

March 1968

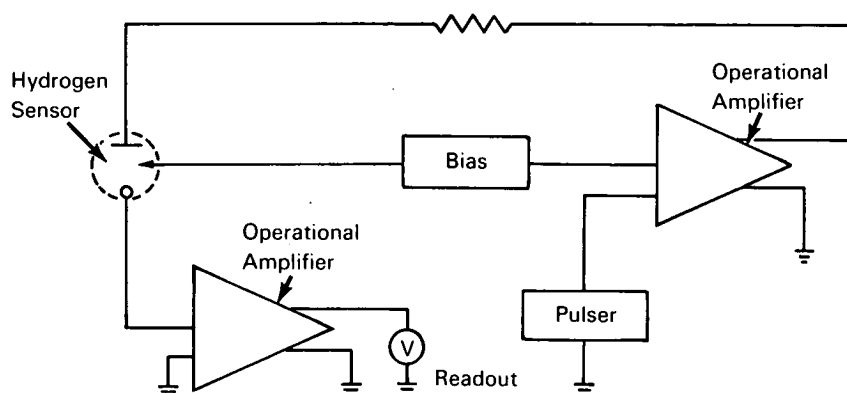
Brief 68-10049

NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Method of Maintaining Activity of Hydrogen-Sensing Platinum Electrode



The problem:

To devise an electrochemical hydrogen sensor in which the platinum electrode can be maintained in a highly catalytic state, and thus ensure that the sensor will operate with a minimal response time and maximal sensitivity to the hydrogen gas being sensed.

The solution:

A three-electrode hydrogen sensor, consisting of an anodic platinum working electrode, a reference electrode, and an auxiliary electrode, with electronic control and readout circuitry to reactivate the working electrode to a state of maximal catalytic activity.

How it's done:

The platinum working electrode is prepared by cathodic electrodeposition of a bright platinum or a platinized (platinum black) coating, from a solution containing a platinum coordination compound or complex, on an inert metallic substrate. The platinum (or platinized) electrode is then subjected to repeated anodic-cathodic polarization cycles to effect activation. After many cycles, a film of highly energetic, catalytic sites is formed on the electrode. The activity of the electrode prepared in this manner will degrade

in time. By incorporating this working electrode in a sensor cell with a reference electrode and an auxiliary electrode, the working electrode can be restored to its original state of catalytic activity by means of the circuit shown in the block diagram. When the working electrode deteriorates, this circuit subjects the electrode to a series of anodic-cathodic polarization pulses. During the period of reactivation, the sensor will not ordinarily function as a quantitative hydrogen sensor. This problem may be circumvented by incorporating a highly damped (long-time constant) readout device or by shorting out the readout device during the time the polarization pulse is applied.

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: John N. Harman, III
of Beckman Instruments, Inc.
under contract to
Marshall Space Flight Center
(MFS-1422)

Category 03