

53rd IAA HISTORY OF ASTRONAUTICS SYMPOSIUM (E4)
“Can you believe they put a man on the moon?” The Apollo Program. (3)

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GEMINI: PAVING THE WAY FOR APOLLO

Abstract

When the United States' manned program was conceived, there were two major efforts – Mercury, which would get the United States into space, and Apollo, which would accomplish a not-yet-specified mission. When the President issued his man-on-the-moon-in-this-decade proclamation, Apollo had its mission. The problem was the United States had no idea of how to do it and had only 15 minutes of sub-orbital spaceflight under its belt. Into the breach strode Gemini.

In order to complete the Moon mission, many questions had to be answered. Could astronauts survive 14 days in space? Would the radiation be too great? Can astronauts do extra-vehicular activities and accomplish real work? Can two spacecraft maneuver and rendezvous and dock in space? Can we get sufficient electrical power for 14 days? These and a number of other questions were wrapped up into the goals for the Gemini Program. By the time the Gemini Program ended, all of the key questions had been successfully answered, and the United States was on its way to the Moon.

The Gemini Program had eight specific goals, seven stated and one unspoken: 1. To subject two men and their supporting equipment to long-duration flights of up to two weeks. 2. To achieve rendezvous and docking with another spacecraft. 3. Using the target docking vehicle propulsion system, to maneuver the mated pair after docking. 4. To develop and successfully use techniques for extravehicular activities that would accomplish real work. 5. To provide a controlled reentry to a precise spot. 6. To provide training for crew members who would later crew the Apollo spacecraft. 7. To perform scientific and engineering experiments while on orbit. And, 8 – to overtake and surpass the Soviet Union in space accomplishments.

The problems Gemini overcame were many. The Titan II launcher, originally an ICBM, had to be man-rated (POGO had to be countered and safety systems and redundancies were installed). New management and engineering systems had to be invented and perfected. Rendezvous techniques had to be developed (the first attempt to close on the target vehicle put the two spacecraft farther apart).

The outcome of the Gemini Program was ten successful manned flights in 20 months. The way was paved for Apollo, and the Soviet Union found itself a distant second in the space race.

This paper describes the major steps and activities that were required to make Gemini – and thereby Apollo – a success.