

Celebration and Dedication of an IEEE Milestone at Parkes, Australia

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Introduction

On the 20th July 1969, the first humans landed on the Moon and pictures of the first steps and walk were seen around the world live by television. This was the first time a human had stepped onto the surface of another heavenly body. The signals were received by two receiving stations in Australia firstly at the 24m NASA station located at Honeysuckle Creek [1-2], near Canberra, and the 64m Parkes radiotelescope [3], which had been specially equipped to be a back-up receiver. These stations were part of an international earth station receiving network established to support NASA.

As part of the 50th anniversary celebrations of this event, the IEEE has recognized Parkes and Honeysuckle Creeks' involvement through an IEEE Milestone. This Milestone was recognized by a dedication and unveiling of a plaque at Parkes on the 11th October 2019. The station at Honeysuckle Creek no longer exists as it was disassembled and parts moved to Tidbinbilla, the location of a current NASA earth station. However, as Parkes delivered the higher quality signal for most of the Moon excursion and as it still is an important operational radiotelescope on the international scene, it was the logical location for the IEEE Milestone dedication.

The IEEE Milestones program honors significant technical achievements across electrical and electronic engineering. It is a program of the IEEE History Committee that is administered through the IEEE History Center. Milestones recognize the technological innovation and excellence for the benefit of humanity found across products, services, papers and patents. Milestones are may be proposed by any IEEE member or any IEEE Section / Society, and are sponsored by an IEEE Organizational Unit - such as an IEEE section, society, chapter or student branch. After detailed review by an IEEE History Committee Milestone advocate, then to recommendation by the IEEE History Committee and approval by the IEEE Board of Directors, a bronze plaque commemorating the achievement is placed at an appropriate site with an accompanying dedication ceremony.

On the Moon

In the journey to the Moon from the Command module, the Lunar Module had been expertly piloted to a safe landing spot in the Sea of Tranquility by astronaut Neil Armstrong [4]. As Armstrong made his way down the ladder of the Lunar Module, he deployed the TV camera. Goldstone and Honeysuckle Creek were monitoring the FM portion of the signal from the Lunar Module, waiting for a TV signal. Just before he set foot on the moon, Houston selected the clearer video coming from Honeysuckle Creek. As the telescope can only go down to about 30 degrees to the horizontal, Parkes received a signal about 7 mins into the landing. The signal was used for the rest of Moon landing lasting about 3 hours as it was superior. A TV camera recorded the picture received on a monitor at Parkes and this signal was transmitted to Goldstone in the US. Originally, Parkes was to be a backup for main station at Goldstone but after the excitement of the landing, the astronauts decided to go onto the Moon's surface earlier than planned. At that time, Australia was in the prime position to receive wideband signals (TV) from the moon. While the TV from Parkes went direct to Sydney, the rest of Parkes data was sent (via Sydney) to Honeysuckle Creek, which demodulated Parkes data and combined it with its own for transmission to Houston. Humanity was able to witness this significant moment in history, with the greatest possible clarity, thanks to the Parkes radiotelescope. The TV pictures were distributed to 600 million people watching it live around the world. The TV was finally

switched off by the astronauts, just over 5 hours later, and 2 ½ hours after the end of the moon walk. It is because of this historic episode as well as the major technical achievement, which allowed this to happen, that the Parkes Radio Telescope is the location of this IEEE Milestone.

The Parkes Radiotelescope

This unique instrument was commissioned by CSIRO in the late 1950s to very stringent specifications. Freeman, Fox and Partners of London prepared a design that met these requirements. The design was completed in 1958. It was fabricated by Maschinenfabrik Augsburg Nurnberg AG (MAN) of West Germany. On-site construction commenced in May 1960 and it was official opening ceremony by the Australian Governor General on 31st Oct. 1961. Parkes was the second reflector radiotelescope after Jodrell Bank in the UK and it was used as a test bed for several future radio telescopes, then in the planning stage. It has several unique technical features including a small analog computer known as the master equatorial, which was designed by Barnes Wallis FRS of WWII Dambusters fame, that is in the concrete column tower supporting the telescope. The dish is 'slaved' to follow its master, which can be programmed to follow a celestial track and thus control the direction of the telescope. The Parkes dish has a longer focal length than at Jodrell Bank and this enables it to be more efficiently fed. The first efficient feed was the new concept corrugated horn designed by Australians Harry Minnett and Bruce Thomas FIEEE in 1966 to match the focal field of a parabolic dish [5-6]. The corrugated horn has, since the 1970s, become dominant in ground station applications. Both features and some others were first used on the Parkes radiotelescope [7]. Therefore in 1969, the Parkes radio telescope was superbly positioned to receive the weak signals under adverse local weather conditions. This was just as well as reception from the Moon at Parkes took place in very high winds, gusting to 110 km/h (68 mph), when the dish was fully tipped over at 60 degrees zenith angle (30 degrees elevation), risking damage to the dish to keep the antenna pointed at the moon during the Moonwalk

Milestone Dedication on October 11, 2019.

