

SUBMERSIBLES - MANNED AND UNMANNED

Dr Victor Brand

In 1716 Sir Edmund Halley, who discovered the Comet which bears his name, built a diving bell which could support divers working at 65 feet for up to 4 hours.

It was not until the 1930's that William Beebe developed a diving vehicle which he named "Bathysphere". It was built of quarter inch steel and was 4 and a half feet in diameter. Oxygen was fed into the sphere at the rate of 2 litres/minute to cover the requirements of two persons. This bathysphere made 32 dives between 1930 and 1934, and reached a maximum depth of 3028 feet. These dives are described in Beebe's book "Half Mile Down" - a classic of the underwater scene.

Then Professor Auguste Piccard transferred his attention from the stratosphere to the inner space and his first vessel FNRS-2 proved to be the first of the modern submersibles in that it was not secured by cable to a mother ship and had its own means of propulsion, ascent and descent.

He later built the "Bathyscaphe Trieste" which in 1960 reached the deepest known depth in the ocean, 35,800 feet in the Challenger Deep in the Marianas Trench. In the 1960's, interest in underwater exploration using diving vessels became intense. The following is a short summary of some of the useful work which was done in this period:

- 1958 Cousteau's "Soucoupe" 1000 feet capability.
- 1963 "Trieste I and II" recovered some remains of the "Thresher" submarine which sank off Boston. The sub was first discovered and photographed by "Mizar", a naval research ship which towed an underwater camera platform.
- 1964 "Archimede" a French Bathyscaphe which reached 34,500 feet in the Kurile Trench near Japan.
- 1966 "Pisces", a Canadian vessel, raised a sunken tug boat from 670 feet in Pugot Sound.
- 1966-70 "Pisces" was used to recover Naval experimental torpedoes.
- 1968 "Star II" located and recovered nuclear payload from an aborted satellite launch.
- 1969 "Mizar" located wreckage from Nuclear sub "Scorpion" near Azores, "Trieste II" inspected and analyzed the remains.
- 1970 "Mizar" located lost French sub "Euridyce" near Toulon and "Archimede" investigated the wreckage.
- 1970 "Deep Quest" located a fighter plane in 3500 feet off San Diego.
- 1966 H Bomb at Palomares, Spain. After 2 planes collided, 3 bombs were recovered near the village; the fourth was eventually located at 2800 feet by the submersible "Alvin". Two parachutes attached to the bomb were waving about in the swell and after becoming entangled, "Alvin" backed off, while the unmanned "Curv", cable controlled underwater recovery vehicle, attached a line to the bomb.

It is clear that much of the important underwater salvage has been achieved by unmanned craft. During the Symposium of underwater physiology in 1975 organised by the UMS, a paper titled "Why Man?" was read by HR Talkington. The speaker pointed out the limitations of manned craft.

1. Personnel fatigue
2. Waste disposal
3. Life support systems
4. Fire safety
5. Escape
6. Personnel training

The unmanned vehicle is not affected by these considerations.

New technology in low light TV systems, manipulators and feed back control systems has resulted in a very functional craft which can be much smaller and cheaper than the manned submersible.

Hybrid vessels are being designed and produced with diver lookout facilities, and carrying their own unmanned vehicle for use in special circumstances.

The October 1976 issue of the journal *Ocean Industry* contains a directory of 63 unmanned vehicles in use, under construction, or in the design stage.

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AVIATION SAFETY, WINGED AESCULAPIUS

It isn't every day that an invitation comes to join a class of pilots on an air medicine course. I arrived just in time to enter the compression chamber and "go up" to 24,000 feet before taking off the oxygen mask to learn the feel of oxygen lack, to be recorded by pencil on a pad nearly illegible before oxygen was resumed.

Everyone talks flying all the time. We saw a lot of films ... how to survive on a tropical island; when and how to use a variety of ejector seats (they never practice using them, as crush fractures of lumbar vertebrae are a real hazard).

The old pilots (in their thirties) speak critically of the younger generation. "We worked hard to ensure success. Now they don't care if they're scrubbed; they go and do something else. And it's no use threatening young student pilots that they'll get killed if they do the wrong thing. In these days of disposables and inbuilt obsolescence they don't fear death ... so they are taught it will hurt before they die; then they pay attention."

We learned of noise hazards, about spacial disorientation and about night vision. Good pilots are encouraged to lead almost monastic lives. Wine, women and song are all bad news before flying.

(Extracted from an essay by "Hypophysis" in AMA Gazette, 4 August 1977)