

A Personal History
of the
Royal Greenwich
Observatory
at Herstmonceux Castle
1948 – 1990

Volume 2 – Appendices

George A. Wilkins

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A Personal History of the Royal Greenwich Observatory at Herstmonceux Castle, 1948 - 1990

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PREFACE TO VOLUME 2

The appendices that comprise the second volume of this *Personal History of the Royal Greenwich Observatory at Herstmonceux Castle* are varied in character. They are intended to provide additional background information and further details of activities and persons that would be inappropriate in the Narrative in the first volume. Some of the sections are based on previously unpublished articles or quotations from published papers, but most contain information that has been collected from a wide variety of sources that are not readily available. In contrast to the style of the Narrative, attempts have been made to give references to these sources, but unfortunately this has not been done consistently. It is hoped, however, that the following paragraphs will serve to indicate principal sources that have been used and the abbreviations that identify them.

Sources of information

The principal sources of information about the activities of the RGO that have been used during the drafting of this account are, firstly, duplicated information bulletins that were circulated to staff to keep them informed about past and future events and, secondly, the printed annual reports that were distributed externally to show how the Observatory had used the funds that had been allocated to it.

The information bulletins were started in February 1952 and subsequently appeared with changes of title, frequency, compiler, spread of topics, depth of content and style. I have a fairly complete set as, although I did not at first receive a personal copy of the RGO Information Bulletin, I subsequently inherited Dr Porter's copies for the period from 1951-1961 and thereafter I was able to save my personal copies. I have looked through these 'bulletins' quickly and prepared a 'diary' of events that appeared to be relevant to this highly selective account. I realize that many important events relating to research and telescopes etc are not included.

The early annual reports went under the title *Report of the Astronomer Royal to the Board of Visitors*. (The annual meetings of the Board of Visitors were normally held on a Saturday in June.) Copies were distributed to senior members of the staff and to Scientific Officers such as myself. I was later able to extend my set back to 1945. These reports ceased in 1964 and thereafter the only full reports of this kind were those published for 1974 to 1979/80, then for 1981 to 1985 and for 1985 to 1987.

I have also made some use of the RGO house journal, *Gemini*, but I have not yet looked systematically through my copies. Some of the material has been obtained during my visits to the RGO archives in the Cambridge University Library. In addition I have referred to my large number of other documents, such as McCrea's tercentenary booklet, about both activities and persons when trying to find or confirm details, but this is time consuming and often frustrating!

I gave many references to my sources in my 2004 draft, or on the print-out, but these have now been largely omitted from the narrative.

References in the main text or in the appendices

A reference of the form [RAR yy, nn] usually indicates page nn of the annual Report of the Astronomer Royal for the report-year ending in 19yy. They applied to the year up to the end of March. I believe that they were printed in the published volumes of *Greenwich Observations*.

From 1965 to 1973 full annual reports were not published, but short reports, mainly about research activities, were published in the *Quarterly Journal of the Royal Astronomical Society* from 1962 to 1982. References of the form [QJR yy, nn] refer to these shorter reports for the years ending in 19yy.

A reference of the form AR yy indicates for 1974 to 1980 the Annual Reports that were published first of all for the calendar year 19yy and then for the year ending in September 19yy.

A reference AR 85 indicates the composite report for October 1980 to September 1985 and AR 87 indicates that for October 1985 to September 1987. As far as I am aware, there are no published reports for the years 1987 onwards, although extensive reports were prepared for the Research Councils from 1965 onwards.

A reference of the form RGO X indicates class X of the RGO Archives in the Cambridge University Library. Each class is divided into numbered 'pieces'. Each of the sheets in some of the pieces (especially the early ones) have been given individual 'folio' numbers. A complete reference takes the form RGO X (pn, fn), but there may not be any of these.

References to RGO Information Bulletins or RGO Information Circulars (which replaced RGO Information Bulletins for a while) may use the abbreviations IB and IC, but the codes IB and IC may have been omitted and only the number [xxx] or date [yy/mm] is given in square brackets. This also applies to the Reporter that replaced the IBs in 1988 and for which the codes take the form [yy/xxx]. The abbreviation OC indicates an Official Circular.

References in the text to books and papers are given in only sufficient detail to identify them, but full publication details should be found in appendix G.

Other abbreviations that may be used in references in the narrative or appendices

AGN = AT Division General Notice TN = RGO Training Notice

NAR = NAO annual report – not published

CC = NAO Computer Circular CN = NAO then RGO Computer Notice

Gem = *Gemini* (from 1982-1993): followed by number and the page number(s).

Spe = *spectrum* (from 1994 to 1998): followed by number and the page number(s), but my copies of *spectrum* (except the last) have been 'lost' at the University of Exeter.

SPH, nn refers to chapter nn of *A personal history of the NAO* by D. H. Sadler

George A. Wilkins

2009 May 15

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APPENDIX A. UNPUBLISHED REVIEW ARTICLES AND NOTES

A.1 A review of the history of the RGO, 1948–1990

This unpublished article on the history of RGO at Herstmonceux Castle is based on a lecture that I gave to the Bristol Astronomical Society at the University of Bristol on 1 February 2002. George A. Wilkins.

A.1.1 Introductory remarks

The first 300 years of the history of the Royal Greenwich Observatory (RGO) were fully documented in a 3-volume set at the time of the celebration of the Tercentenary in 1975. There have been many other books and articles about the Observatory and about the Astronomers Royal who dominated its activities while it was based at Greenwich. In this article I have concentrated on the period from 1948 to 1990 when the Observatory was based at Herstmonceux Castle in Sussex. I had the good fortune to be based there for almost the whole of this period.

I should make it clear that this is not intended to be a dispassionate objective statement of the astronomical work of the Observatory. There are three main reasons for this. Firstly, I want to try to give an impression of what it was like to work, and play, at Herstmonceux, and this must be largely based on my own experiences. Secondly, I was involved in what was usually referred to as the service work of the Observatory, rather than with the more glamorous astrophysical research, much of which was done at overseas observatories, rather than at Herstmonceux. Thirdly, the work of the Observatory covered such a wide range of activities that it would be impossible in an article such as this to discuss in detail the nature of the results or of the facilities that were used or developed at Herstmonceux.

Strictly, the name Royal Greenwich Observatory dates from 1948 at the start of the move from Greenwich to Herstmonceux Castle, but I shall use it also for the Royal Observatory (RO) at Greenwich. The talk to the Bristol Astronomical Society was based largely on the use of slides, many of which I had taken of facilities and activities at Herstmonceux, but I have relied on words only for this article. In expanding the notes on my slides, I have added some additional detail that was not given in the talk at Bristol, and I have omitted some remarks. I start with a very brief sketch of the history of the RGO up to the move from Greenwich to Herstmonceux Castle in Sussex.

A.1.2 Early history

The Royal Observatory at Greenwich was founded by Charles 2 in 1675 to provide the astronomical foundation for the determination of longitude at sea. The first Astronomer Royal, **John Flamsteed (1675-1719)** concentrated on star positions. Then **Edmund Halley (1720-1742)** made observations of the position of the Moon over a 19-year cycle. **James Bradley (1742-1762)** improved the accuracy of observations. **Nathaniel Bliss (1762-1764)** left no mark on the RO.

The fifth Astronomer Royal, **Nevil Maskelyne (1765-1811)**, achieved the main objective by producing the *Nautical Almanac and Astronomical Ephemeris* (NA) for 1767 and the *British Mariner's Guide*, which contained the instructions on how to use the method of lunar distances to determine longitude. John Pond (1811-1835) neglected the NA, and Thomas Young became Superintendent of NA. The next Superintendent set up the Nautical Almanac Office, which was separate from the RO

for the next 100 years. In 1833 a time ball was installed on Flamsteed House to provide the first public time signal for ships in the port of London. “Greenwich time and the longitude” by Derek Howse is the best account of this early period and of the later developments in the spread of Greenwich time.

George Biddell Airy (1835-1881) believed that the RO was funded as a public service and he was content to leave astronomical research to the universities and wealthy amateurs. He became the unofficial chief scientific advisor to HMG. In 1838 magnetic and meteorological observations were started and in 1849 the electric telegraph was used for the distribution of GMT. He is, perhaps, best known for the Airy transit circle (1851), which in 1884 was adopted to define the zero meridian and hence GMT for international use. 1873 saw the start of the RGO series of daily observations of sunspots and other solar phenomena – these are related to both geomagnetism and climate.

William Christie (1881-1910) took a greater interest in astrophysics and in 1894 installed the 28-inch refractor. His successor, **Frank Dyson (1910-1933)** organised the 1919 Eclipse expedition to test Einstein’s theory of general relativity. The 10th Astronomer Royal, **Harold Spencer Jones (1933-1955)** was interested in astrometry and geophysics, rather than astrophysics. Spencer Jones became formally responsible for the Nautical Almanac when the suspension of Leslie John Comrie (Supt. NAO 1930-1936) led to the NAO becoming part of the RO for administrative purposes. Comrie’s successor was Donald H Sadler (Supt. NA, 1936-1972), who was then a young man. During the war the NAO was evacuated to Bath; Sadler was awarded the OBE for his work for the Admiralty Computing Service.

Spencer Jones pressed for the move of the RO from Greenwich, but no action was taken until after the war. It was decided to move the whole of the Observatory, rather than to set up a remote observing station. The estate of Herstmonceux Castle was chosen as it was in the best part of the country for observing and there was ample space for new buildings. Moreover, the Castle and some temporary wartime buildings could be used right away for offices, workshops, etc, while the new buildings were being constructed.

A.1.3 End of Spencer Jones era – 1949-1955

Herstmonceux Castle is situated about two miles south of the village of Herstmonceux in Sussex in an estate of 375 acres, much of which was rented out for farming. The castle was built of brick in about 1440; much of it was demolished in the 18th century, but it was rebuilt between about 1911 and 1935. An aerial view of the Castle, probably taken in about 1948 after it had been purchased by the Admiralty, shows also temporary huts that were built during the war for the Hearts of Oak Friendly Society.

