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THE CSIRO PARKES TELESCOPE AND THE DEEP SPACE NETWORK

Abstract

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Parkes Radio Telescope was commissioned on 31 October 1961. Through its early astronomical discoveries, it quickly became the leading instrument of its kind in the world. It was recognised early on by NASA/JPL, that the performance parameters and innovative design features of the Parkes telescope made it a nearideal instrument for tracking spacecraft in deep space. At the time, NASA/JPL was planning the next generation of large tracking antennas of its fledgling Deep Space Network (DSN). Consequently, in July 1960, more than a year before its commissioning, it was proposed by NASA to permanently include the Parkes telescope in the DSN. However, the offer was rejected by the CSIRO, but in a separate inter-agency agreement, the CSIRO agreed that whenever a strong, stable signal was required during space missions, the Parkes telescope could provide tracking support, especially during critical moments like a planetary flyby or an impact on another planetary surface. To this day, it is still the rationale for the Parkes telescope's support of space missions. In the first few years of the telescope, it was extensively studied by NASA/JPL. The design proved so successful that it was subsequently adapted and became the model for the large antennas of the DSN.

The first space mission Parkes was involved in was the Mariner 2 mission to Venus in December 1962. The purpose of the Mariner 2 tracks were to confirm the suitability of the design. It was so successful that it was followed up with the Mariner 4 mission to Mars in 1965. The high point came with the Apollo manned lunar landing missions from 1969-72, especially of Apollo's 11 and 13. In the 1980's, Parkes tracked the Voyager 2 encounters of Uranus and Neptune in 1986 and 1989 respectively and ESA's Giotto flyby of Halley's Comet in 1986. The year-long Galileo support at Jupiter in the mid-1990's helped save the mission from complete failure. Most recently, Parkes tracked the Mars Science Laboratory, Curiosity, landing on Mars in 2012. Throughout its history, the CSIRO Parkes telescope has demonstrated its utility as a tracking antenna. This paper will describe these efforts and the profound impact it has had on the Deep Space Network, from its inception.