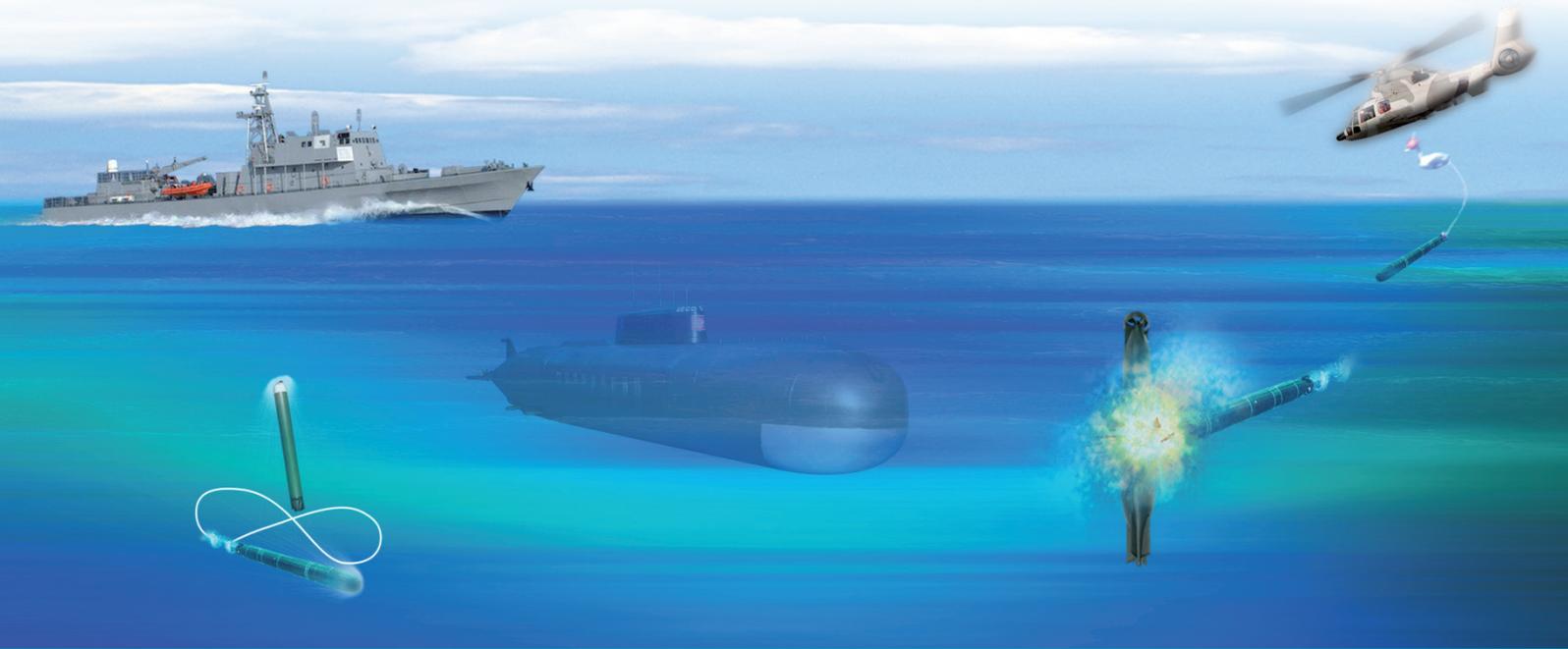


Shade™

Torpedo Defense Suite for Submarines



Protect against acoustic homing torpedo attacks

Benefits

- Responds automatically, in real-time, to any threat detected by the submarine without human intervention
- Pre-sets countermeasures automatically
- Selects appropriate defense program from variety of programs contained in the Countermeasure Control Module (CCM)
- Increases probability of submarine survivability

Advanced Defense Suite, Selecting and Firing Torpedo Countermeasures

Shade is a torpedo defense suite for submarines that protects submarines from attacks by all types of acoustic homing torpedoes.

The Shade system consists of three main components:

- Defense programmer that analyzes threats and selects (pre-programmed) response
- Launcher controller that enables the selection and firing of torpedo countermeasures, either automatically or manually.
- Up to 32 launchers for firing up to 32 decoys

The system can launch and operate several types of hard and soft kill torpedo countermeasures, such as the Torbuster, a hard kill torpedo countermeasure that seduces the torpedo to close proximity, activating an explosive warhead when the target is at the closest

point of approach, inflicting sufficient damage to the torpedo to neutralize it.