One of my earliest colour slides (1956) shows the east wing of the Castle and the ornamental lake, which was referred to as the “moat”. The more imposing view is that of the south wing, with its imposing gatehouse and twin towers. The Great Hall of the Castle was converted for use as the library. Other rooms were used for offices and one was used for the staff canteen. The north-east wing was converted to make a residence of Spencer Jones and his successor. The panelled drawing room was later used as a committee room (1981); I first saw it when Lady Spencer Jones entertained the very young children of the staff during a Christmas/New Year children’s party. The imposing Staircase Hall was normally used for important committee meetings and for

presentations to staff, etc. A slide shows George Harding as Father Christmas at a party, but Sir Harold used to play this role.

Above the offices for the Meridian Department in the north wing of the Castle was the Long Gallery; this was panelled and had a Jacobean overmantel above a fireplace. Although it had a decorated plaster ceiling and a sprung floor for dancing, it was broken up by partitions to make offices for the astrometry and astrophysics department, which remained at Greenwich until 1957. The small chapel in the east wing of the Castle was used for seminars, teaching and other staff meetings. There was a horizontal circular 'window' in the roof above where the altar would have been and two wires had been fixed across it to simulate the wires of a transit instrument.

I joined H M Nautical Almanac Office in 1951 after it had moved in 1949 from Bath to Herstmonceux. At that time most of us used hand-cranked Brunsviga calculating machines, although we did have some electric machines that were useful for certain types of work. The bulk of the computing was carried out by the use of punched-card machines. There was also an analogue computer in the form of an occultation machine that was used for the prediction of the times of occultations of stars by the Moon. A slide shows Miss Marion Rodgers, who joined the NAO in the 1930s; she is now in her 90s and she still keeps in touch with many past members of the staff. Amateurs used to observe the occultations and the differences between the observed and computed times were mainly used to determine the variations in the rotation of the Earth.

Apart from the production of almanacs for international use in astronomy, marine and air navigation, and geodetic surveying, the NAO used to compute sunrise, sunset and lighting-up time for places in the UK for diaries and other publications. The slide shows Angela James in front of a map showing the places concerned; she was one of two young lady graduates who were appointed just before the move from Bath.

I lived in the men's hostel in one of the huts for almost two years. The ladies' rooms were in the north attic of the Castle; we ate in the canteen. Most of the staff were members of the Social and Sports Club. There were clubrooms in the huts for billiards and snooker, table tennis, and social events, including an annual pantomime for the children. There was a sports field for hockey, cricket and stoolball. This was a Sussex game with rules similar to those of cricket, but was usually played by ladies or mixed teams. There was also a single tennis court and we used to enter a team in the tournament for small clubs organised by the local paper, the Sussex and County Herald. A slide shows that the RGO tennis team in 1953 was made up of 3 men and 3 ladies from the NAO. Donald Sadler was a fine sportsman and had played both tennis and hockey at a high club standard before the war. Gordon Taylor, who came from Bristol, is now the Director of the Computing Section of the British Astronomical Association. Mavis Gibson married Patrick Wayman, who joined the RGO just after me and who left to become the Director of the Dunsink Observatory, near Dublin.

The staff had access to the formal gardens and to the grounds; these were open to the public on a few afternoons each week during the summer. A slide of the gardens shows two of the NAO Assistants (my tennis partner, Aileen Grogan, and Ruth Timbrell) by the west border, while a slide showing white rhododendrons by a woodland path was my first colour photograph and was taken on 1956-05-30.

The solar dome, shown in a slide when the hillside was covered in snow, was at first the only observing facility. Complaints about its appearance led to the appointment of a naval architect to design the rest of the new buildings and domes.

Although Spencer Jones was the AR, and lived in the Castle, we saw little of him. He spent a lot of time at national and international meetings. He followed up a proposal by Professor Plaskett in 1946 for a large telescope for the UK by obtaining an American donation of a 98-inch mirror blank. There were discussions and it was decided to site the Isaac Newton Telescope at Herstmonceux, but there was no further action on it before his retirement at the end of 1955. The construction of the new buildings for the RGO (West Building, Equatorial Group and Meridian Group) had been very much delayed by the stop-go policies of the government and they were not then finished.

A.1.4 Woolley period – 1956-1971

The 11th Astronomer Royal was **Richard van der Riet Woolley (1956-1971)**. He had been a Chief Assistant at Greenwich before his appointment as the Commonwealth Astronomer for Australia. When he landed at Heathrow he made what he thought was an off-the-record comment to the effect that space travel was “utter bilge”. This led to a newspaper cartoon showing the solar dome and men carrying placards proclaiming “unfair to spacemen”.

Almost his first job was to make a presentation to Donald Sadler at the Club party after the pantomime, as Sadler had won the Spencer Jones Indoor Sports Trophy during the autumn. Woolley was also a keen sportsman and had played hockey for the RO, but at Herstmonceux he contented himself with tennis and cricket. A slide shows him (and me) in the RGO cricket team in 1956.

At this time the telescopes were being installed in the Equatorial Group and the construction of the West Building for the NAO and Time Departments and for the Chronometer and Engineering Workshops was well advanced.

I went on duty to USA for one year from Feb 1957 to Feb 1958, and so I missed the finish of the construction and the move of the NAO from huts to WB. I spent 6 months at the U. S. Naval Observatory in Washington, D.C., and 6 months at the Yale University Observatory. I learnt how to program an IBM 650 computer and attended lectures on celestial mechanics. The experience proved to be very valuable. I received a foreign-service allowance as single man, but my wife and two-year old son went with me.

When I returned in 1958 the rest of the staff had moved from Greenwich and the Equatorial Group on the hill to the east of the Castle was in use. It had an imposing entrance through gates in a massive wall decorated with flint knapping. I still regret that I did not photograph the craftsman who knapped an enormous pile of flints for this building. There are 3 domes (A, B & C) on the north side for reflecting telescopes, and three on the south side for refractors, but Dome C remained empty as there were no funds for the planned new Schmidt telescope. The domes were clad in copper so that would turn green and blend with the countryside; they had to be heavily insulated and were a constant source of trouble. There was an ornamental pool and steps between the various levels of the domes and walkways. These architectural features proved to be very hazardous to astronomers (and students) working in the Group on dark nights!

There was no formal opening, but the Duke of Edinburgh did visit the Observatory in November 1958. The telescopes were transferred from Greenwich and included:

the 30-inch Thompson reflector (1897); the 36-inch Yapp reflector (1934);
the 26-inch refractor (1892) in a dome with a rising floor to save time when

changing to another star between short exposures for the measurement of parallaxes; a 13-inch astrographic refractor (1890); and the 28-inch refractor (1894).

The EQ Group contained an optics laboratory and an aluminising plant; this was designed for the 36-inch mirror, but its first use, with difficulty, was for a 1-metre mirror from the Vatican observatory (?).

My slide of the main entrance to the West Building, which I took on my return in 1958, shows that the work on the approach road and car park had not yet been completed. The staff of the NAO had moved from the huts by the Castle at the beginning of October, just after the launch of Sputnik 1, the first artificial satellite of the Earth. Some of the staff were then desperately struggling with the problem of providing predictions for this unexpected satellite. The punched-card machines were also moved and were supplemented in 1959 by an ICT 1201 computer. This was operated by NAO staff, but was used generally for RGO purposes.

[When I went to the USA I took a programming manual for an English Electric DEUCE computer, which was the commercial version of the ACE Pilot Model at the National Physical Laboratory, as this appeared to be the most suitable computer for our work. Unfortunately, the Admiralty rejected our proposal and chose a less expensive computer that proved to be very expensive in effort — I had to write the basic software and no scientific software was available from other sources — and very low on speed and capacity.]

The Time Department moved from Abinger and was split to provide a separate Electronics Department. The Greenwich Time Service used quartz-crystal clocks at this time, but it had a link to the first atomic clock at the National Physical Laboratory. An enormous double-storey atomic-clock cellar was included in the West Building, but it was not needed as small commercial caesium time standards became available after a few years. The third wing of the West Building included the Chronometer Workshop and the main stores and was linked to the Engineering Workshop.

The Spencer Jones Group (originally known as the Meridian Group) contained the Cooke reversible transit circle (RTC), and the photographic zenith tube/telescope (PZT). The former was used to determine precise positions and proper motions of stars and continued the work of the Airy transit circle. The PZT was used to measure universal time and the variation of latitude as the UK contribution to the international programme for monitoring the rotation of the Earth. The telescope was controlled from a separate building, which also served as a rest room for the observers. It had small a snooker table for cloudy periods! There was also an astrolabe, which was intended to supplement the PZT, but this was soon transferred to the Royal Observatory at the Cape of Good Hope.

When the position of the new Ordnance Survey pillar was determined with respect to Greenwich a discrepancy was found and it was eventually realized that that the OS did not change to the Airy meridian after 1884, but continued to use the earlier meridian, which was some 19 feet away. The RTC and the PZT both began operations in 1957.

Work started in the spring of 1959 on the building of a Clubhouse to replace the accommodation that had been lost when the wartime hutments were demolished after the completion of the West Building. It was built by the voluntary efforts of the members of the Club which had been given a major boost by the coming of staff from Abinger. The Clubhouse was opened in October 1960 and provided a bar and kitchen as

well as two snooker tables and a general area that was used regularly for table-tennis, badminton and ballroom dancing.

Woolley was very keen on country dancing, but this was organised independently of the Club. The partitions in the Long Gallery were removed at the end of 1957 and the staff were transferred to other rooms in the Castle or to the top floor of the Time Block in the West Building. This meant that the Long Gallery could be used for other purposes, including country dancing and social functions. For a while Woolley kept his grand piano in the Long Gallery and he sometimes dined there in the evening.

