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From the Parkes Catalogue to COMRAD*

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Abstract

I present a brief description of John Bolton's work in establishing the Parkes Catalogue as the first of the major radio source databases. I also discuss how this Catalogue evolved over the years from a paper card format to a sophisticated computer database.

One of the great attributes of the Parkes Catalogue is that no-one (except perhaps John Bolton) has ever been quite sure what it was! Was it the result of a survey of radio sources made at Parkes? Was it a collection of cardboard cards filed in grey metal cabinets? Was it a paper published in the *Australian Journal of Physics*, produced by the staff of the Division of Radiophysics in 1969 and edited by Jennifer Ekers (1969)? Or was it the constantly changing, printed computer listing of radio sources and related information which John made widely available to many workers over the years?

The answer is that it has been all of these things to different people at different times. However, there's no doubt that the first version of the Catalogue resulted from the 408-MHz survey of Bolton *et al.* (1964).

The survey work was continued in three more papers between 1964 and 1966. Later collaborators included Marc Price, Doug Milne, George Day, Ron Ekers, Doug Cole and John Shimmins (Price and Milne 1965; Day *et al.* 1966; Shimmins *et al.* 1966). They used the newly completed Parkes telescope to produce a list of about 2000 southern sources, many of which were also remeasured at the shorter wavelengths where the resolution and positional accuracy are far better.

Originally, John recorded these data on file cards, all of which still reside in my office and several of which I still refer to. Later, many of the data were transferred to the 'new-fangled', 'hi-tech' IBM punched computer cards. This allowed rapid searching and sorting of what we now call the database. It also permitted printed listings of source measurements to be made both easily and often. John used this new technology to circulate the data freely worldwide to anyone who requested them, a policy which we maintain to this day, although line-printer paper and magnetic tapes have given way to floppy disks and FTP.

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I know that many astronomers began new projects and benefited from John's distribution of the Parkes Catalogue, particularly science students just starting on their careers. I also remember asking John if he ever worried about making his current research results so freely available. I guess I expected a reply to the effect that scientists were 'officers and gentlemen'. Typically though, his reply was quite different: 'It's no use to anyone who hasn't worked here at Parkes and doesn't collaborate with us because they wouldn't understand it, nor its inherent selection effects'.

Out of the first Parkes Catalogue, I believe, came the system of naming radio sources which was later to be adopted by the IAU and used for essentially all the later source surveys. In its earliest form, a source was named, for example, PKS 1226+02. John told me that the main reason he thought the scheme useful was that it enabled a Parkes telescope driver (operator), after being asked to drive to the 'next source', to start the dish moving towards the correct place in the sky while the astronomer read out the precise right ascension and declination.

The so-called Parkes naming system was never intended to pinpoint the position of an object precisely (something often forgotten when radio astronomers criticise optical astronomers for talking about 'RU Craporium' or similar stars). And I recollect that John felt strongly that the 'clock should stop', precession-wise, in 1950. As someone now wrestling with the problem of a radio survey catalogued with dual equinox and equators, dual epochs, and dual names, I'm not sure he was wrong!

Undoubtedly one of the great advantages of the Parkes Catalogue is that it contains not only radio data, but also a lot of optical information, such as identifications and redshifts. Furthermore, it isn't just a listing of *measurements* of radio sources, but a listing of the *sources themselves*; that is, to use modern computer language, there is one *record* for each object, which contains many *fields* of data at both optical and radio wavelengths. This permits users of the Catalogue to cross-correlate the data much more easily.

To compile the catalogue, John brought together data from many places. For example, when I joined him in the early 1970s, not only had the Parkes 2700-MHz survey data been added, but also radio data from Molonglo, Cambridge and Ohio (which John often referred to scathingly as the 'OXO sources', since we were then largely concerned with the South Galactic Pole region, which contains names similar to OX074). Seriously though, it's certain that many astronomers sent their data to John long before publication simply because he had made the Parkes Catalogue data so freely available to them.

It was typical of John Bolton that he firmly believed that in order to *use* optical data successfully, you had to be experienced in *collecting* it. I'm very grateful to him for introducing me to 'big-time' optical astronomy, on the Anglo-Australian and UK Schmidt telescopes, as well as on the older Stromlo 74-inch telescope. I particularly remember being straddled dangerously high in the air over the polar axis of the 74-inch one cold winter's night, trying to guide the plate that was to identify the strong radio source PKS 1610–77. We were listening to a cricket match (an Ashes series) being broadcast from England while John bawled me out for 'buggering up' the mixing of the developer in the darkroom!

By the time John retired in the early 1980s, the title 'Parkes Catalogue' had become something of a misnomer, since it contained so many data from other

observatories. About 1989, therefore, we decided to restructure it and rename it *PKSCAT90*, ready for the new decade. Under this new name it is now a sophisticated computer database and includes not only extensive radio and optical data for over 8000 sources, but also references and cross-references.

