SPACE OPERATIONS SYMPOSIUM (B6)
Human Spaceflight Operations Concepts (1)

Author: Mr. Gary Rohrkaste
United Space Alliance, United States

CONSIDERATIONS FOR COMMERCIAL RECOVERY OF HUMAN CARRYING EARTH LANDING CAPSULES

Abstract

Currently (and historically) recovery of human rated spacecraft from Earth landings is highly dependent on military and government organizations to provide the assets to recover the flight crew, cargo, and craft. While these organizations excel at this type of operation, they may not be the most cost-effective for commercial launch services. As the access to low Earth orbit transitions to commercial operations, the recovery of the Earth landing capsule, crew, and cargo is a sub-operation that needs to make the transition as well. This will require the review of several paradigms such as the number of handlers each flight crew needs for the adaptation from a de-conditioned state to Earth's gravity, the handling of cargo, and considerations of decontaminating the capsule for transport or disposal. This paper will review the considerations of commercial recovery of human carrying Earth landing capsules. Briefly, it will review past experiences of Apollo and SkyLab missions which were at sea recoveries. It will summarize the current Soyuz recovery concept of operations from the International Space Station (ISS) which is a ground landing. It will also look at the current Space Shuttle Solid Rocket Booster (SRB) sea recovery, which was initially conceived as a much more commercially based operation than what it has matured to. While the Space Shuttle landings are not part of this paper because the Shuttle is a winged vehicle, some of its operations do have applicability to a generic capsule recovery, those will be discussed. Additionally, current Search and Rescue (SAR) concepts and the applicability to commercial operations will be discussed. Assent and reentry aborts will be briefly touched upon since these are also Earth landings. The paper will present two (2) concepts of operations, one for a sea landing and one for a land landing which will be commercially based. It will identify were current paradigms must be rethought in order to make a commercial operation feasible. Additionally, a high order cost analysis of each concept of operations will be given. Copyright © 2010 by United Space Alliance, LLC.