Woolley made various changes in the organisation of the Observatory and introduced some new activities: For example, the first of the annual Herstmonceux Conferences was held in 1957 to encourage links between RGO and universities. Leading astronomers from overseas were usually invited and the Long Gallery was used for this and other such meetings. Woolley also started the vacation course for undergraduates, many of whom became astronomers. For a while there were two courses of about six weeks each during the summer.

Woolley set up astrophysics research teams and reduced the emphasis on the long-term observational programmes. He developed an extensive programme for the use of telescopes overseas, especially in South Africa, but also in Egypt, Spain, and the USA. Some of the engineering department staff went out too to build up their experience.

Unfortunately, Woolley also decided that RGO should publish its research papers as well as the data resulting from the observations made by the staff. The papers came out as individual *RGO Bulletins* and at first were printed from typescripts. Consequently, the research was undervalued by the rest of the world.

Woolley carried the day in his opposition to the UK joining the European Southern Observatory and he obtained approval for the Anglo-Australian Telescope project. The telescope was good, but the site at Siding Springs was inferior to the ESO site in Chile.

In April 1965 responsibility for the funding of the RGO passed from the Admiralty to the Science Research Council. This led to an enormous increase in bureaucracy and eventually proved disastrous for the Observatory. The University of Sussex at Falmer on the outskirts of Brighton, was established at about this time with an institute for astronomy led by Professor W. H. McCrea. Woolley and others were given honorary positions there and joint seminars were held at the two sites alternately.

Luckily the replacement for the ICT 1201 computer was ordered before the changeover to SRC and an ICT 1909 computer was installed in 1966. It was not the computer I wanted, but it proved to be better than I expected. It was used by the University of Sussex for a short while.

Soon after his arrival Woolley had forced a change of design of the Isaac Newton Telescope (INT), but the project was subject to many delays. It was, however, continued by the SRC. The INT was intended for general use by UK astronomers, and was not to be regarded as an RGO telescope. Nevertheless, the RGO was expected to provide operational support, although it was not given any extra resources for this job.

The construction of the dome was started in 1965 and I took a series of slides of the building and of the arrival of the parts of the telescope. In February 1966 I slipped into the dome when the massive dome arches were lowered in to place – there was no Health and Safety Executive in those days! I also went in during some lunch times to

watch the progress in the construction of the telescope, but I did not have suitable equipment to get good photographs. The telescope was formally inaugurated on 5 December 1967 by Queen Elizabeth. My slide of her signature in the RGO visitors book also shows the original INT and a replica that was made in our workshops for the Queen. It was a foggy day and so the Queen was unable to look through the telescope, nor did she get a good view of the Castle, which was floodlit for the occasion.

1967 was also the year in which we celebrated the bicentenary of the Nautical Almanac. The National Maritime Museum mounted a special exhibition in the Old Royal Observatory at Greenwich and Sadler wrote the booklet *Man is not lost* to accompany it. Unfortunately, NMM failed to print and publish the booklet before the exhibition closed!

By the summer of 1969 construction had started on a building just to the north of the Engineering Workshop for the new Physics Department, which was headed by Dennis McMullan from Cambridge. Its first task was to design and build electronographic cameras, but then it turned to the development of detectors based on the use of CCDs (or charge-coupled devices). Woolley was very much against the use of computers for telescope control; it was said that in orders they had to be disguised as process controllers

In 1971 the 28-inch telescope was moved back to Greenwich – it had been used mainly for double-star observations, but no resources were left for such work.

At the beginning of 1970 Sadler was given leave of absence in order to organise the IAU General Assembly that was held at the University of Sussex in August. I became Acting Superintendent and later, in 1971, Superintendent as Sadler did not return to the post. [Woolley tried to block the confirmation of my acting promotion to SPSO as he wished to use the complement position for astrophysical research, but my appeal to SRC was successful.]

Woolley was knighted in 1963 and he retired at end of 1971. He then became the director of the new South African Astronomical Observatory, which was formed from the Royal Observatory at the Cape of Good Hope. After his departure a portrait in oils of Sir Richard hung in the Long Gallery – it was his leaving present, which he gave back.

A.1.5 Period of change – 1972-1981

Margaret Burbidge (1972-1973) was appointed director, but not as Astronomer Royal — this title went to Martin Ryle at Cambridge. She resigned in the autumn of 1973 and returned to California. She had spent a lot of time away from Herstmonceux as she continued to observe on telescopes overseas and to attend many international conferences. At this time Alan Hunter was deputy director and a slide shows him at the final retirement of Donald Sadler in 1972.

Alan Hunter (1973-1975), who had joined the RGO in 1937, became director and it was appropriate that he should oversee the RGO Tercentenary celebrations in 1975. The highlight was the Tercentenary Royal Garden Party when Princess Anne unveiled a bust of Flamsteed that had been carved by George Elliot, one of the stonemasons who worked on the restoration of the Castle. In addition there was a large sundial, which had been suggested and designed by Gordon Taylor. [I had the task of verifying that his design was sound. I was also made chairman of the local organising committee for a special tercentenary symposium that was held in the Castle.] A booklet

about the history of the RGO was written by Professor McCrea at the instigation of the RGO. A much more extended and expensive history in three volumes was published commercially and many articles about the RGO were published in newspapers and magazines.

Hunter had a quite different management style from Woolley and in 1974 the departments of the RGO were grouped into divisions [I became responsible for the oversight of the work of the Time Department as well as of the NAO and the Computer Department, which was split from the NAO. Later the Library and the Archives were added to this Almanacs and Time Division (A&T).] This was also a period of review by SRC about the role of the RGO in the context of proposals for a Northern Hemisphere Observatory (NHO). Eventually it was agreed that RGO should be responsible for building of the NHO, and Graham Smith was appointed as the next Director to carry it through.

When Hunter retired he gave to the RGO Club a cheque for double the amount of his leaving present to pay for pumps and water-treatment equipment, etc, so that the small ornamental pool in the formal gardens could be used by the staff as a swimming pool.

Graham Smith (1976-1981) had meanwhile been pressing forward the planning of the NHO. He decided that the publications and records store in the basement of the chronometer wing of the West Building should be converted to office space for the NHO design team. Although most of it was then above ground, it was designed to withstand attack in the event of war, and so the cutting of windows through the thick reinforced concrete walls was a difficult and expensive operation that is shown in my 1976 slide.

Graham Smith also decided in 1976 that the Meridian Department should be evicted from its rooms in the north wing of the Castle in order to provide space for a permanent public exhibition to follow up the Tercentenary celebrations. Part of the rationale for the move of the staff to the West Building was to break their isolation from the other staff concerned with photographic astrometry and astrophysics.

In 1977 the RGO series of daily observations of sunspots and other solar phenomena was stopped after more than 100 years. It was claimed that the results were no longer useful as more sophisticated observations were being made elsewhere. This was true, but the basic reason was that Woolley had deliberately allowed the Solar Department to run down by not replacing its senior staff when they retired; consequently there had been no upgrading of its objectives and equipment.

Consideration was given to the transfer of the early records of the RGO to the National Maritime Museum at Greenwich, but thanks to the enthusiasm of Janet Dudley, whom we had just recruited to act as librarian, it was decided to keep them at Herstmonceux. The extensive collection of papers that were kept by Airy formed a major part of these archives. Janet obtained the support of the Manpower Services Commission for a major project to sort and list the archives and so make them much more accessible than they would otherwise have been. Some time later she obtained approval to set up a conservation laboratory and she even poached the conservation officer from the East Sussex County Council. She also brought together the early books that were scattered throughout the library; most of them had been collected by Airy.

1979 saw both the construction of a new wing of the West Building for the astrophysics teams and the removal of the Isaac Newton Telescope. The former was a

result of the Labour Government's programme to support the building construction industry. The latter had been agreed by Graham Smith as part of the price for the NHO. The INT was to be transferred to La Palma as one of the three telescopes. This was not to save construction costs, but to ensure that the RGO did not devote resources to the maintenance and use of the telescope in the UK. Consequently a lot of effort and costs were wasted on the redesign and on rebuilding, which included a new mirror. Moreover, the UK did not have a convenient test bed for new instruments, nor a large telescope that could be used by students and others for training before travelling to the Canary Islands. The empty dome remains at Herstmonceux as a landmark for mariners in the English Channel.

Two years later, however, on 1981-07-03 a telescope for the new satellite laser ranging system (SLR) was installed in what had been the solar dome. This was the result of a proposal by a combination of university groups and the A&T Division as it was realized that the PZT would be superseded by new techniques for monitoring the rotation of the Earth. [I drafted the proposal and argued for it in SRC committees.] The choice of telescope was made by our senior telescope engineer, John Pope, who was on hold owing to the delay in the international agreement for La Palma. This was lucky for the project as he realized that the telescope proposed by the laser group at the University of Hull would have been inadequate for the task.

Graham Smith resigned after his appointment as successor to Sir Bernard Lovell as director of the radio observatory at Jodrell Bank. I acted as his deputy for his last year of office and made the staff presentation to him. A slide shows him handing to me a cheque for double his leaving present; he asked that it be used to provide staff facilities on La Palma.

A.1.6 Period of decline – 1981-1990

Alec Boksenberg 1981- 1995, from University College London, succeeded Graham Smith. A slide shows him and Patrick Moore on the South Bridge of the Castle, on the occasion of the first annual meeting of the Federation of Astronomical Societies on 1981-10-03 at Herstmonceux. This was shortly after I had carried out my last duty as deputy director by opening the meeting before Boksenberg arrived to take up his post on the following Monday.