The dedication of the Milestone was attended by about 50 people, which included the IEEE President-elect Toshio Fukuda, the Region 10 Director Akinori Nishihara, representatives of the IEEE NSW Section, which nominated Parkes for the Milestone, and representatives of most Australian science and engineering academies and organisations such as the Australian Academy of Science (AAS) and Engineers Australia. The Antennas & Propagation Society and our History Committee supported the nomination and I represented the Society. Dr John Reynolds who represented the CEO of CSIRO and is Officer in Charge, CSIRO Parkes, welcomed all attendees and Dr Fukuda introduced IEEE, the Milestone program and pointed out this IEEE Milestone was the very first for Australia (Figure 1). David Burger, representing IEEE History Committee, gave more details of the Milestone program and Parkes' importance and on behalf of the NSW History Committee, I outlined the significance of the Parkes radiotelescope and the Moon landing and the citation. He presented John Reynolds with an IEEE medallion struck to celebrate the Moon landing and certificates to the nominating committee. We were lucky enough to have present one of the people involved in 1969 at Parkes. David Cooke who was with CSIRO at the time and oversaw the receivers there (Figure 2). He told the group about his experiences and issues such as strong winds blowing during the reception. Some details of the Honeysuckle Creek station and the first signal reception was given by Dr Ed Kruzins, who is currently in charge of the NASA station at Tinbinilla. The speeches concluded with thanks to all speakers and attendees by the Chair of IEEE NSW Section, Sasha Nikolic. The attendees then walked a short distance toward the telescope where a plinth had been placed in the ground. The IEEE Milestone plaque was mounted on the top of the plinth and for the unveiling ceremony was covered by an IEEE banner. After a few words describing the significance of the

occasion, the IEEE President-elect removed the banner to applause from the crowd (Figures 3 and 4). Some local media were present, and a report was televised later that evening in a news bulletin [8]. Another notable event about the day was that Parkes is in a region where there has been a reduced rainfall and, therefore, when it rained when we enjoyed a luncheon provided by the Dish café there was excitement. A gala dinner was held in the evening following the Milestone dedication at Parkes attended by all invitees to celebrate the occasion. There were several speeches including from President-elect Fukuda, Barbara Newton deputy mayor of Parkes, Professor Ron Ekers representing AAS and Bruce Howard representing Engineers Australia.

Like the 1969 event, inclement weather affected the Milestone Ceremony, with torrential drought breaking rains and gale force winds inundating the site just minutes after the unveiling event.



Figure 1: IEEE President-elect welcomes guests to the IEEE Milestone dedication and plaque unveiling.



Figure 2: View of audience at dedication. Speaker is David Cooke.

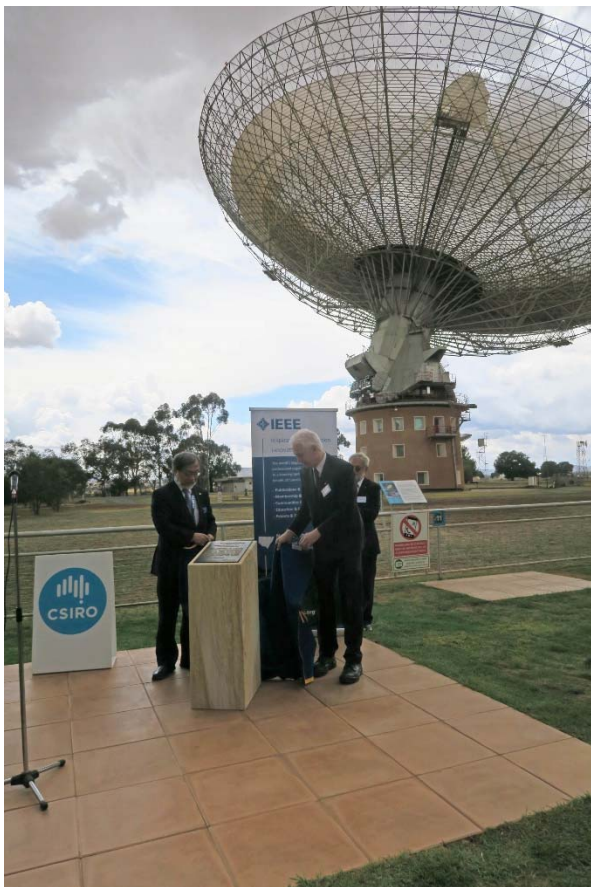


Figure 3: Unveiling of plaque by IEEE President-elect Fukuda assisted by David Burger representing IEEE History Committee.



Figure 4: Milestone plaque on plinth beside the Parkes radiotelescope.

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