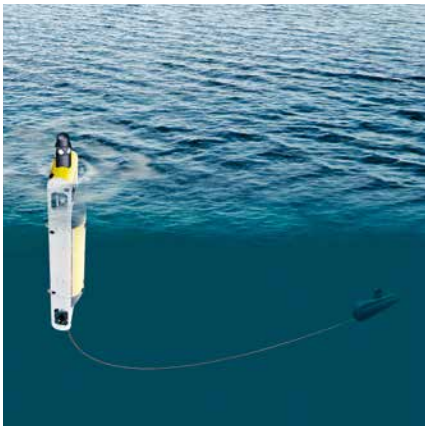
SAAB

SUBROV

THE VERSATILE SUBMARINE VEHICLE

PROVEN MISSION SUCCESS



AN UNDERWATER **ADVANTAGE**

The role of submarines is changing. Traditionally, they were used to sink ships and act as a deterrent, but their covert capability means they are increasingly being used to gather intelligence.

Using Saab's ***thinking edge***, we develop and deliver innovative underwater products that facilitate this transition and enhance the capabilities of submarines.

One of our latest systems is the Submarine Remotely Operated Vehicle (SUBROV), which is deployed from any submarine and is designed to fit in a standard 21 inch heavyweight torpedo tube. The highly manoeuvrable, versatile vehicle can be used for a multitude of underwater tasks, from inspection and surveillance to mine countermeasures (MCM) and Autonomous Underwater Vehicle (AUV) recovery.

OPERATIONAL CONCEPT

Before use, the system is moved from its standard torpedo stowage position and loaded into a torpedo tube. The vehicle then manoeuvres out of the torpedo tube to perform the desired mission, such as:

- Inspection/intervention
- Communication/surveillance
- Mine countermeasures
- AUV recovery

INSPECTION/INTERVENTION

In the past, hazardous undersea inspection tasks were carried out by divers. As an unmanned system that is controlled from a submarine, SUBROV is a safer alternative. The system can perform visual inspections of the submarine itself, including the bottom and berthing locations, as well as the surrounding area. It also means that new procedures that were previously impractical are now possible due to SUBROV's wide range of capabilities and available tools. In addition to colour and low light cameras, the SUBROV is fitted with sonar for improved navigation and relocation of objects.

COMMUNICATION/SURVEILLANCE

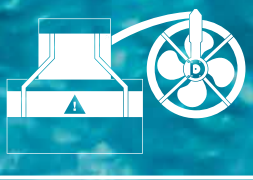
When undertaking covert operations, a submarine cannot reveal its position. To ensure this, the vehicle can carry an antenna module which can be brought to the surface to establish radio communication. It can also be used to dock and connect to underwater communication nodes for stealth missions.

MINE COUNTERMEASURES

By utilising its sonar and cameras, the SUBROV can be used for the detection or relocation of sea mines. The vehicle can be equipped with tools to perform various tasks such as cutting wires and retrieving or moving objects using a manipulator.

AUV RECOVERY

Recovering AUVs into a submarine can be complex and expensive. The SUBROV solves this problem by enhancing the submarine's existing capabilities and offering a simpler alternative to previous methods. For a recovery operation, the vehicle can be equipped with a gripping tool, enabling it to dock with an incoming AUV. The vehicle's manoeuvrability means it can then move and reinsert the AUV into a torpedo tube.



BRUSHLESS SAAB THRUSTER

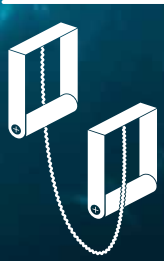
The lightweight and robust thruster propels the vehicle through the water, providing an excellent power-to-weight ratio

DETECTION EQUIPMENT

The HD camera, obstacle avoidance sonar and profiler enable the vehicle to locate mines and other potential threats

NAVIGATION

USBL, MEMS, DVL, INS and speed log for navigation



AUV RECOVERY TOOL

The tool is attached to the AUV hull, enabling the control system to manually steer the AUV into the torpedo tube

ONE VEHICLE – MANY ROLES

SYSTEM OVERVIEW

SUBROV comprises a vehicle, a winch including a tether management system, an operator console and support equipment.

The system is handled on board using the same equipment as a heavyweight torpedo. The vehicle is launched and retrieved from a torpedo tube and is secured using the same torpedo locking devices. For a standalone installation, no changes to the submarine are necessary, as only existing interfaces are used. The system's modular and scalable design allows for easy integration of new tools and sensors.

The operator console on board the submarine displays video and sonar images to the pilot, enabling easy manoeuvring of the vehicle. During operation, the vehicle is powered by a lithium polymer battery that is qualified for use on board submarines. This allows it to use a long thin fibre optic tether for vehicle control and sensor data telemetry. An external battery charger is used to recharge the battery when SUBROV is inside the submarine. A winch placed inside the torpedo tube manages the tether, maintaining length and tension in order to keep it safe during missions and stowage.

SUBROV's modular design also facilitates comprehensive Built In Test, as well as the efficient removal, repair and replacement of components. The well-proven Saab thrusters, together with a lightweight, robust polypropylene plastic framework and low drag fairings provide the vehicle with an exceptional power-to-weight ratio.

SYSTEM SPECIFICATIONS

VEHICLE EXCLUDING TOOLS

LENGTH	3.1 m
WIDTH	0.5 m
HEIGHT	0.5 m
WEIGHT IN AIR	300 kg
WEIGHT IN WATER	Adjustable, slightly buoyant
SPEED	0–3 knots
OPERATIONAL DEPTH	500 m
PAYLOAD	10 kg

VEHICLE CONTROL	6 Degrees of Freedom, auto depth, auto heading, auto altitude, waypoint steering and autopilot
NAVIGATION SENSORS	Microelectromechanical Systems (MEMS) and Doppler Velocity Log (DVL) Optional: Speed log, Inertial Navigation System (INS) and GPS
CAMERA	Colour camera Other types of camera available on request

TETHER	800 m, 4 mm fibre optic
POWER SUPPLY	LiPo battery, 8 kWh
RANGE	10 km
ENDURANCE	6 hours
COMMUNICATION	Fibre optic – Gigabit, Ethernet
SONAR ALTERNATIVES	Mechanical scanning profiler Other types of sonar available on request

SUBROV SYSTEM: WET PART

LENGTH	4.5 m
DIAMETER	21 inches
WEIGHT IN AIR	< 600 kg
OPERATIONAL DEPTH	500 m

EQUIPMENT SKID

LENGTH	2 m
DIAMETER	21 inches
WEIGHT IN AIR	200 kg

FEATURES

- Embedded computer with vehicle/winch control software
- Power Supply Unit (PSU) with battery charger
- Operator Console Board (OCB), two monitors, cables
- Spares and tools

CONFIGURATION OPTIONS

- Disposable tether (up to 25 km)
- INS, Ultra Short Base Line (USBL) responder
- Sonars, HD camera
- Manipulator arm, cutting tool, brush, tooling motor
- Satellite link, radar detector

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SAAB DEVELOPS **HIGH TECHNOLOGY** UNDERWATER SYSTEMS THAT ENABLE ARMED FORCES TO ENHANCE THEIR **SITUATIONAL AWARENESS,** EXTEND THEIR **OPERATIONAL CAPABILITIES** AND RESPOND TO **ANY THREAT** – EVEN IN THE **HARSHEST ENVIRONMENTS.**

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