Boksenberg's first action was to initiate a reduction of about 25 % in the staff levels of the RGO, whereas under Graham Smith our complement had been rising to cope with the demands of La Palma. A more than proportionate cut was made in the services, such as those of the A&T Division. Nevertheless, the SLR was successfully brought into operation and proved to be extremely effective. For several years we were the most productive station in the world. A photograph of the SLR at night, with its green beam piercing the sky, was used as the cover illustration for an issue of *Nature* in 1985. In addition, a Hewitt satellite-tracking camera was moved from Malvern and installed in the empty Dome C in the Equatorial Group. The operators were transferred from the University of Aston and they achieved a significant improvement in productivity

Boksenberg attempted to make the Castle a positive asset as a conference centre. It was ideal for this purpose as it already had bedrooms, kitchen and dining room, the Long Gallery (now usually called the Ballroom) and other meeting rooms, the library, the gardens and grounds. One of the large offices, which had views over the moat, was converted for use as a conference room and furnished with antique-style chairs. It is

shown in a slide of a dynamical astronomy workshop — A&T played its part by organising several national and international workshops in the Castle.

The year 1984 was celebrated as the centenary of the decision of an international conference that the Greenwich meridian should be the prime, or zero, meridian for the measurement of longitude. [Correspondingly, the universal day was defined by Greenwich Mean Time starting at midnight on the Greenwich meridian. The Nautical Almanac continued, however, to use the astronomical day starting at noon until 1925.] The booklet produced by the Ordnance Survey to mark the event describes the founding of the Royal Observatory and its role in the determination and distribution of time. Members of the Brighton Astronomical Society walked along the zero meridian from Peacehaven on the coast to Greenwich and I was asked to start them off early on 1984-08-17.

The main purpose of the RGO had been changed from astrometry under Spencer Jones to astrophysics under Woolley and then, under Smith and Boksenberg to the provision of support for UK astronomers at overseas observatories on La Palma and elsewhere.

The observatory on **La Palma** is an international one and involves several European countries other than Spain and the UK. The observatory is built on the rim of an extinct volcano and is usually above the clouds, as is seen in a slide giving a general view, with the building for the INT. The opening ceremony took place in fine weather in June 1985. There are three telescopes in the Isaac Newton Group. They are usually known by their initials.

INT – needed considerable modification to cope with the new latitude and a new generation of instruments. The new, slightly larger mirror has an aperture of 2.5 m.

JKT – Jacobus Kapteyn Telescope – a 1 m astrographic telescope that was jointly funded with the Netherlands – hence the name – and Ireland.

WHT – William Herschel Telescope was completed in July 1987. It is an altazimuth with 4.2 m mirror. The cover of the RGO Report for 1985-1987 shows the WHT Dome at night – half open!

CAMC – Carlsberg Automatic Meridian Circle came from Denmark – hence the name – and is the same basic design as the RTC at Herstmonceux, which ceased operation in 1982. CAMC started operation in 1984 and is jointly operated by Denmark and the UK.

By about 1985 the RGO at Herstmonceux was under threat once more, but complete closure was averted. A slide dated 1986-05-31 shows Professor Richard Gregory & Patrick Moore at Herstmonceux to consider whether instruments could be kept in use as a part of a science centre. The decision to sell the Castle and its estate and to move RGO to Cambridge with a further reduction in complement was announced in 1986. My arguments that the SLR should stay at Herstmonceux were accepted and it continued to operate successfully with funding from the Natural Environment Research Council.

I retired in July 1989 but continued to make occasional visits until the RGO moved to a new building at Cambridge in the spring of 1990. My successor, Bernard Yallop, allowed me to continue to use the same room.

The new RGO building was built on university land behind the Cambridge University Observatory. At first all seemed to be going well, but then the funding organisation changed as the Science and Engineering Research Council (formerly SRC)

was split into the Particle Physics and Astronomy Research Council and the Engineering and Physical Sciences Research Council. PPARC appointed a new Chief Executive soon the daggers were out again. This time, In spite of the efforts of the new director **Jasper Wall (1996-1998)**, the assassins were successful and the RGO was closed at the end of 1998 after 323 years. The RGO staff held a reunion prior to the closure on a fine day in the summer of 1998.

Some of the staff went to La Palma and others to the Astronomy Technology Centre at Edinburgh. A few others found posts in the Institute of Astronomy at Cambridge or elsewhere in astronomy. The NAO staff went to the Rutherford Appleton Laboratory.

A.1.7 Concluding remarks

During its long history the RGO made many valuable contributions to society through its services to navigation and time as well as through its observation and publication of astronomical, geomagnetic and meteorological data. It has also contributed through its work on the development of instruments and techniques and through its research on all aspects of astronomy.

I am pleased to be able to conclude by noting that three of the activities for which I was responsible at Herstmonceux have survived:

The NAO is now based at the Rutherford Appleton Laboratory in Oxfordshire.

The SLR is still in operation at Herstmonceux

The RGO archives are now in the care of the Cambridge University Library.

Herstmonceux Castle is no longer the home of the RGO, but it is, fittingly, being used as an International Study Centre. The developer who bought Herstmonceux Castle failed to get planning permission for the additional buildings that he wished to erect and he eventually sold the Castle and estate to the Queen's University of Ontario, Canada. The West Building has been converted from offices and laboratories to bedrooms and lounges. The Equatorial Group is open as a Science Centre and a Lottery grant has just been received to bring the telescopes and domes into use again.

A.2 Review of almanacs and time activities

The following review of the post-war activities of H.M. Nautical Almanac Office and of the Time Department was written hurriedly on 1998-12-09 in response to a request from Professor Sir Francis Graham Smith for material about the NAO for inclusion in a talk about the RGO to be given at the meeting of the Royal Astronomical Society in January 1999. He mentioned 'MERIT & the laser ranger' and so notes on the work of the Time Department, which was based at Abinger until late 1957, are also included. It has since been edited in order to make it suitable for a wider readership.

George A. Wilkins

The Nautical Almanac Office (NAO) moved from Bath to Herstmonceux Castle in 1949 to join other departments of the Royal Greenwich Observatory (RGO). Donald Sadler, the Superintendent, then carried through the unification of the almanacs of the UK and the USA. He and Gerald Clemence (Director of the NAO in the US Naval Observatory) had to persuade the navies and the air forces to change their practices in order to arrive at a common content and format, and this was not easy. There was already a lot in common between the astronomical almanacs, but there had to be some

give and take to get the final agreement on content and on the sharing of the work of computation and printing. Unfortunately, he could not persuade the Americans to change their title from *American Ephemeris* to *Astronomical Ephemeris (AE)*. The preparation of the *Explanatory Supplement* was also shared, although it was only published in the UK.

Sadler had been aiming even higher — for an *International Astronomical Ephemeris*, but he did not achieve this, although Germany gave up its *Astronomisches Jahrbuch* and took over from us the work of publishing *Apparent Places of Fundamental Stars*. The unification of the *Nautical* and *Air Almanacs* was accompanied by a unification of the auxiliary navigation tables (mainly for RA/Dec to Alt/Az conversions) and Sadler played a major role in this. He also designed the *Star Almanac for Land Surveyors*, which is still in use in its original form nearly 50 years later!

Sadler was strongly involved in both technical and administrative activities in the International Astronomical Union (IAU). He made major improvements when he was General Secretary, and his final task was to organise the IAU General Assembly in Brighton in 1970. When he retired he not only passed on the job of Superintendent of the NAO to me, but he nominated me for two IAU jobs, so that I became the chairman of the IAU Working Group on Numerical Data and the IAU's representative on the Federation of Astronomical and Geophysical Services. I eventually became the secretary of FAGS, and I suspect that this led to my being nominated as the chairman of the IAU Working Group on the Rotation of the Earth in 1978. This WG organised Project MERIT which evolved in 1988 into the successful International Earth Rotation Service.

The NAO was also responsible for an international service for the prediction and reduction of occultations of stars by the Moon, which was led by Mrs Flora Sadler until her retirement in 1973. This was primarily aimed at providing a uniform time-scale against which the variations in the rate of the rotation of the Earth could be determined. This aspect was superseded by atomic time, but the expertise in the NAO was used by Leslie Morrison in particular to collect and re-reduce earlier observations so as to considerably improve our knowledge of the variations in the 'length-of-day' since the 17th century. Leslie also provided the technical back-up for Richard Stephenson's work on the use of the records of ancient eclipses for the same purpose — now described in detail in a book.

An unexpected offshoot of the NAO's occultation programme was the discovery of the first quasar. The NAO provided predictions for the occultations of radio sources, which were used to help to map their structures. Then Cyril Hazard observed one that behaved like a point source; Bill Nicholson was responsible for the reduction to determine the coordinates of the source, which led to the optical identification of 3C 273B as a quasar. Predictions were also provided for X-ray sources. Gordon Taylor predicted the occultations of stars by the major planets and by minor planets (asteroids). These led to the discovery of the rings of Uranus and more accurate estimates of the sizes and shapes of some asteroids.

The NAO did not have enough resources to carry out a major program of research or development in celestial mechanics — the US Navy was more sympathetic to this than the SRC! I produced an improved 'improved lunar ephemeris' for the AE, and learnt to write Fortran in the process, but such work was taken for granted and I doubt whether it got more than a sentence in the annual report. Andrew Sinclair and later Don Taylor did, however, produce a series of papers on the motions of minor planets and

satellites whilst also contributing to other aspects of the work of the office.

The NAO was responsible for the provision of a computer service for use throughout the RGO. Unfortunately the Admiralty turned down our bid for a DEUCE computer and allocated us an ICT 1201, which was really only fit for commercial accounting. Our later bid for an IBM 360 was also turned down, but the ICT 1909 proved to be a very powerful tool that was used for astrophysical research as well as for astrometry and the almanacs. In the NAO we developed one of the first systems for the automatic composition of numerical tables for phototypesetting from magnetic tapes. During the 1970s we also pioneered the introduction of ephemerides in compact forms for use in portable electronic calculators etc and Bernard Yallop developed this in the volumes of *Compact Data for Navigation and Astronomy*.

The divisional structure of the RGO was introduced in 1974 and I became Head of the Almanacs and Time Division (A&T), which included the NAO and the Time Department, and later the Library and Archives. Under Humphry Smith the Time Department had played a major role in the introduction of atomic time for the national (Greenwich) time service — until we got our own commercial caesium standards we regulated our quartz clocks by reference to the NPL primary standard. We and USNO introduced ‘coordinated universal time’ by agreeing when to make the step adjustments in the epoch and rate of the time signals that were then trying to follow the time given by the Earth as monitored by instruments such as the photographic zenith telescope and the astrolabe. Smith was the chairman of the international working party that eventually agreed on the TAI/UTC system that has been in use since 1972.

