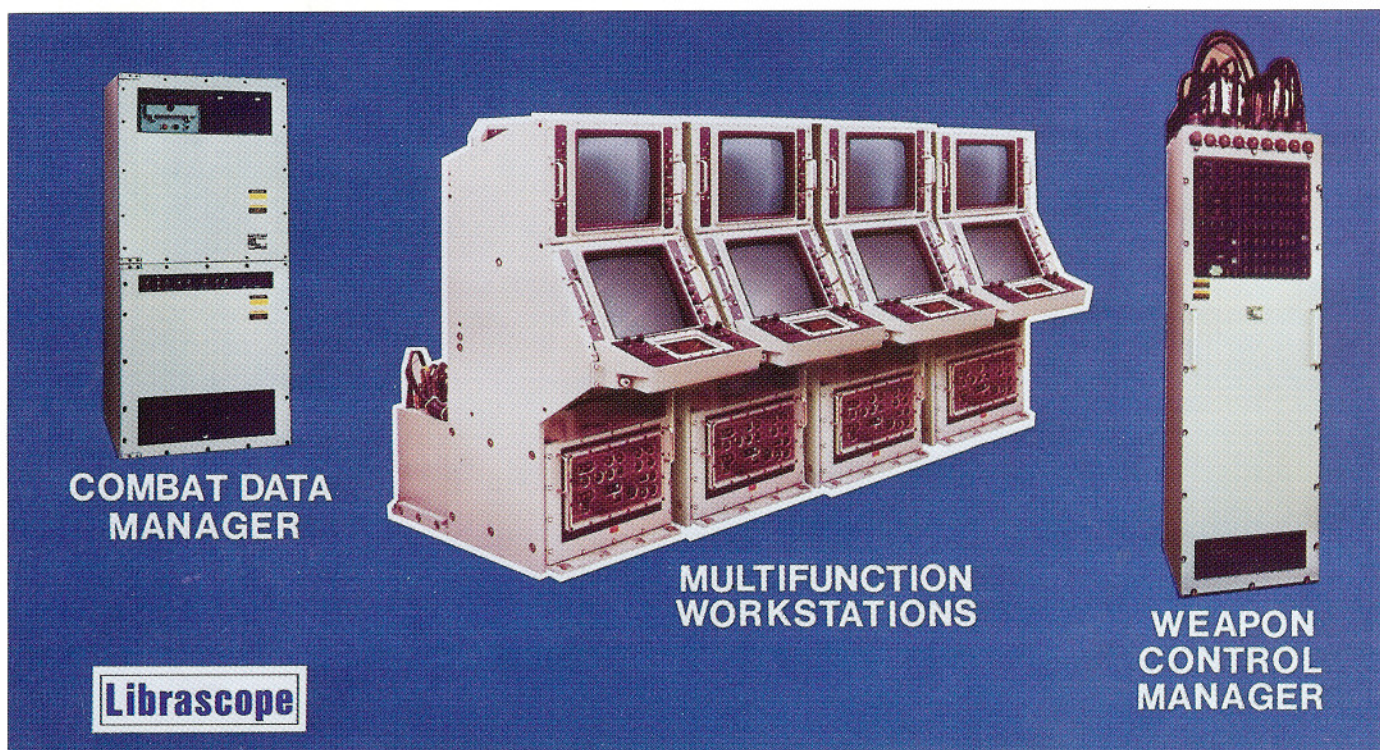


Figure 3. SUBICS-900 Combat Control System

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