SPACE

Gemini Fuel Cell Studied

The breakdown in the Gemini 5 fuel cell was caused by the heater supplying oxygen to the cell, but the situation is not expected to recur.

➤ FUTURE MANNED SPACE flights are not expected to be troubled by a breakdown in the heater supplying oxygen to the fuel cell that for a while threatened a short flight for Gemini 5.

The fuel cell provided electricity for the GT-5 space experiments and all other in-flight electrical power during its eight days orbiting earth. Silver-zinc batteries were used during reentry and landing.

Fuel cells were selected as the electrical source because they are so much lighter than conventional batteries. Although the two on board GT-5 together weighed only 134 pounds, a conventional battery powerful enough would weigh about a ton.

Besides supplying electricity, the fuel cells produced more than two gallons of water a day, which was used to increase pressure in the astronauts' drinking water tank.

The fuel cell battery is about the size of a two-foot stack of records. It produced up to two kilowatts of direct current power at peak load when operating properly.

The trouble was caused by the heating element inside the oxygen supply tank, a device that resembles on a larger scale the wire heaters widely used in offices to boil water for coffee or tea. The oxygen, which was stored at about 300 degrees below zero F. in a liquid state, had to be heated to a gas before it reacted with the hydrogen to to produce electricity directly.

Energy was produced in the fuel cell by forcing the oxygen and hydrogen gas into stacks where they were chemically changed by an electrolyte of polymer plastic and a catalyst of platinum. The resulting electrons and ions combined with oxygen to form electricity, heat and water.

A fuel cell converts chemical energy released by the oxidation of a fuel directly to electrical energy. It differs from the ordinary storage battery in that fuel and oxidant can be fed to the cell while it is operating, instead of being stored within the unit.

Although the astronauts used liquid hydrogen and oxygen stored at cryogenic temperatures for their fuel supply, fuel cells that operate at room temperatures have been built at home by hundreds of amateur scientists around the country.

The efficiency of fuel cells is inherently more than twice that of the best conventional power generators. Although invented in 1839, the hydrogen fuel cell remained a scientific curiosity until the last few years.

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Goodyear

APOLLO STABILIZERS—A Goodyear Aerospace Corporation engineer inspects a sphere that will hold the National Aeronautics and Space Administration's three-man Apollo spacecraft upright in water during recovery operations. The 43-inch spheres are made of polyethylene-coated fabric.

SPACE

Decision Made to Launch Manned Laboratory

➤ THE AIR FORCE now has its long-awaited "O.K." to launch a Manned Orbiting Laboratory, or MOL, to explore how man can be used to his best advantage in space.

The timing of the go-ahead announcement by President Lyndon B. Johnson at a news conference was believed geared to the very successful Gemini 5 flight of Astronauts L. Gordon Cooper Jr. and Charles Conrad Jr.

The decision tells the world that the U.S. is very much in the space business. However, the Air Force's Manned Orbiting Laboratory is in no sense a weapons system. It is a laboratory in space for making observations of earth and its surroundings, the President and Department of Defense officials stressed.

Such observations could include both surveillance and reconnaissance of ground and atmospheric events, as well as interception and inspection of foreign objects in space.

There is a possibility that Manned Orbiting Laboratories could serve as command posts in space for military operations on earth.

More immediate, however, would be the close scrutiny with which men in MOL's could scan earth using telescopes and other optical and infrared detecting devices.

Unmanned flights to test launching, recovery and other basic parts of the system will begin late next year or early in 1967, President Johnson said.

The initial unmanned launch of a fully equipped laboratory is scheduled for 1968. This will be followed later that year by the first of five flights with two-man crews.

Total cost for the MOL program is $1.5 billion.

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TECHNOLOGY

'Heli-Scoop' Designed For Rescue and Recovery

➤ A "HELI-SCOOP" with a plastic-covered "basket" has been devised to make helicopter rescue and recovery operations less dangerous.

The scoop consists of a rigid aluminum boom with a plastic-covered wire net at the end. The boom, attached to the front of the copter, can be bent in the middle to bring the recovered person or object in through a side hatch.

Since the boom is in front, the pilot has a clear view of the object being retrieved and does not have to get dangerously close. Also, since the boom can be pivoted to bring the object in from the side, no crew member has to leave the craft.

The entire assembly, which weighs 175 pounds, may also be used for removing people from mountain ledges or buildings. The heli-scoop was reported by the National Aeronautics and Space Administration as a technical innovation initiated by the space program.

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