In the early 1970s the NAO was a party to a bid for a lunar laser ranging system to be built in the UK for deployment in South Africa, but that was not approved by SRC, possibly because we could not get appropriate support from any South African group. We did, however, get approval for Andrew Sinclair to spend a year in Australia to work on the LLR project at Orroral, near Canberra. This proved to be one of the keys to the later success of the satellite laser ranging project, which replaced the PZT as the RGO’s contribution to the determination of UT and polar motion. By this time the occultation program was obsolete and so NAO staff moved to the Time Dept to develop and operate the SLR system. Another key to its success was the allocation of John Pope to the project while we were waiting for the go-ahead for La Palma — it was he that ensured that the telescope was capable of the doing the job that was required. The SLR made its first observations in 1983 during the MERIT Main Campaign and went on to become the most productive station in the world for several years — I am pleased to say that is still up high up on the list for the number of satellites observed.

The NAO provided the first UK prediction service for artificial satellites, but Woolley would not support the work and it went to the Royal Aircraft Establishment (RAE) and later to the Radio and Space Research Station (RSRS) at Slough. In the 1960s a kinetheodolite from the RAE was operated by a group within the NAO for the observation of the positions of satellites; the prediction programme was passed on to RSRS. After a few years the kinetheodolite was transferred to the Royal Observatory at the Cape. In the 1980s a much more powerful satellite-tracking camera was moved from its original site near Malvern into one of the domes of the Equatorial Group and the observers joined the A&T Division. This Hewitt camera was later moved to Australia.

My involvement with international activities and with administrative matters in RGO and SRC meant that I did not give as much time to the NAO as I would have liked. I did, however, put forward proposals for the revision of the *Astronomical*

Ephemeris and I finally persuaded the Superintendent of USNO to seek the approval of Congress for the change of name of the *American Ephemeris* to the *Astronomical Almanac*. These changes were incorporated in the *Astronomical Almanac for 1981*. I did not, however, find enough time to carry through the corresponding revision of the *Explanatory Supplement* before my retirement in 1989.

One point that may be of particular interest in connection with the closure of the RGO is the effort that was put into the RGO archives. This was almost entirely due to Janet Dudley, who first of all persuaded us that we should retain the archives at Herstmonceux and not pass them to the National Maritime Museum. Then she obtained an enormous amount of high-quality labour, including Adam Perkins, from the Manpower Services Commission to list the records. In addition she argued for, and obtained, the setting up of a conservation laboratory. Unfortunately, the laboratory was lost when the archives were moved to the Cambridge University Library, but the listings are available there for use for research. I also suspect that more recent papers were saved than would otherwise have been the case.

The NAO was reduced to 4 or 5 persons when the move to Cambridge took place, and the Time Department was abolished. The NAO has continued to fulfill its share of the cooperative work with USNO and to provide a public data service. In addition, one of its new members, Steve Bell, wrote a bestseller — *The RGO Guide to the 1999 Total Eclipse of the Sun*. It is such a pity that the RGO is now in permanent eclipse!

A.3 Recollections of the Royal Greenwich Observatory, 1951-1990

This is a revised and extended version of the article that I wrote for the RGO house journal Gemini under the title “Almost 40 years in the RGO at Herstmonceux Castle” just before I retired from the RGO in 1989. George A. Wilkins.

A.3.1 1951–1965

Although I had chosen a book on astronomy as a school prize I had no intention of becoming an astronomer and my studies at Imperial College took me from physics to mathematics and into geomagnetism. At one time it seemed that my first job would be concerned with the design of electrical-power lines, but my Ph.D. supervisor, Prof. A. T. Price, drew my attention to a vacancy in H. M. Nautical Almanac Office (NAO), which was already at Herstmonceux Castle in East Sussex. He saw this as a possible route into the Magnetic & Meteorological Department of the Royal Greenwich Observatory (RGO), but for me the initial attraction was a job in computing that applied astronomy to the public service. The post also carried deferment from compulsory military service, but it was the location at the Castle in proximity to the sea and the South Downs that finally made the offer of a post irresistible.

I joined the RGO on 1 October 1951, and during my first two years at the Castle I lived in the men’s hostel in one of the ‘huts’ that used to stand on the area by the south courtyard that is now used a car park for the public visitors. The ladies’ hostel was in the north attic of the Castle and we had our meals together in the dining room of the Castle. The RGO Club then had the use of two large rooms in the huts; one contained three table-tennis tables and a stage, while the other had a billiard table, a dartboard, and some rather dilapidated armchairs that were arranged to form a lounge area. The clubrooms were very heavily used at lunchtime but, as very few members of the staff had cars in those days, the evenings were usually quiet.

Observatory vehicles were used to bring staff to work from Herstmonceux village or from Pevensey Bay Halt in the morning and to return them in the evening; these vehicles were also used for some recreational purposes, and the Club arranged outings to various places of interest. There was an infrequent bus service between the nearby Herstmonceux Church and Hailsham, but after a table-tennis match in Eastbourne I would have to dash for the last bus to the village and then walk down the lane back to the Castle. I can even recall walking back across the marsh from Pevensey after an evening in Brighton; the sky was clear and I saw more stars and nebulae than on any other occasion.

At that time the NAO occupied huts on each side of the south courtyard, and I looked out from my office across Halley Road to another wooden hut. The Chronometer Workshop, which was then extremely busy, was also in a hut, and its staff were also very pleased to move to the West Building, now called the Bader Building, some years later. The Astronomer Royal, Sir Harold Spencer Jones, lived in the Castle, which was also used for offices for the Solar, Mag. & Met., and Chronometer Departments; the General Office was then so small that it fitted comfortably into two rooms in the south-east corner. The rest of the RGO was still dispersed, with some staff at Greenwich and others at Abinger; we saw some of them on the day of the Annual General Meeting of the Association of Astronomers, as our branch of the Institution of Professional Civil Servants (IPCS) was then known. It was a time of economic stop-and-go, and there was little money for new buildings; one site engineer was delighted at completing one task — the laying of grass verges along the road to the East Gate! Another site engineer had the swimming pool cleaned out and I was able to have a swim before the water turned green again for another twenty years.

The Superintendent of the NAO was Donald Sadler (then known to the staff as DHS), and during my first few years in the NAO he gave me a series of jobs that gave me experience in the use of a variety of calculating machines and in the organisation of the work; I also had to learn about the techniques of editing and printing. The aims were to get results that could be trusted and to get them in an economical way; moreover, the printed numbers had to be right and the layout and style had to be such that the numbers could be used with the minimum of effort and risk of error. The production of the Almanacs was very much a team effort and Sadler made clear his displeasure with anyone whose work was not up to the expected standard. In all written memos the members of the staff were referred to by their initials; titles and given names were not used to show rank or status. Even the Astronomer Royal was known as 'the A.R.'

The NAO had a variety of desk calculating machines, the most popular of which was known as a Brunsviga; it was operated by turning a handle, but for complex tasks it was faster than electric machines. The bulk of the calculations were carried out on punched-card machines, each of which could perform a very limited set of operations. Their main virtue was that intermediate results could be passed from one stage to the next without anyone having to write them down and then reset them, as was the case with the desk machines. By the standards of the day they were very reliable, but a great deal of time had to be spent in applying checks to the results so as to pick up the errors made by the machines, their operators, and by those who designed the procedures and the 'plugboards' that controlled the machines. At first all the results had to be keyboarded by the printer and so every member of the staff had to spend two hours each day 'reading' proofs to find all the errors made by the printer or by our own staff in preparing the 'copy'. Each page was normally checked in some way by at least six

different persons, but still the occasional error would slip through to the published volume. Eventually the NAO obtained an IBM card-controlled typewriter that produced copy that was good enough to be photographed to make the printing plate, but this could only be used economically if there were a large number of pages with the same layout.

Richard Woolley became the A.R. at the beginning of 1956, and he arrived from Australia just in time to attend the Club's pantomime and party. One of his first actions was to start a country-dancing group, which met in the huts. Some years later, there was a clash with another Club function, and he had the office partitions that were in the Long Gallery of the Castle taken down so that once again the Castle had a ballroom. He was also keen on cricket and tennis, which was then played mainly as mixed doubles since the RGO recruited many attractive players from the local girls grammar schools. Most games were played within the lunch-hour, but when the A.R. played the games went on into the middle of the afternoon.

Woolley had more profound effects on other aspects of the RGO since he built up research teams at the expense of the traditional long-term observing programmes, especially those of the 'geophysical' activities, including the solar work. I sometimes wonder how my life would have changed if I had accepted Woolley's invitation to move from the NAO into astrophysical research, but at no time have I felt that I should have done so, even though in recent years the NAO-type activities have been cut to the point where their continued viability is in doubt.

In 1957 my life was changed dramatically as Sadler had managed to arrange with Gerald Clemence, the Director of the Nautical Almanac Office of the U.S. Naval Observatory (USNO), that I should spend a year in the USA to learn about the use of electronic computers, which were just becoming available commercially, and about celestial mechanics. Since I was to be away for only one year the Admiralty was only prepared to pay my foreign service allowance at the single-man's rate, but nevertheless my wife Betty, whom I had married in 1953, and our young son, Michael, went with me on the Queen Elizabeth. We lived for 6 months in Washington DC, where I worked in the Nautical Almanac Office of the Observatory and learnt to use IBM 650 computers. Then we spent another 6 months in a small seaside village outside New Haven, in New England, where I attended lectures in the Astronomy Department of Yale University and used the computer there to continue the work I had started at the USNO. But that would make another article by itself...

