

SPACE OPERATIONS SYMPOSIUM (B6)  
Training Relevant for Operations, in particular Human Spaceflight (3)

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21ST CENTURY EXTRAVEHICULAR ACTIVITIES: SYNERGIZING PAST AND PRESENT  
TRAINING METHODS FOR FUTURE SPACEWALKING SUCCESS

**Abstract**

Neil Armstrong's understated words, "That's one small step for man, one giant leap for mankind," were spoken from Tranquility Base forty years ago. Still, those words resonate in the ears of millions, including many who had yet to be born when man first landed on the surface of the moon. By their very nature, and in the true spirit of exploration, extravehicular activities (EVAs) have generated much excitement throughout the history of manned spaceflight. From Ed White's first space walk in June of 1965, to the first steps on the moon in 1969, to the impending completion of the International Space Station (ISS), the ability to exist, live and work in the vacuum of space has stood as a beacon of what is possible. But it was NASA's first spacewalk that taught the engineers on the ground a valuable lesson; it revealed that, to succeed, spacewalking requires a unique set of learned skills. That lesson sparked extensive efforts to develop and outline the training requirements necessary to ensure success. As focus shifted from orbital activities to lunar surface activities, the required skill-set, and subsequently the training methods, changed. The requirements duly changed again when we left the moon for the last time in 1972, and have continued to evolve through the SpaceLab, Space Shuttle, and ISS eras. Yet because our visits to the moon were so long ago, our expertise in the realm of extra-terrestrial EVAs has diminished. As manned spaceflight again shifts its focus beyond low earth orbit, EVA success will depend on the ability to synergize the knowledge gained over 40+ years of spacewalking to create a training method that allows a single crewmember to perform equally well, whether performing an EVA on the surface of the Moon or while in the vacuum of space, heading for a rendezvous with Mars. This paper reviews NASA's past and present EVA training methods and extrapolates techniques from both to construct the basis for future EVA astronaut training. Copyright © 2009 by United Space Alliance, LLC.