

Continued Development of the Rapid Cycle Amine (RCA) System for Advanced Extravehicular Activity Systems

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Development activities related to the Rapid Cycle Amine (RCA) Carbon Dioxide (CO₂) and Humidity control system have progressed to the point of integrating the RCA into an advanced Primary Life Support System (PLSS 2.0) to evaluate the interaction of the RCA among other PLSS components in a ground test environment. The RCA 2.0 assembly (integrated into PLSS 2.0) consists of a valve assembly with commercial actuator motor, a sorbent canister, and a field-programmable gate array (FPGA)-based process node controller. Continued design and development activities for RCA 3.0 have been aimed at optimizing the canister size and incorporating greater fidelity in the valve actuator motor and valve position feedback design. Further, the RCA process node controller is envisioned to incorporate a higher degree of functionality to support a distributed PLSS control architecture. This paper will describe the progression of technology readiness levels of RCA 1.0, 2.0 and 3.0 along with a review of the design and manufacturing successes and challenges for 2.0 and 3.0 units. The anticipated interfaces and interactions with the PLSS 2.0/2.5/3.0 assemblies will also be discussed.

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