Just before I went to the USA, we had put in a bid for a DEUCE computer that was then being built by the English Electric Co. as an engineered version of the pilot model of the ACE (Automatic Computing Engine), which had been developed at the National Physical Laboratory. We were unsuccessful, and rumour had it that it was in direct competition with a bid for a new crane for the dockyard at Chatham! We were eventually allocated an Hollerith 1201 computer, which was originally known as the HEC4 (Hollerith Electronic Computer), and which was considerably less powerful than the DEUCE and much more difficult to use than the IBM 650 computers that I had been using in the USA. It came without any software, and so I had to develop a set of routines that were equivalent to what is now known as an assembler. I even had to invent ways of representing and describing numbers based on 4 bits, and so in the early NAO Computer Circulars there are tables for 'bi-octal' numbers (now known as hexadecimal bytes). We also had to develop all the basic routines for evaluating trigonometric functions etc. We did the initial development work on a computer in

London, and I gave training lectures for other RGO programmers in the Chapel of the Castle.

While I was in the USA the first artificial satellites were launched and the West Building was completed. When I arrived back I was pleased to find the NAO in its new offices, but I was very disappointed to find that Woolley had insisted that the NAO should abandon the satellite prediction service that it had established; the responsibility was transferred to the Royal Aircraft Establishment. I was also just in time to see the final stages of the clearance of the huts. The Club then had no meeting room, although some use was made of the canteen in the West Building. The Club had had, however, an influx of new members, including Joe Bates, from Abinger, where there had also been a thriving Club. In the spring of 1959, thanks largely to the determination of Joe, we started to build our own Clubhouse by working in the evenings and at weekends; it was a dry summer and we had the roof on by the autumn. Then some members of the local planning committee claimed that we did not have planning permission and the building must be demolished. We knew that we had approval from the Admiralty, but it took months to resolve the situation. Four of us (Joe Bates, Henry Gill, Harold Rodemark and myself) continued regularly with the fitting out until the threat had gone, and work could resume in earnest. The Clubhouse was formally opened on 1960 October 1. All those who had contributed more than 200 hours received a polished wooden gavel, and their names were listed in the booklet about the RGO Club that was published at the time.

The Clubhouse provided a wide range of facilities for the staff — two full-sized snooker tables, table-tennis, badminton (but the ceiling was too low for matches), darts, a lounge and a bar. The office was soon converted into a ‘shop’ for bulk purchases, before the days of cash-and-carry stores. The Clubhouse was used mainly in the lunch-times, and was used only occasionally for major events as the ballroom in the Castle was available for social events, at which the local Blue Stars band was very popular. A ballroom-dancing section was started, but as with the folk-dancing it soon became dominated by associate members who did not work at the RGO. I gave up cricket and stoolball, but I continued to play tennis regularly. Although we had only one tennis court, we were able to play in a tournament for small clubs that was organised by *The Sussex Express and County Herald*.

In 1961 I attended the General Assembly of the International Astronomical Union in Berkeley, California, and in retrospect it is clear that this was the start of another thread in my career. Sometime afterwards, Professor Fricke, the Director of the Astronomisches Rechen Institut in Heidelberg, invited me to visit his Institute in 1962 to lecture on the subject of a paper that I had given at Berkeley. In 1963 I became the secretary of the IAU Working Group on Astronomical Constants, of which he was the chairman. I was then elected Vice-President and later President of IAU Commission 4 (Ephemerides), which was primarily concerned with developing further cooperation between the almanac offices of the world. Since then I have held a variety of offices within the IAU and have represented it on other international organisations. Between 1975 and 1979, I was secretary of the Federation of Astronomical and Geophysical Services. As a consequence I travelled to many interesting places and made many friends in other countries.

It soon became clear that the 1201 computer (which had only 1024 words of store for both programs and data) was not capable of doing many of the NAO data-processing jobs, and it was even less suited to research projects. I acquired a copy of a program

from the Jet Propulsion Laboratory for the evaluation of the coordinates of the Moon and used it to teach myself Fortran so that I could run the program on an IBM 7090 computer in London. We soon began to run other jobs in this way and to press for a replacement for the 1201. I spent a large part of one year in a computer specification and evaluation exercise involving the Post Office Technical Support Unit and Admiralty O & M. At the end of it we went out to tender to four companies. I put great weight on software and on compatibility with the USNO and other astronomers, and so I favoured an IBM 360, but the computer selected by the team was an ICT 1909, which undoubtedly had more hardware power for its price. We insisted on an acceptance trial that lasted a week and during which the computer had to demonstrate its reliability and its ability to run four programs together. We subsequently expanded the system by replacing the central processor and adding disc drives discarded by the Atlas Computer Laboratory, but although the system worked well we were never able to share software easily with other groups.

A.3.2 1965–1981

The year 1965 saw the transfer of the responsibility for the RGO from the Admiralty to the newly-formed Science Research Council (SRC, later SERC and now PPARC). The consequential increase in funding for astronomy led to a welcome increase in the complement of the RGO, but to an even greater increase in the amount of time and paper that was involved in non-scientific activities such as the annual cycle of estimates and reports. The more significant change was that the RGO was no longer regarded as an Observatory whose main functions were to carry out astronomical programmes of observation and to provide national and international services for navigation and time. Instead the RGO's first priority became the support of research in universities; the conduct of its own projects came second, and services soon became a poor third. Woolley managed, however, to continue to develop the research programme in association with the Institute of Astronomy at the new University of Sussex. His successors were less successful and the RGO's own programme was gradually reduced and was subjected to frequent external review.

The change from the Admiralty to SRC saw the end of a practice that was known as Staff-Side Scrutiny. This meant that each annual report on a member of staff was seen by one member of a panel of scrutineers who were elected by the staff. The aim of the scrutineers was to ensure that no member of staff was penalised by an unjust adverse report on himself (or herself) nor by the overmarking of another person. Now Woolley was keen to know about all his staff, and he carried the procedure one stage further. We had an annual meeting of all reporting officers at which they read out their draft markings and commented on the work that had been done during the year. The countersigning officers and the scrutineers were also present, and anyone could question any mark that was felt to be unjustifiably high or low in comparison with others in the same grade. I am sure that this led to a much more uniform standard of marking and it also meant that more attention was paid to the career development of staff; for example, staff were moved from one department to another in order to widen their experience, or to make better use of their talents, or even to remove a personality clash that was thought to be having an adverse effect.

I spent some time on the continuation of my Ph.D. research in geomagnetism since my external examiner, Professor Sydney Chapman, had pressed me to write it up for publication in the *Philosophical Transactions of the Royal Society*. As a

consequence, in 1965 I attended a conference in Brazil and then flew to the USA to give a lecture at the Goddard Space Flight Center, but I declined an invitation to work on geomagnetism at the Center. I also tried to continue the work on the orbits of the satellites of Mars that I had started at USNO; this led to invitations to lecture at a summer school in the Tyrol and to speak at a conference in Rome, but I made little real progress as my main duties in the NAO took up most of my time and attention. Sadler had become General Secretary of the IAU, and so he delegated to me more responsibility than would otherwise have been the case. I became Acting Superintendent at the beginning of 1970 when Sadler was assigned to special duties for one year to organise the IAU General Assembly at the University of Sussex; he did not take back his responsibilities for the NAO before he retired in 1972. During 1970 the Astronomy Committee of SRC decided to stop the publication of our principal publication, then known as *The Astronomical Ephemeris*, but I was allowed to speak at the next meeting and I was able to get the decision rescinded.

During the mid-1960s we watched with curiosity the building of the dome for the Isaac Newton Telescope and then the lifting-in of the parts of the telescope. It had, however, been made clear to us that this was not to be 'an RGO telescope', but was for the use of university astronomers. Some of us were invited to the Long Gallery when the Queen came on one foggy day at the end of 1967 to inaugurate the telescope, but I suspect that few of us realized that the future of the RGO would be so closely linked with its success or failure. Unfortunately it came ten years too late, and the RGO did not, at first, give sufficient priority to its development and operation. As a consequence, the task of building and operating the new Northern Hemisphere Observatory (NHO) was almost denied to the RGO.

The SRC tried to encourage a corporate spirit by sponsoring annual sports days, which were at first held at the Civil Service Sports Ground at Chiswick. The RGO participated strongly against the larger laboratories in cricket, netball, 5-a-side football, bowls and tennis, in which I occasionally shared in winning the mens-doubles or the mixed- doubles trophy. After some years an indoor sports day was also held. On the first occasion I went to Runcorn as a member of the volleyball team; several of us had not played the game before, and so we were comprehensively beaten. Our table-tennis team fared much better.

The decade of the 70s saw major changes in the role and administration of the RGO. Woolley retired at the end of 1971 and the title of Astronomer Royal was conferred on Martin Ryle, a radio astronomer at the University of Cambridge, rather than on Margaret Burbidge, who was belatedly appointed as the next Director of RGO. Our IPCS Branch Secretary, Joy Penny, claimed that this was yet another indication of SRC's intention to take away the national status of the Observatory and, unfortunately for the RGO, she has been proved right. The Deputy Director, Alan Hunter, had to take on most of the work of running the RGO during Mrs Burbidge's short term of office, and he was then made Director until the end of the RGO's Tercentenary Year (1975). He instituted the grouping of departments into divisions, and I found myself also having responsibility for the Time Department and for the Library, including what became known as the Archives. I then had no inkling of the extent, character or value of the 'records' that had been brought from Greenwich but, thanks to the appointment of Janet Dudley as Librarian in 1978, they have received in recent years the recognition and care that they so richly deserve.

The Tercentenary celebrations can now be seen to have occurred at the time of a

crucial change in the role of the RGO. The Director-Designate, Graham Smith, was in post and the NHO Division had been formed. The decision to move the Isaac Newton Telescope (INT) to La Palma was made for ‘political’ reasons, rather than on technical or financial grounds, but I did not realize at the time that it would eventually lead to the complete abandonment of Herstmonceux as the site of the RGO. It was ironic that the dismantling of the INT took place in the same year (1979) as a new wing of the West Building was brought into use for the staff that were engaged in astrophysical research.