Versions of *PKSCAT90* are available for mainframe computers as well as for IBM-type and Macintosh personal computers. Largely as a result of the work of Robina Otrupcek, printed versions of the Catalogue have also been produced and distributed worldwide; it contains both printed data and sky 'pictures' in a graphic, atlas format.

More recently, the number of catalogued southern sources has increased dramatically to over 60,000, following the completion of the PMN (Parkes–MIT–NRAO) survey at Parkes (see Fig. 1). These data are now, for the most part, published and are available for downloading through our FTP computer server. They can also be obtained as a set of floppy disks, together with suitable access and graphing software.

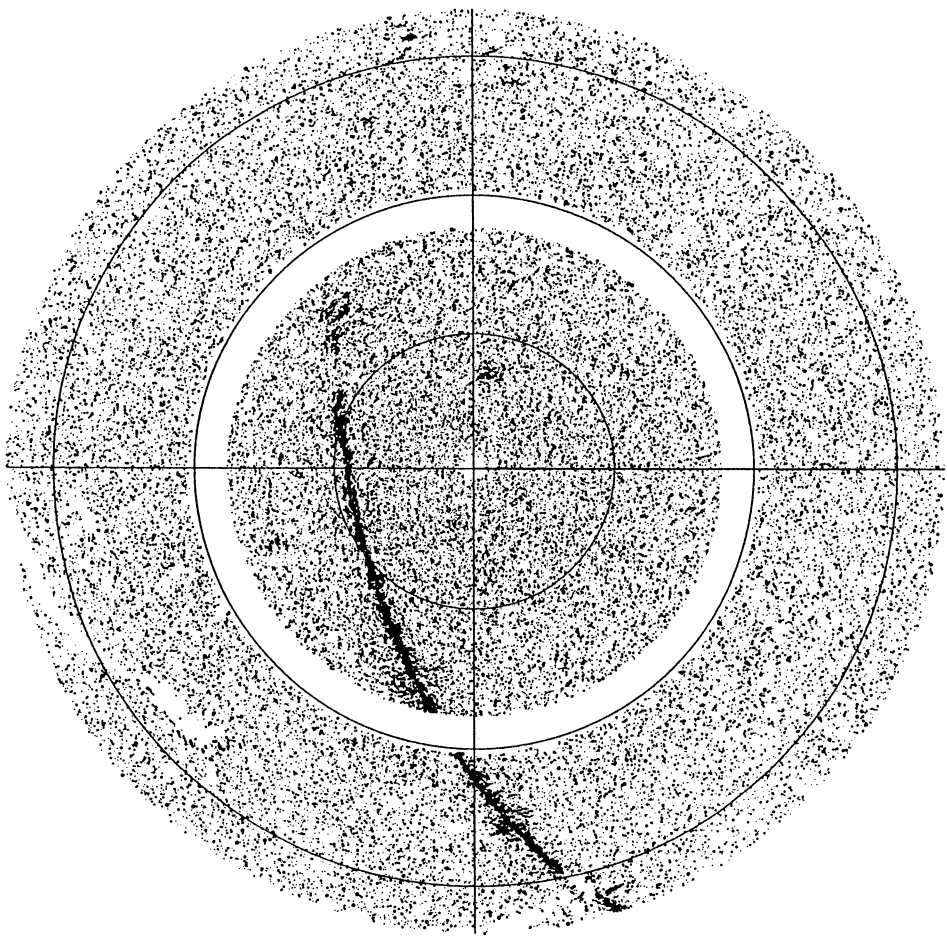

Fig. 1. The Parkes–MIT–NRAO survey for the Southern, Tropical and Equatorial zones (declination circles at −60°, −30° and 0°).

In the last year, many of the *PKSCAT90* and PMN data have been included in a first edition of a massive collection known as COMRAD (COMpendium of RADio sources). This database, which is being compiled by Heinz Andernach, of the European Southern Observatory, and me, includes about 300,000 entries from the principal Southern and Northern Hemisphere radio source surveys.

Of course, it is possible to access many of these surveys over international computer networks. However, COMRAD includes information for about 80% of all known, catalogued sources, and is meant to be used as a 'stand-alone' database on a personal computer. This localisation gives the astronomer both much faster database searching and total control to do cross-correlations.

Finally, I often wonder how John would have used the large modern databases such as COMRAD. Undoubtedly he would have been silent for several days, and then produced an idea that would have left me breathless. He was, I believe, a true genius, perhaps shown by the fact that, while his *reasons* for a decision might often be suspect, *the decision itself* was almost invariably right.

He was often described as a hard man who didn't suffer fools gladly—or at all. But I found him extremely fair and an excellent colleague, and one who inspired the greatest respect. As Ben Johnson said about William Shakespeare: 'I loved the man... and do honour his memory'. And I miss him.

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