

[Who We Are](#)[About Fuel Cells](#)[News](#)[Transportation](#)[Space and Defense](#)[Careers](#)[Home](#)[UTC Power >>](#)

Space and Defense

[Heritage](#)

Apollo Fuel Cells

In the 1960's, UTC Fuel Cells designed, developed, qualified and manufactured the fuel cell power plants for NASA's Apollo, Apollo-Soyuz, and Skylab programs. These were the world's first operational fuel cells, and used the Bacon (molten KOH) technology. A complement of three 28-volt power plants provided all the onboard electrical power to the Apollo Command and Service Modules.



Each power plant was rated at 1.5 kW, with a maximum power of 2.2 kW for brief periods. Each unit weighed 250 pounds and were fueled by cryogenic hydrogen and oxygen. The three cells operated in parallel; a single power plant was enough to ensure safe return.

Fuel cell performance during Apollo was exemplary. Over 10,000 hours of operation were accumulated in 18 missions, without an in-flight incident.



Marine Fuel Cells

There has been considerable interest in fuel cells for marine applications, both undersea and shipboard. UTC Fuel Cells has played a leading role in development and demonstration programs.

In the 1980's, UTC Fuel Cells designed and delivered a complete 30 kW fuel cell power system to the U.S. Navy for the Lockheed Deep Quest vehicle. The alkaline (KOH) electrolyte fuel cell was packaged in a pressure-tight containment vessel, which also served as a heat exchanger. Hydrogen and oxygen were provided from pressurized gas tanks.



The system was operated for several years, at depths of over 5,000 feet.

In the early 1990's UTC Fuel Cells developed and demonstrated a 10 kW prototype unit for a Navy unmanned undersea vehicle; this unit used the proton exchange membrane (PEM) technology.

