

JPL Spacecraft Antennas

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The author has recently completed a book entitled *Spaceborne Antennas for Planetary Exploration* (Wiley Interscience 2006) which traces the development of the antennas used on JPL Spacecraft from their inception on the very first US Explorer Mission in 1958 to the present. The focus is on antennas that have flown on JPL spacecraft or were used for JPL scientific instruments that have flown on other spacecraft. The book primarily deals with the RF design and performance of the antennas and associated front-end equipment, but also includes a chapter on mechanical development. It describes all the new designs and technological innovations introduced throughout the JPL Space Mission Program. There is also a thorough treatment of all the analytical and measurement techniques used in the design and performance assessment.

This book is complementary to *Large Antennas of the Deep Space Network* also by William A. Imbriale (Wiley Interscience 2003), which describes the JPL ground network antennas. However, whereas the ground antennas are primarily for telecommunication, the antennas on the Spacecraft can serve the dual purpose of a science instrument or communication of the science and telemetry data to earth. The JPL space program has several distinct eras. The very first mission was an earth orbiter, quickly followed by unmanned exploration of the moon in preparation for NASA manned flight to the moon. Missions to the moon included the Ranger series that captured pictures of the surface as it flew into the moon, and the Surveyor spacecraft that successfully landed on the surface of the moon. The first interplanetary spacecraft were flybys, initially targeting the inner planets of Venus, Mercury and Mars. The flyby era concluded with the Grand Tour Voyager Mission that flew by Jupiter, Saturn, Uranus and Neptune. The next phase of space exploration was planetary orbiters including Venus, Mars, Jupiter and Saturn. Probably, the most challenging and exciting missions to date have been the Mars landers and these missions are currently ongoing. In the planning are sample return missions. In addition to planetary exploration missions there have been a number of missions that have explored planet earth, including Synthetic Aperture Radar (SAR) missions that have mapped the entire planet.

This paper discusses highlights from the book.