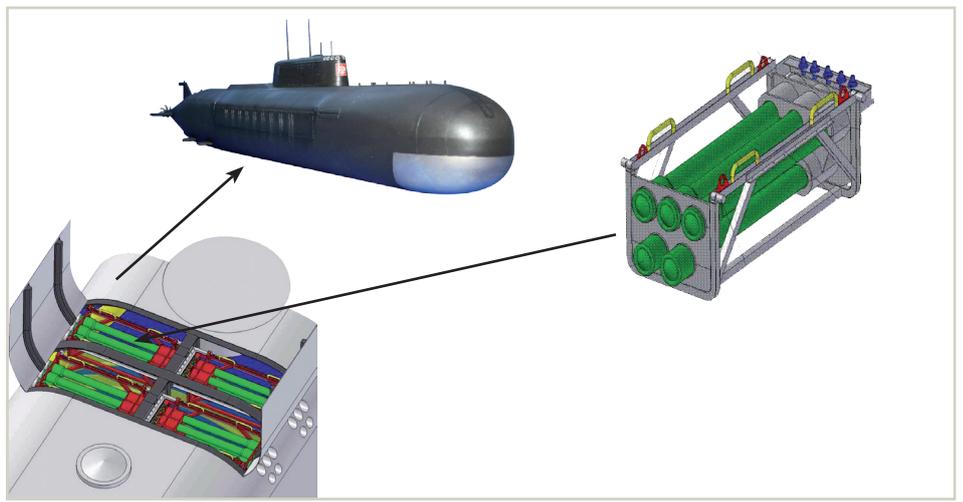
The Subscut and the Scutter are both torpedo countermeasures that are launched immediately following a torpedo alert and are automatically initiated after launch, propelling themselves to a preset depth where they hover, waiting to detect active acoustic transmissions, resulting in the selection and generation of an appropriate deception program from transmission.

The Exercise Scutter is the ultimate tool for validating performance at sea. An enhanced, yet cost-effective version of Scutter, Exercise Scutter enables torpedo defense doctrine evaluation in sea trials, against real and simulated threats. It enables testing and developing customized responses and is a useful, low-cost training device.

Other types of countermeasures can be incorporated.



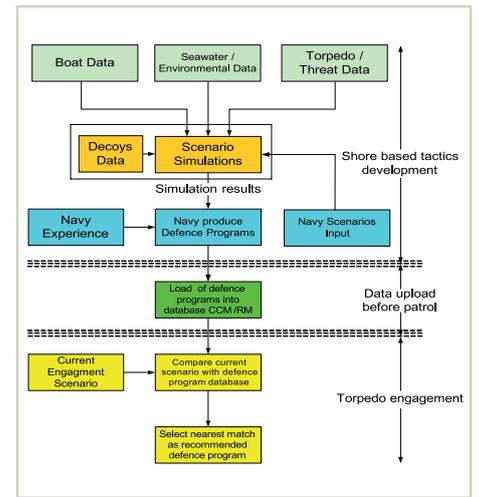
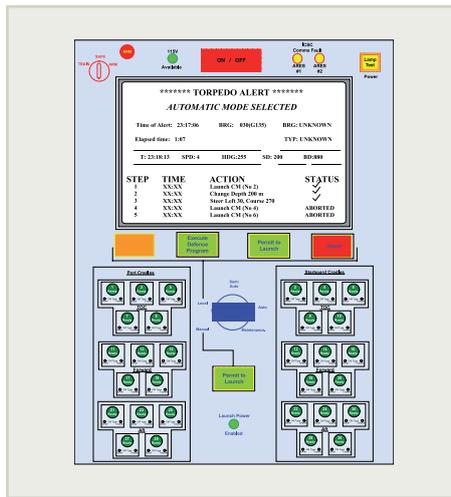
Torbuster



Subscut



Scutter



Operational Technique

The Shade Torpedo Defense Suite interfaces with the submarine's combat system, enabling receipt of torpedo alerts and threat data.

Operational Sequence

- Sonar detects torpedo
- Combat system alerted
- Combat system transmits threat data to Shade
- Defense programmer analyzes threat
- Pre-programmed response selected
- Defense program is executed
 - Launch countermeasures (Torbuster, Subscut, Scutter or combination)
 - Transmit to combat system evasive maneuver recommendation

Operates in a Variety of Modes

Shade operates in four combat modes:

- Fully automatic - Upon combat system alert, no operator needed
- Semi-automatic - Requires approval by combat system command
- Local - Operator punches in data of incoming threat and defense programmer calculates and executes defense
- Manual - Operator chooses specific launcher and countermeasure and commands launching manually

A maintenance mode exists for programming and uploading database to the defense programmer and countermeasures.

Shade can be operated in training mode. The system receives the alert, calculates and transmits the defense program to the combat system, but no countermeasure is launched.