In the early 1970s the NAO was party to a university proposal for a UK lunar laser ranging system to be sited at Sutherland in South Africa, but the proposal was rejected when it was found that all the costs would have to be met by the UK. Some years later the RGO supported a revised proposal for a satellite laser ranging system (SLR), and we eventually found ourselves taking the lead role. The delay that occurred before the international agreement for the new observatory on La Palma was signed did have one beneficial effect as far as the SLR project was concerned. It allowed John Pope to be the SLR project engineer for a while, and it was he who drew up the specification for the telescope, which has been a critical contributor to the eventual success of the project.

In 1978 I was asked to be chairman of an international working group to develop the use of new techniques for monitoring the rotation of the Earth. This involved a stint of 10 years, but ‘Project MERIT’ gave me a great deal of professional satisfaction, as well as a lot of extra work. The new International Earth Rotation Service (IERS) came into being on 1988 January 1; the new techniques had effectively taken over several years earlier — we stopped operating our Photographic Zenith Telescope in 1983 in order to put more effort on the SLR — but we had to get international agreement to a new organisational structure.

The RGO’s 100-year old programme for observing the Sun was stopped in about 1978 since it was considered that the results no longer justified the effort required; we had hoped that the work would be continued by an observatory in Hungary, but this did not happen. The building was then used for the SLR project. In 1982 advantage was also taken of the move of a small telescope to Spain by installing a Hewitt satellite-tracking camera in its place in Dome C of the Equatorial Group. The camera had previously been operated at a site near Malvern by a group based in the University of Aston. The transfer of the camera and observers to Herstmonceux resulted in an enormous gain in productivity, because of the better weather and the fact that the observers were able to live nearby.

The involvement of the RGO in space geodesy through the operation of the SLR and the Hewitt camera led to my becoming a member of the Geodesy Subcommittee of the Royal Society, but I did not expect to become its chairman for a term and to have to justify the development of geodetic activities in the UK. The involvement of the RGO in geodesy was not, however, a new development. The Royal Observatory was founded to develop an astronomical technique for the determination of longitude at sea, and the 7th Astronomer Royal, Sir George Airy, started several geodetic and geophysical programmes. In fact, the 10th Astronomer Royal, Sir Harold Spencer Jones, was the President of the International Union of Geodesy and Geophysics at the time that I joined the RGO. Unfortunately, the following Directors of the RGO were not as broad in their interests, and during the 1980s I had to spend a lot of time trying to maintain the staff and funding for the activities of the Almanacs and Time Division of the Observatory.

A.3.3 1981–1990

Soon after Alec Boksenberg became Director in 1981, the RGO suffered a major redundancy exercise that reduced the complement by about 25%. I am thankful that on his first day in office he relieved me of the additional duties as Deputy Director that I had been given by Graham Smith during his last year as Director. (Instead he appointed a full-time scientific administrator and so was able to spend much of his time away from Herstmonceux.) It was a wretched task to identify the staff who should receive a ‘brown envelope’ containing an offer of ‘voluntary premature retirement’, especially as my Division did not have the priority work associated with the new observatory and telescopes on La Palma. The Greenwich Time Service suffered particularly badly and we lost experienced staff with specialist knowledge from the NAO.

Surprisingly, there was an enormous increase in the amount of effort devoted to the RGO archives, even though just a few years earlier it had been suggested that they should be transferred to the National Maritime Museum, which had the responsibility for the Old Royal Observatory at Greenwich. Thankfully, Janet Dudley had persuaded me and then Graham Smith and SERC that the RGO should not only retain them, but should also take steps to ensure their conservation. A conservation officer was recruited and a conservation laboratory was set up in the north-east wing of the Castle. Janet later persuaded the Manpower Services Commission to support a project to sort and catalogue the enormous quantity of records that had accumulated over the three hundred years of the existence of the Observatory. The project was called the ‘Laurie Project’ in memory of Phillip Laurie, who had died shortly after his retirement and who, almost alone amongst the scientific staff, had appreciated the value of the records. He had not only started to catalogue them, but he had also done much to save them from destruction some years before.

The staff of the Laurie Project were recruited from the unemployment register on a temporary basis; their pay was low even though some of them were graduates, but most were enthusiastic about the work. Janet appointed Adam Perkins to lead the team and he proved to be so suited to the job that he is now the RGO Archivist in the Cambridge University Library. At first the information was written on index cards, but then the team was provided with some personal computers. I have benefited greatly from their work during my post-retirement visits to the library to seek information about the history of the NAO and RGO.

The brown-envelope exercise was followed by a series of reviews, culminating in the decision by SERC to move the RGO from Herstmonceux to another site. Almost all the staff (apart from a few senior staff) were strongly opposed to this decision and some of us wrote to our local MPs to try to gain their support. They appeared sympathetic, but it appears that they forwarded our letters to the SRC, with the result that we were admonished for our actions. Two ladies, who had written on behalf of the trade unions that formed the Staff Side, were even subjected to formal disciplinary proceedings. The proposal was widely criticised in the press and the Council was unable to obtain the approval of the astronomical community to the move, but it went ahead and decided to move the RGO from its fitting home at Herstmonceux Castle to the garden of a small Victorian observatory in Cambridge!

Throughout this troublesome period in the 1980s I was fortunate in that I was involved in several international activities that gave me new interests and experiences. During the 1970s I had been chairman of the IAU Working Group on Astronomical Data and had successfully proposed that it be incorporated into the IAU Commission 5

on Documentation, which was also concerned with the storage and retrieval of information. I later became Vice-President and then President of the Commission, in which capacity I was able to initiate the first LISA meeting on Library and Information Services in Astronomy; this was held in Washington in 1988 just before the IAU General Assembly in Baltimore. The opening reception was held in the library of the U.S. Naval Observatory, where I had worked during my period at USNO in 1957.

The organisation of Project MERIT involved geodesists as well as astronomers from all around the world, and so I visited Australia again in 1979 and had a fascinating visit to Japan for a Geodetic Conference in Tokyo in 1982. It also led to my being invited to give a lecture tour in China in 1987, when during the course of three weeks I spoke at three observatories and two geodetic institutes. Our hosts ensured that my wife and I were shown the principal tourist attractions in each area. The triennial IAU General Assemblies took me to Patras and Delhi, as well as Baltimore, and so my collection of colour slides increased considerably during this decade. I also arranged for some of our meetings to be held in the Castle as Boksenberg had endeavored to make use of its potential as an attractive conference centre.

I was fortunate in that I was due to retire before the move would actually take place, but many of the staff faced a major disruption to their lives, and some decided to resign rather than uproot their families. There were many regrets when we had our last Xmas Lunch in the Castle and when, a few months later, we held a 'Farewell to the Castle' party just before it was handed over to the developer who had bought the estate. I was relieved of my duties as a Division Head and as Superintendent of the Nautical Almanac at the end of March 1989, and so I was able to devote my last three months of service to trying to round off some of the many jobs that I had started but had been unable to complete.

The RGO Club arranged a memorable retirement party for me and my wife by way of a buffet lunch in the Clubhouse. Amongst the presents was a photograph of the Castle that had been taken by Norman King, with whom I had played many games of tennis and table tennis since he joined the RGO in 1979. I subsequently used a cheque from the staff to buy a globe of the Earth that had several features linking it closely to the work of the NAO and Time Department. A few days later the end of my career in the civil service was marked by attendance at a Garden Party at Buckingham Palace, but this time my wife and I did not travel to London in a chauffeur-driven RGO car as in 1969, when Andrew and Mary Murray also had invitations.

I was able to retain the use of my office in the West Building until the move to Cambridge took place in April 1990. I cleared my desk on April 4 and in the evening played in the RGO table-tennis team in a drawn league match, which was held in the Clubhouse. My diary records that "I won two sets!!" — not bad for a veteran!

Although my memory of many events has faded and although I have left out much that might have been included, I hope that I have been able to convey in this article some of the satisfaction and enjoyment that I have gained from my work for the RGO and especially from the many members of the staff who became my friends during my 38 years at Herstmonceux Castle.

APPENDIX B. VARIOUS NOTES AND MEMORANDA

B.1 Notes about Sir Harold Spencer Jones

A personal overall assessment by George A. Wilkins

The following paragraphs were originally written as the conclusion to Chapter 2, but I have accepted Andrew Murray's comment that they were inappropriate (or some such comment) there.

It is very difficult for me to comment on Spencer Jones' term as Astronomer Royal. He initiated and carried through the decision to move the Observatory to Herstmonceux Castle, but the delays caused directly by the war and then by the economic difficulties of the country during the post-war period meant that he had to retire before the equatorial telescopes came back into use. I believe that he was right to wish to move to a new site where all activities (except geomagnetic recording) could be together. I also believe that the chosen site was almost certainly the best available for sky conditions and in respect of its suitability for enabling the oldest scientific establishment in the country to update itself. He should, however, have left some of the old equatorial telescopes at Greenwich; the corresponding savings on construction costs and staff commitments would have allowed him to argue more strongly for the new telescope that was intended to go into the sixth dome. This together with the 26-inch and 36-inch would have been sufficient for a good programme to complement and support the work on the Isaac Newton Telescope.

I believe that he was right in retaining the wide spread of the activities of the RO, and it seems a pity that he did not accept the suggestions that the RGO should also take on some radio-astronomy observations. It would be interesting to know why he allowed five years to elapse before he appointed a second Chief Assistant, especially as he was involved in so many other non-RGO activities. His final choice of Gold was a good one, especially as he brought a programme for cosmic-ray observations, but he did not have time to prove himself before Spencer Jones retired. With hindsight it would, however, have been better if he had appointed, right away, someone to carry through the Isaac Newton Observatory project.

