Utilizing a Suited Manikin Test Apparatus and Spacesuit Ventilation Loop to Evaluate Carbon Dioxide Washout

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NASA is persuing technology development of an Advanced Extravehicular Mobility Unit (AEMU) which is an integrated assembly made up of primarily a pressure garment system and a Portable Life Support System (PLSS). The PLSS is further composed of an oxygen subsystem, a ventilation subsystem, and a thermal subsystem. One of the key functions of the ventilation system is to remove and control the carbon dioxide delivered to the crewmember. Carbon dioxide washout is the mechanism by which CO2 levels are controlled within the spacesuit helmet to limit the concentration of CO_2 inhaled by the crew member. CO_2 washout performance is a critical parameter needed to ensure proper and robust designs that are insensitive to human variabilities in a spacesuit.

A Suited Manikin Test Appartus (SMTA) is being developed to augment testing of the PLSS ventiliation loop in order to provide a lower cost and more controlled alternative to human testing. The CO2 removal function is performed by the regenerative Rapid Cycle Amine (RCA) within the PLSS ventilation loop and its performance is evaluated within the integrated SMTA and Ventilation Loop test system. This paper will provide a detailed description of the schematics, test configurations, and hardware components of this integrated system. Results and analysis of testing performed with this integrated system will be presented within this paper.

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