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EDITORIAL

Fifty Years of National Service

A recently issued publication* details some of the many contributions made by the Johns Hopkins University Applied Physics Laboratory (JHU/APL) during its 50-year history.

The Laboratory was off to a fast start in World War II. Under the inspired leadership of Merle Tuve, a physicist on leave from the Carnegie Institution of Washington, a proximity fuse was quickly developed that was first used in combat by the Navy at Guadalcanal in January 1943. The fuse was a miniature electronic device that triggered the explosion of an artillery shell when the missile came to the vicinity of a radiowave-reflecting target. The fuse had a major role in the destruction of the Japanese Naval Air Forces and was a key factor in defeating V-1 buzz bomb attacks on London and in stopping the last German offensive in the Battle of the Bulge.

Before the end of World War II, APL began efforts to develop a long-range supersonic guided missile. The means of propulsion chosen was a ramjet that has an opening in front to let air in, a combustion chamber in the middle to heat the air, and an opening at the end to exhaust the products. Initial proof of feasibility of the ramjet came quickly. Remaining problems were many, including obtaining an understanding of supersonic aerodynamics and control, radar guidance, and telemetry. Development of an operational ramjet missile involved cooperation of nine universities, five industrial organizations, and three governmental facilities. In the decades that followed, APL continued to participate in the improved design, testing, and evaluation of a series of guided missiles. Ultimately, APL had a key role in the development of the Harpoon and Tomahawk cruise missiles that were used in Desert Storm.

The Transit navigation system developed at APL has the ability to compute a location on Earth by observing the change in frequency of a satellite-borne transmitter during a single pass overhead. The Transit system is used today on thousands of commercial vessels as well as on Navy ships and submarines.

Early in the Navy's efforts to create the Polaris fleet ballistic missile system, APL was asked to provide a continuing evaluation of the total system. "The Laboratory's experience in missile design, testing, and analysis; its understanding of operational systems; and its expertise in telemetry, instrumentation, and computer simulation made it uniquely capable of undertaking this task." Later, this evaluation function continued when the Poseidon and Trident systems were built.

These ballistic systems were very important to nuclear deterrence, and hence safeguarding the strategic submarine fleet was a high-priority task. The APL was asked to coordinate a program to investigate all phenomena that might be exploited by a potential enemy to detect submarines. The ocean is an extremely complex medium, structured in layers of varying salinity and temperature, but APL has established the scientific basis for assessing submarine security.

The above examples are only part of the many efforts made by APL for the Navy. The Laboratory has also been active in space science and technology. As a division of JHU, APL has interacted with the medical school in the development of more than 100 biomedical products.

The effectiveness of APL is to a large degree explained by the attitudes and policies that have characterized the Laboratory since the founding. Under the leadership of Merle Tuve, traditions were established of devotion to the national interest, alert identification of important goals, a can-do attitude toward difficult problems, and teamwork among staff. It has been the policy of APL "to pay close attention to the users of our developments and technologies..., to design critical experiments and realistic test programs, to live with the operators, to anticipate countermeasures and new threats, and to stay with a program through its operational life."

In keeping with the changed circumstances of the moment, APL will adjust the scope and to a limited extent the direction of its activities. But it has never grown for growth's sake (staff totals 2800), and its innovative scientists and engineers will identify new goals. Moreover, "the end of the Cold War does not presage the beginning of the millennium or even emergence of a safe world.... The disintegration of Communism as a commanding force...has reduced the threat of Armageddon but it has not eliminated political struggle and potential conflagrations." There will continue to be a role for APL in providing innovative technology for defense and welfare of this country.

Philip H. Abelson

*"Fifty Years at the Applied Physics Laboratory," *Johns Hopkins APL Tech. Dig.* (1992), vol. 13, no. 1.