

The book Tracking Apollo to the Moon by Hamish Lindsay provides a historical account of events leading to the first manned lunar landing and adds the dimension of how the Apollo missions were tracked to the moon. Lindsay was a key figure in the Australian personnel who maintained and operated ground tracking stations during Apollo in Australia. As such, he frequently uses the main story line to explain the difficulties and challenges accompanying the tracking mission. In light of the author's background, it makes sense that he focuses on Australia's contribution to tracking the landings.

Critical Examination

There were two main drawbacks to the book's content. First, it lacked technological descriptiveness about tracking mission criteria and solutions. Most of the history surrounding Australia's tracking stations is given in a casual, first-hand account style that loses some of the more detailed information. Secondly, it lacked critical analysis surrounding the causes of decisions made for the tracking mission of Apollo. It focused on factual events, but did not analyze the overall culture enveloped during the 1950s and 1960s. The author also avoided the historical context surrounding America's achievement, as well as the social and economic pressures accompanying the program.

Lindsay begins with a historical chronology starting with a Chinese legend from 2000 B.C. This chronology is much more a general description of man's progress and recorded struggle to reach the space outside our grasp. During the description of space exploration origins, Lindsay does a fine job examining the pressures created by the hostility of two world powers competing for attention and notoriety. However, once the stage is set for the space race, he immediately abandons providing historical context following the beginning of Apollo, when America clearly pulls ahead of the Soviets.

The first main drawback of the book is its lack of descriptiveness about technological detail surrounding the tracking mission. For example, Lindsay explains the events at Tidbinbilla tracking station while the ground crew waited for Apollo 11 to reach the moon. On July 18, 1969 (Australian time), there was a fire in the power input circuit breaker of the backup transmitter for the station. However, the detailed solution is only described as the equipment being "jury rigged" to get it back on air (pg 218). The lack of detail provided could be because the book mainly provides general information about tracking, perhaps to the general public.

More detail on the technological component of tracking Apollo to the moon would have been wonderful.

The second drawback of the book is its lack of critical analysis about the cultures that formed the Apollo mission throughout its duration. Events plaguing the story like Kennedy's assassination, the Vietnam War, and Apollo 1 are handled without in-depth analysis and little emphasis is given. Lindsay almost treats these catastrophes as blips on the radar that do not have much to do with how Apollo finally came to succeed, instead of as life-changing events that put the mission into context of the day. For a reader who did not live in the times of Apollo, it is hard to understand the different pressures on the space program and the United States government trying to conduct the mission.

Critical Examination of Sources

The author's sources are a surprising combination of mainly personal accounts and histories. This was evident from the way the book was written as well. Lindsay only cited three references specifically on networking and tracking stations: PARKES: Thirty Years of Radio Astronomy, Space Tracking and Data Acquisition Network STADAN, and Deep Space Network. Again, the author presents a more first-hand account narrative than an analysis of the requirements and technological achievements of the ground tracking mission in Australia. This seems like too broad a strategy for a book that considers the broad component of "Tracking Apollo to the Moon". Lindsay should have cited more references about the tracking stations and mechanics themselves, instead of so much dedication to the historical accounts and events leading to Apollo, no matter how many years the event preceded the 1960s.

Relevance to Larger Apollo Project

Lindsay's account provides information about the tracking mission component of Apollo. This was an important part of the mission, and his account goes through each mission and distinctly discusses events that occurred during each. However, his account mainly focuses on Launius' Apollo Technology category. However, it features a more informal narrative which made it feel like a first-hand account. It also does not detail the technology required in a way that is intuitively required of this category. Perhaps some books are weaker than others in determining their category according to Launius. However, the book does show how the tracking mission contributed to the overall success of Apollo.

Engineering Decision

Lindsay described America's decision to set up stations around the world as "vital in manned missions" (page 37). In all of the early fiction and theoretical proposals, according to Lindsay, the requirement for the crew to contact their base was ignored. However, because of the complex spacecraft and Apollo-era technology, this contact was mandatory. There were many factors which contributed to this decision.

The complex equipment onboard the spacecrafts required monitoring. Scientific study of space's medical effects also was necessary. Doctors and administrators at NASA wanted the ability to monitor astronauts and their medical information. Also, computers were primitive, requiring the spacecraft to relay the majority of telemetry to ground controllers instead of on-board processing of the information. This was never truer during the calamity of Apollo 13. As the emergency unfolded, ground controllers were receiving large portions of spacecraft telemetry. Only after looking and sifting through these large amounts of data did they pinpoint the cause of the disaster. If the spacecraft did not relay the information, key engineering decisions and solutions would not have been able to be made.

The world network of ground stations and its creation was also important because the political pressure attached to success was high. Especially after Kennedy's death, NASA, the United States government, and the American people associated the mission with honoring Kennedy's memory. Failure on any one of Kennedy's promises: 1) to land on the moon, 2) with a man, and 3) to return him safely to Earth, would tragically injure not only his memory but also the political gain America was to claim by beating Russia in the quest for a manned lunar landing.

Accompanying the political pressure was economic pressure caused by the toll that dedicating money to the moon caused. Within America, there was a struggle for money across many fronts such as the Vietnam War and social programming. This economic pressure demanded that the vast sums of money spent to go to the moon would ensure a victory, a safe victory. The need for assured success ushered in the idea of a network capable of real- and full-time monitoring. Lindsay sells this decision in one sentence, "The global and planetary nature of the missions meant that the mission control centers needed to keep in contact with their spacecraft, especially at high activity periods such as landing on the moon" (page 37). Logically, at least three main primary stations were required, approximately 120 degrees apart in America, Europe, and the Pacific. These locations became America, Spain, and Australia. The network

was logistically devised and set up well before the first orbital mission on February 20, 1962. Overall, in a large project like Apollo, the requirement for a ground control link to the spacecraft in real-time was considerable, but technology was not the only component of the decision. It was also a political and economic decision. These types of problems are all-encompassing and require the decision maker to consult many different experts for the overall decision to be a positive one. In this case, the United States did make a decision based on all the pressures at hand and used technology to bring about Apollo's success in regards to the tracking and ground stations requirements.

In all, Hamish Lindsay's discussion of the worldwide tracking network was interesting and explained a rarely understood viewpoint. The book had descriptive weakness about technology but was very strong descriptively of the actual events during the missions. The capability of the world tracking network and its evolution from concept to operation was vital to Apollo's success and was used after Apollo's end to usher in a new era of space exploration.

Works Cited

Lindsay, Hamish. *Tracking Apollo to the Moon*. New York: Springer, 2001.

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