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Sidewinder: Creative Missile Development at China Lake

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Westrum, Ron. *Sidewinder: Creative Missile Development at China Lake.* Annapolis, Md.: Naval Institute Press, 1999. 331pp. $32.95

A few weeks before this review was written, I received via e-mail an unclassified image that was making the usual military rounds. The only words in the accompanying e-mail were, "This is a successful solution." The image was an infrared photograph from a missile seeker video taken one frame prior to impact with a QF-4 remotely piloted target drone. The image was as clear as an Ansel Adams photograph of moonrise over Halfdome. Though the heat of the intake and particularly the exhaust could be noted, all parts of the aircraft were easily identifiable—and it was a head-on shot. The missile was the AIM-9X, the latest evolution of the Sidewinder, conceived and developed a full half-century ago. Indeed, the Sidewinder has been the successful solution to a question that the U.S. Navy never posed about a heat-seeking guided missile it never asked for, from engineers at a naval laboratory whose stated mission prohibited them from developing guided ordnance. Westrum's book is a fascinating story of the people who developed what has been called the world's best air-to-air missile, and of the laboratory that in its own curious way allowed these engineers and scientists to exercise their creative genius.

Westrum writes in the area of science, technology, and society, with special emphasis on aviation and systems safety. He is a professor of sociology and interdisciplinary technology at Eastern Michigan University and is the author of two previous books and numerous articles. This work is the result of twelve years of research on the Sidewinder experience at China Lake.

Sidewinder tells the story of a man and his missile. Bill McLean was a Caltech physicist by education and an engineer by nature. He began his career in 1941 at the National Bureau of Standards, in the Ordnance Accessories Division of the Office of Scientific Research and Development (OSRD) in Washington, D.C. He worked on proximity fuses for rockets and bombs. In OSRD McLean found an environment with minimal organization and maximum interaction between creative people, whose roles fluctuated with the current needs of programs. This intimacy of small teams had been known to work in industry at places like the Lockheed "Skunk Works," so those who formed the Naval Ordnance Test Station (NOTS), China Lake, California, made sure to instill OSRD's principles in the new desert test range and laboratory for rockets. Bill McLean thrived at China Lake, as he had at OSRD.

McLean did not set out to design a guided missile. It was the result of his frustration with aiming devices for unguided air-to-air rockets. The miss rate of early guided missiles was 90 percent; a better solution was necessary. He felt that the fire control had to be put in the missile instead of the aircraft, an idea contrary to the then-current approach to radar—combat aircraft had to continue to illuminate their targets with their onboard radar while the missile homed in. McLean believed that an infrared (IR) seeker, which was much smaller than a radar seeker, was called for, and his concept of the "heat-homing rocket" was born.

Westrum bases his history on countless interviews with members of the Sidewinder project, as well as on records

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obtained from these members and official sources. His anecdotes bring a sense of the familiar to a laboratory working intensely to provide the military with a successful solution to air-to-air combat. Many military personnel then believed an IR seeker could not work. An IR detector was developed and mounted on an old, surplus radar pedestal. It used feedback to follow the target. Westrum notes, "It tracked lighted candles, birds, and even hugs. Crowds came to committee meetings just to watch the tracking films." McLean's philosophy was always to keep it simple, maintain an open mind about various approaches to the problem, involve the end user at every step of the development process, and test to improve the product early on. Often, in the evenings, a cluster of automobiles could be seen in the parking lot outside Michelson Laboratory, as the Sidewinder team returned after dinner to resume their work. Weekend work was common, and always actively involved was Bill McLean, as head of the aviation ordnance department and later as technical director of NOTS. One can envision the man "out on the Baker 4 test track at two in the morning, in shirtsleeves, waving a cigarette to see how the tracker was working."

Westrum has documented a triumph of technological weapons innovation by a small, devoted team of Navy engineers and scientists who provided a "successful solution" in spite of bureaucratic roadblocks and lack of funding. He has captured the essence of the man who led the team, and of the environment in which their efforts flourished. The book is highly recommended as a record of what can be accomplished with creative technical expertise and great perseverance.

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Brown, Charles H. *Dark Sky, Black Sea.* Annapolis, Md.: Naval Institute Press, 1999. 252pp. $34.95

This work is a detailed history of the evolution of naval aviation's quest to conduct night and all-weather flight operations. With this book Charles Brown, a former carrier pilot and squadron commander, makes a significant contribution to understanding naval aviation on carriers. He details the many trials and advances of aircraft and their equipment between 1925 and 1999 in the attempt to conquer the difficulties of flying at night. The author's use of primary sources as well as of his own experiences only adds to his outstanding research. He conveys a full understanding of the technological and tactical advances through successive phases of carrier aviation.

While the first attempts at night carrier landings on USS *Langley* (CV 1) occurred in April 1925, interest in the concept of night combat operations had its real beginning in 1929, when the Navy first experimented with a predawn launch for a mass bombing exercise.

Innovation during World War II was driven by the increasing ability of the enemy in Europe to fight at night and by Japan's interest in night naval operations. In April 1942, the U.S. Navy established the first development, test, and training unit for night-fighter equipment and operators, at Quonset Point, Rhode Island. In 1944 the first detachments of trained night fighters deployed with Admiral Marc Mitscher in Task Force 58. Mitscher's carrier-based fighters flew the first night combat air patrols against harassing Japanese Betty bombers and conducted the first night carrier offensive operations of the war.