

# **History of Rocketry and Astronautics**

**AAS History Series, Volume 52**  
**International Academy of Astronautics Symposia**

**Front Cover Illustration:**

Apollo 11 crew inside their Command Module *Columbia* simulator on June 10, 1969. Left to right: Neil Armstrong, Michael Collins, and Buzz Aldrin; Source: NASA.

# **History of Rocketry and Astronautics**

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the International Academy of Astronautics**

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**Otfrid G. Liepack, Volume Editor**

**Rick W. Sturdevant, Series Editor**

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Subscriptions to the *Journal of the Astronautical Sciences* and the *Space Times* should be ordered from the AAS Business Office. Back issues of the *Journal* and all books and microfiche should be ordered from Univelt, Incorporated.

## Foreword

Like its predecessors, the Fifty-Third History Symposium of the International Academy of Astronautics, held in conjunction with the Seventieth International Astronautical Congress (IAC) in Washington, DC, during the third week of October 2019, followed the well-established pattern of including the presentation of papers on memoirs, organizational, scientific, and technical histories, plus others related to rocket and space-related activities in the annual meeting's host nation—in this case, the United States. Given that 2019 marked the fiftieth anniversary of the first lunar landing, however, both IAC program planners and IAA History Committee members chose to give special emphasis to the significance of the *Apollo 11* mission specifically and, in a broader sense, to the entire Apollo program.

That focus prompted me to recall one of those memorable moments when anyone then witnessing an event can tell you where and when they were. On Sunday July 20, 1969, at 6:56 P.M., for example, I—along with several dozen other Volunteers in Service to America (VISTA) about to depart for one-year assignments to villages across the state—was watching television in an Anchorage, Alaska, hotel lobby. Through this very first, satellite-delivered, live television broadcast in Alaska, we watched astronaut Neil Armstrong step from the *Apollo 11* Lunar Module *Eagle* onto the Moon and say, “That’s one small step for [a] man, one giant leap for mankind.” All of us VISTA volunteers and others shouted for joy and clapped hands. I shall never forget that historical moment, but I am not sure any of us truly appreciated—let alone bothered to understand at the time—how much effort went into providing that live coverage to Alaskans.

The US Air Force had launched TACSAT 1, an experimental communications satellite developed by Hughes Aircraft Company, from Cape Canaveral on February 9, 1969. Controllers positioned the 1,600-pound satellite in a geosynchronous orbit over the Pacific Ocean. That satellite provided a crucial link between the US Army SATCOM Agency at Fort Monmouth, New Jersey, and a military satellite communications terminal located adjacent to broadcast pioneer Augie Hiebert’s television station KTVA channel 11, the CBS network television station in Anchorage. Television signals transmitted from the *Apollo 11* astronauts on the lunar surface went from the NASA Space Center in Houston, Texas,

to commercial television facilities and were “picked off the air” by the Army SATCOM Agency’s Engineering Test Facility at Fort Monmouth.

On July 11, 1969, an Air Force C-141 aircraft crew had flown the Anchorage satellite communications station, an AN/TSC-54 network terminal—developed by Radiation, Inc., a subsidiary of Harris-Intertype Corporation—to Alaska. Designed as a quick-reaction terminal for the Defense Satellite Communications System, a complete 23,000-lb TSC-54 terminal—antenna, antenna trailer, operations shelter, and power generator—plus its operating team could be transported on a single cargo aircraft anywhere on Earth. The TSC-54 terminal was placed adjacent to Hiebert’s KTVA transmitter in Spenard, which covered the Anchorage bowl and much of the adjacent Matanuska-Susitna Valley.

For the Alaskan TV project, the SATCOM Agency at Fort Monmouth relied primarily on an experimental LET-1 terminal designed by the Lincoln Laboratory of the Massachusetts Institute of Technology. The LET-1 network terminal, completed in 1965, had a 15-foot diameter parabolic antenna. As a backup at Fort Monmouth, the Army operators employed a transportable AN/MSC/46 network terminal—specially designed for the Defense Satellite Communications System and boasting a 40-foot diameter parabolic antenna inside a protective radome—that Hughes Aircraft Company had developed specifically for the SATCOM Agency.

In addition to their Alaska TV relay project, Army Space Agency operators at Fort Monmouth relied on another capability—the AN/TRC-157 terminal, for voice and teletype communications, at Wheeler AFB, Hawaii—for playing a significant role in *Apollo 11* splashdown and recovery on 24 July 1969. As a US Navy after-action report later explained, “Many problems arose as a result of a quick installation and corrective action was required throughout the mission.” Severe fading problems occurred on July 22. When the fading continued to increase, TACSAT-1 was released for maintenance on July 23, and twelve hours before recovery, the naval task force commander learned that TACSAT-1 could not be used except in an emergency. Then, two hours before recovery, TACSAT-1 “returned [to service] providing two simplex circuits.” The after-action report concluded that “except for the failure of the satellite, most of the problems experienced could have been eliminated by improved management.” So, as the American radio broadcaster Paul Harvey used to say, “Now you know the rest of the story.”

**Dr. Rick W. Sturdevant**  
**Series Editor**  
**Space Training and Readiness**  
**Command Office of History**



## Preface

The major goal of the 70th International Astronautical Congress (IAC) was to celebrate the 50th anniversary of the *Apollo 11* landing. The conference was held 21–25 October 2019 in Washington, DC. To commemorate this astonishing event, the History Committee of the International Academy of Astronautics (IAA) had scheduled for several years a special session with the title “Can you believe they put a man on the moon?” Not that we have any doubt that this happened; we wanted to reach out to a larger audience than those who are just interested in the history of spaceflight. And this was a large success.

We welcomed and listened to lawyers, artists, conspiracy theorists, museum creators, scientists, and engineers. They all shared their side of the Apollo story. This special series of sessions included an afternoon event during the IAA Academy Day on 20 October 2019, in which NASA Chief Historian Dr. Bill Barry moderated a plenary session on the Apollo anniversary. We were happy to listen to several talks, which have been videotaped and added to this set of proceedings.

Bill Barry, NASA Chief Historian: “Apollo: A 50th Anniversary Perspective”

Jim Green, NASA Chief Scientist: “Apollo’s Science Results”

John Logsdon, George Washington University: “Once We Went to the Moon”

Howard McCurdy, American University: “When the Moon Is in the Seventh House...”

Teasel Muir-Harmony, Smithsonian: “Around the World with the *Apollo 11* Crew”

Roger Launius, Smithsonian: “Apollo’s Legacy: A Meaning for the Moon Landing”

Besides the Apollo event, the History Committee of the IAA had two more sessions. One session continued the tradition to focus on the history of the host country. We decided this year to specialize on US space history after World War II. We had the chance to hear about important figures of the US space companies and organizations, such as Fred Ordway, Fred Durant, Joseph Gavin, and Andrew G. Haley, to mention just a few.

During the second session, we had talks introducing more pioneers, the history of *Voyager*'s family portrait of the solar system, and many other interesting talks.

Whether the audience for these proceedings is interested in learning more about the past or just to wonder how spaceflight started, you have the correct book in your hands.

The slogan of the IAC 2019 was "Space: The Power of the Past, the Promise of the Future." A nicely chosen phrase to emphasize how important history is, as it drives ideas and dreams to reach for higher places.

**Dr. Otfried G. Liepack**  
**Volume Editor**  
**Pasadena, California**  
**September 2020**

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