

## Topic Page: [submersible](#)

Definition: **submersible** from *Philip's Encyclopedia*

Small craft for underwater exploration, research, or engineering. The **bathyscape**, invented in the 1940s by Swiss scientist Auguste Piccard, had a spherical chamber attached to a much larger hull, which functioned as a buoyancy control device. From the late 1950s, a new generation of submersibles evolved for engineering and research work. A typical craft has a spherical passenger capsule capable of withstanding water pressure down to c.3,600m (12,000ft). Attached to this is a structure containing batteries, an electric motor with propeller, lighting, a mechanical arm for gathering samples, and other technical equipment.

Summary Article: **submersible**

From *The Columbia Encyclopedia*

small, mobile undersea research vessel capable of functioning in the ocean depths. Development of a great variety of submersibles during the later 1950s and 1960s came about as a result of improved technology and in response to a demonstrated need for the capability to visit the ocean depths to make direct observations and measurements, to recover lost equipment, and for possible rescue activity. Submersibles are constructed in a variety of sizes and shapes and are designed to perform different and often highly specialized tasks. All contain power sources and one or more sensors, among them lights, photo and video cameras, sonar hydrophones, instruments for measuring environmental parameters, side-scanning sonars, and geophysical devices (magnetometer, acoustic profiler, gravimeter). Some also have mechanical arms (manipulators) to collect samples and perform other modest tasks outside the vessel. Manned submersibles also have a crew compartment within a pressure hull and life-support systems. The modular construction of some vehicles permits easy modification of them for different operational tasks.

In recent years, it has become clear that special purpose, unmanned submersible vehicles can augment or replace manned submersibles. There are two basic types of unmanned submersibles. The remotely operated vehicle (ROV) is controlled from the surface by a tether, or cable, which is used to transmit power to the vehicle and serve as the medium through which the video signal and other sensor data are transmitted to the surface. The untethered ROV, more generally called an autonomous underwater vehicle (AUV), eliminates the cable and carries its own power. Because of the drastically reduced bandwidth and transmission delays inherent in tetherless underwater communications, these vehicles roam freely using onboard computers to run preset missions. Transmission of instructions to, and video information from, the vehicle is accomplished by means of an acoustic communication link. Some manned submersibles are equipped to carry ROVs to allow exploration of areas too small or dangerous for direct observation by the submersibles themselves.

Submersibles are being used in an increasing number of applications. In addition to salvage and rescue missions, submersibles are used for laying pipelines underwater, for work on offshore oil drilling platforms and wellheads, and for seafloor mapping, underwater surveys, and tunnel and aqueduct inspections.

Most modern submersibles are descendants of the first diving sphere (bathysphere), developed in the 1930s, and the more mobile submarine, which cannot operate at great depths. The inherent danger in a

bathysphere was its inability to surface on its own accord, being raised and lowered by a winch system on a surface vessel. In 1954 one of the first types of submersible, the bathyscaphe, was designed and successfully tested by Auguste Piccard to overcome this problem and to provide limited maneuverability. A bathyscaphe is in effect an underwater balloon. The cabin is suspended beneath a large flotation chamber that contains gasoline and iron pellets. Submersion is accomplished by release of some gasoline, rendering the craft heavier than water. To rise, some of the iron-shot ballast is released. A second model of the bathyscaphe, called the *Trieste II*, carried two men to a record-breaking depth of 35,800 ft (10,900 m) at the bottom of the Marianas trench in 1960.

One of the most impressive submersibles is the *Aluminaut*, constructed of high-strength aluminum alloys and able to operate at 15,000 ft (4,570 m) carrying a crew of six. The *Alvin*, operated by Woods Hole Oceanographic Institution, is capable of diving to depths of 13,000 ft (3,960 m) with a crew of three and, like the *Aluminaut*, is equipped with mechanical arms. In 1974 the *Alvin* and two French submersibles, the *Archimède* and *Cyana*, were used in a joint French-American venture, project FAMOUS (for French-American Mid-Ocean Undersea Study), to learn more about seafloor spreading. The *Alvin* was also used to photograph and retrieve objects from the *Titanic* after its discovery in 1987. In 1998 the French manned submersible *Nautilus*, two manned Russian Mir submersibles, and assorted AUVs were used to raise a 22-ton section of the *Titanic's* hull. In 2012 James Cameron, in the submersible *Deepsea Challenger*, became the third person to descend to the Challenger Deep (35,798.6 ft/10,911.5 m deep) in the Marianas Trench.

#### **APA**

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## Harvard

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## MLA

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