# RICHARD J. COAR

*1921–2013*

Elected in 1984

*"For outstanding contributions to and management of aircraft and aerospace propulsion systems used in military and civil applications."*

BY ALAN H. EPSTEIN

RICHARD JOHN COAR, an innovator and leader in aerospace propulsion, died December 29, 2013, in Roanoke, Virginia, at the age of 92.

Dick spent his entire 50-year professional career at Pratt & Whitney (P&W), rising to president of P&W and ultimately to executive vice present of its parent, United Technologies Corporation (UTC). He led many of the most exciting propulsion projects in aviation history, including the engine for the Mach 3+ SR-71 "Blackbird" and a rocket engine that is still in use after more than 50 years.

Born May 2, 1921, in Hanover, New Hampshire, Dick grew up there and in Kingston, Massachusetts, amid the cranberry bogs. Having picked cranberries as a child, he attributed his excellent academic record to a strong desire to avoid going back to the bogs.

He attended Tufts University, where he was elected to Tau Beta Pi. While an undergraduate, he worked at P&W during the summers. When he retired, he noted that the accounting system wouldn't give him credit for those summers, so he had "only" a 44-year career at P&W.

After graduating in 1942 with a bachelor of science degree in mechanical engineering summa cum laude, he formally joined P&W, during the era of the great piston engines of

World War II. Beginning as a test engineer proving out water injection used to boost power for the P-47 fighter, he quickly rose to assistant project engineer responsible for the first direct fuel injection system, on the P&W R-2360 engine, a 3000 hp behemoth with 28 cylinders and 56 sparkplugs that powered a variety of large aircraft developed late in the war, including the Spruce Goose, the Boeing 377 Stratocruiser, and the B-36 bomber.

Pratt & Whitney was forbidden to work on jet engines during the war because the War Department did not want its major suppliers of aircraft engines diverted from producing the hundreds of thousands of engines needed for the war effort. When the war ended, P&W scrambled to get into the jet engine business. It licensed the Nene engine from Rolls-Royce, "Americanized" it, and renamed it the J42. Dick worked on both the J42 and its higher-thrust, afterburning derivative, the J48.

The 1950s were an exciting time for aviation, and Dick was in the midst of it. In the early 1950s he served as project engineer for the Navy Meteor missile's ramjet engine program. Inventing things as they went along, his team got the engine working, but the Navy cancelled the program and the engine did not go into production. Soon thereafter P&W decided to exit the ramjet business.

Dick was responsible for the afterburner control system for the world's first supersonic fighter, the F-100, and was appointed project engineer for what was then the world's largest turboprop engine, the T57, designed to power large military cargo planes and bombers. The engine ran well but the T57 was not put into production because the Air Force decided to power its planes with jets.

In 1956 Dick began directing the development of a new type of airplane engine, the 304, that would enable the Lockheed CL-400 bomber to fly at Mach 2.5 at the extraordinary altitude of 100,000 feet. Fueled by liquid hydrogen, the engine and airplane were classified above top secret. Dick moved from East Hartford to the newly established 14,000-acre P&W Florida Research and Development Center (FRDC) at the edge of the

Everglades in West Palm Beach, a place more conducive to both highly classified programs and the highly volatile nature of liquid hydrogen. In 1957 he was promoted to assistant chief engineer of FRDC, and in 1958 to chief engineer.

The "Apex Fertilizer" plant (the cover story for the liquid hydrogen fuel production facility) rose from the swamp in an astonishingly short time. The 304 engine ran within months of the start of the program. But then, to the Air Force's surprise, Lockheed advocated for cancellation of the program in 1958. Liquid hydrogen proved to be a problematic fuel for a high-speed aircraft and, perhaps even more importantly, the engineering advances made during the program suggested that an even faster aircraft could be built using a more conventional fuel. The successor aircraft developed into the Mach 3.5 SR-71 "Blackbird" powered by the P&W J58 turbo-ramjet. The SR-71 still holds many world speed records more than 50 years after its first flight.

As engineering manager in Florida, Dick was responsible for the J58 development as well as the RL-10 rocket engine. The RL-10, designed with the knowledge gained from the 304 program, was the world's first liquid hydrogen-oxygen rocket engine. It first flew in 1963 and, after many hundreds of successful launches, is still in use today as the premier upper-stage engine for US space launch.

On Dick's watch at FRDC, P&W developed high-powered military lasers and built the laser for the US Air Force's Airborne Laser Laboratory. Work also began on the engine that was to become the F100, powering F-15 and F-16 fighters and still in production today.

Dick was appointed chief engineer of advanced projects at FRDC in 1958, engineering manager in 1962, and assistant general manager in 1970. In 1971 he was transferred back to P&W's headquarters in East Hartford to become vice president of engineering for all of P&W. He was appointed executive VP in 1976 and president of Pratt & Whitney in 1982.

Under his leadership P&W launched the PW2037 and PW4000 engines for the Boeing 757 and 767 airliners in the early 1980s. In 1983 he also assumed responsibility for UTC

Fuel Cells, Elliot Turbomachinery, and International Support Systems as senior VP of UTC Power. He retired from United Technologies in 1986, after 44 official years with the company.

Dick received the Daniel Guggenheim Medal in 1998, the ASME George Westinghouse Medal in 1994, and the Society of Automotive Engineers (SAE) Franklin W. Kolk Air Transportation Progress Award in 1985. He served on the Department of Defense's Ad hoc Committee on the Export of Technology, NASA Advisory Board on Aircraft Fuel Conservation Technology, and Aerospace Council and the Technical Board of the SAE, and chaired the National Research Council's NASA Research and Technology Advisory Council Committee on Aerospace Propulsion.

One of Dick's longtime passions was audio high fidelity. He was always building or buying the latest and most expensive stereo equipment. He would then sell last year's gear at a very low price to his fellow engineers. Considering that they had all spent their professional lives testing jet and rocket engines, one wonders about the state of their hearing.

Fittingly, he wrote the NAE memorial tribute to Sir Frank Whittle, the English inventor of the jet engine, an invention that played a central role in Dick's professional life and one he brought to the edge of space and beyond.

After his first wife, Cecilie Berle, passed away in 1971, Dick married Lucille Hicks who had worked for him at P&W for 15 years. She predeceased him in 2013. He is survived by his children Gregory, of San Diego; Candace, of Roanoke; Andrea Tittle, of Pittsburg, California; and Kenneth, of Raleigh, North Carolina.