Spencer Jones departed from tradition when he appointed Atkinson and Hulme as Chief Assistants and Smith and Hunter as Assistants. Up to that time most of the staff were recruited at a junior level and the best obtained qualifications by part-time study and worked their way up so that they could supervise the routine work of observing and computation. The only well-qualified members of the staff were the two Chief Assistants, who were recruited at postgraduate level from Cambridge, without experience, and who usually moved back to university after a few years. The introduction of the new grading structure for the Scientific Civil Service in 1947 gave Spencer Jones the opportunity (or did it force him?) to start to change the staff structure more drastically. Wilkins (to NAO), Wayman (to Solar) and Gething (to Meridian) were recruited at post-doctorate level as Scientific Officers in the expectation that they would rise within a few years to 'Head-of-Department' level. There was, as far as I am aware, no suggestion that we were expected to carry out independent research. I saw it that we were expected to improve the quality and effectiveness of the approved programmes of the Observatory, but I do not recall any specific statement or discussion of our objectives.

It is a pity that, as far as I aware, we do not have any record of comments about Spencer Jones' managerial style. He was always very pleasant to the staff, but was he an autocrat who did not consult his senior staff? Did he try to do too much himself and not give his staff the delegated authority and the information that would have allowed them to progress the work more quickly?

B.2 Notes about Sir Richard Woolley

See also section 3.1.1 for brief notes about his previous career and appointment. For further details of Woolley's career see:

Sir William McCrea, 1988. Richard van der Riet Woolley 1906–1986. *Biographical Memoirs of Fellows of the Royal Society*, **34**, 923-982.

B.2.1 Woolley on British participation in space research

The following is a transcript of a copy of a note by Woolley. (Undated, but probably about 1958.) My recollection is that it was written for the Royal Society.

BRITISH PARTICIPATION IN RESEARCH WITH ARTIFICIAL SATELLITES

It is extremely difficult to assess the monetary value of the results of pure research, and therefore difficult to give objective advice about the desirability of committing large sums of Government money to the building of expensive equipment and the maintenance of large teams for pure research.

The astronomical aspects of satellite research concern the figure of the Earth and the far ultra-violet spectrum of the Sun (and possibly of other objects). As regards the former, the figure of the Earth is accessible to surface observation and it should be considered whether a modest fraction of the very large sum to spent on satellite launching would not yield quite satisfactory (possibly more satisfactory) geodetic results if spent on surface observations. Turning to the ultra-violet spectrum of the Sun, this is not accessible to surface investigations but has been observed by vertical rocket flight. One may remark parenthetically that though these observations have been conducted for at least eight years, the published results are meagre, possibly because it is after all extremely difficult to conduct first-class spectroscopic observations in a rocket.

An allied question of interest in the study of solar and terrestrial relations is the determination of the solar spectral regions responsible for the formation of the various layers of the ionosphere. Again it is surprising that more has not been published on this subject. It is accessible to vertical flight, and unique advantage is offered by satellite research over vertical flights only in the possibility of routine observations in the former, after the manner of the spectro-helioscope.

It is impossible for an astronomer to consider the value of this work without reflecting that some of the money involved (if the £9,000,000 mentioned by Professor Massey on page 5 of his memorandum is correct – and one suspects that this is by no means an overestimate) would more than suffice to set up a better astronomical observatory than any now in existence, and to do so in the southern hemisphere while providing every facility for United Kingdom astronomers to use it. Such an installation could include a telescope of more than 200 inches aperture, which would provide the means to carry out first-class research on stellar and galactic problems for at least fifty years without further capital expense.

To call attention to this is to invite comparison between the study of the stars, of the Magellanic clouds, of the galaxy and its dimensions and rotation, and the study of all galaxies outside our own, on the one hand, with the routine study of variations in high energy phenomena on the other.

It will no doubt be said that Government money could be given to satellite research which would not be available for scientific education or for pure research in other fields such as galactic astronomy. If this is the case, we are asked to say whether the scientific results of satellite research are worth £9,000,000 without any standard of comparison – which is to my mind a question which one cannot answer. If, however, comparisons are allowed I must, so far as British astronomy is concerned, call attention to the research value, which is far greater pound for pound in my opinion, of spending money on large telescopes, especially in the southern hemisphere, rather than on artificial satellites. Accordingly, in my opinion, one cannot really quote astronomy in support of a proposal to spend large sums of money on satellite research, especially when enormous strides are being made in astronomy in the understanding of the nature of stellar evolution and the properties of the galaxy. No one who has handled the large telescopes necessary for observing distant, and therefore faint, objects will easily suppose that instruments of this sort can be operated in Sputniks in the near future.

No doubt similar financial comparisons are available from every field in physics, and there seems to be no scientific reason for the Government to select the launching of artificial satellites as an object for its especial benefactions, though there may be military reasons and a desire to support something of great popular appeal.

B.2.2 Woolley and Australia

The following is a quotation from “Under the Southern Cross: A brief history of astronomy in Australia” by R Bhathal & G. White, Kangaroo Press 1991.

pp. 58-59. “Richard van de Riet Woolley, who succeeded Duffield [as director of the Commonwealth Solar Observatory, later the Mount Stromlo Observatory], proved to be a critical figure in changing the entire direction of the scientific work of the observatory from solar and geophysical research to stellar and galactic astronomy. He was also responsible for the transfer of the MSO from the Department of the Interior to the Australian National University, despite resistance to the amalgamation from some members of the staff. In fact, the matter had to be resolved by the intervention of the Prime Minister, R. G. Menzies. This was perhaps Woolley’s greatest contribution to the observatory and to Australian astronomy.”

There is a photograph of Woolley with Spencer Jones taken in the basement of the observatory in 1947.

The following notes are based on quotations from a review of a book about the Mount Stromlo Observatory.

“ a building was finally achieved in 1924 with Duffield as director of the Commonwealth Solar Observatory on Mount Stromlo. British astrophysicist Richard Woolley was elected director in 1939. As he was not interested in continuing solar work, the word was deleted from the title

... Bart Bok, a former Harvard Professor, became Woolley’s hated successor. ... The last few years of Bok’s administration were darkened by controversies between him and Woolley regarding a proposed 150-inch Anglo-Australian Telescope. Bok resigned. His

successor was astrophysicist Olin Eggen. Like Bok, Eggen finally resigned because of controversies about the Anglo-Australian Telescope. ...”

Dorrit Hoffleit, 2004. Review of *Stromlo: An Australian Observatory*, by Tom Frame and Don Faulkner, Allen and Unwin, 2003, in *Astronomy and Geophysics* 45(1), 1.34.

B.2.3 A letter to Professor McCrea

The following is a transcript of the letter that I wrote to Professor W M McCrea on 1988 March 18 in response to his request for my “candid opinion of Woolley as Astronomer Royal, particularly in his dealings with the work of your Office”. At the time he was writing an obituary of Woolley for the Royal Society. Unfortunately, I deleted the original letter from my Amstrad PCW word-processor and so I have used my penultimate typescript on which changes are marked. George A. Wilkins.

I am writing to you from my home about Sir Richard Woolley so that I can write more freely in responding to your request for a candid opinion about his dealings with the work of the NAO and in answering your other questions about him. I also know that if I do not answer your letter right away there would be a considerable delay before I would put pen to paper – or rather finger to keyboard since I am using my Amstrad word-processor.

As you will soon realize I had quite different scientific interests from Woolley and I had little sympathy with the way he treated many of his staff. I must also admit that I have personal reasons to be critical of him, since he tried to block the confirmation of my promotion after I had replaced Donald Sadler as Superintendent. You should bear my bias in mind when you read the rest of this letter; I hope, however, that my bias has not affected my recollection of the facts.

Woolley did not appear to me to take much interest in the work of the Office since he clearly recognized that he could rely on Sadler to see that the work would be done efficiently. Even in 1970 he did not appreciate the fundamental role of the Astronomical Ephemeris in our work and in our relationships with the NAO of the United States Naval Observatory; he was prepared to allow the SRC to stop its publication at short notice and to replace it with an “Observer’s Almanac”. Eventually it was agreed that we should produce both, and even today we still compute and distribute data for selected observatories.

He was certainly not prepared to allow the NAO to expand its activities into the area of the computation of the orbits of artificial satellites. When the first Sputnik was launched it was clear that the NAO was the most appropriate place to provide a national prediction service, but the task was transferred to the Royal Aircraft Establishment within a few months. Some years later he did agree that a kine-theodolite for satellite tracking should be based at Herstmonceux, but he took the opportunity to fill the extra complement places with staff for whom he did not have appropriate jobs elsewhere. His attitude was consistent with his well known antipathy to space activities of any kind. A few years ago there was an informal meeting at the Royal Society of those who were involved in space activities at the time of the launch of Sputnik 1. I went along in place of Sadler and was interested to hear the scathing comments of Sir Harrie Massey about the disastrous effects that Woolley’s negative advice had had on the British space-research programme. As far as I am aware, there is no official record of the meeting, but M O Robbins would probably substantiate my recollections.

His attitude to the work of the NAO is also shown by the way in which he would transfer staff from it to his research department with no notice if he wanted extra help. Soon after he came to Herstmonceux he asked me if I wished to transfer from the NAO to astrophysics; I declined and I subsequently felt that he held this against me. I also felt that he treated Sadler very rudely; on several occasions when I was with Sadler he received a telephone call from Woolley summoning him to go immediately to his office in the Castle; the word 'please' was not to be heard. He generally treated staff in this way, but I have known him to be very charming to visitors. I had very few individual meetings with him during the few years that I was in charge of the NAO and he was Astronomer Royal.

He was a keen sportsman, and he participated actively in tennis for many years and in cricket for all the time that he was at Herstmonceux. Sadler and I used to play men's-doubles tennis with him regularly on Sunday mornings and we had many enjoyable hard-fought games, but we soon learnt not to question his calls. He was also very keen on folk dancing, and his decision that the Long Gallery should revert to being a Ballroom (instead of being partitioned into offices) was made when the Club arranged another function for an evening on which the folk dancers normally met in the Club's premises.

Although he had a very autocratic attitude he did take a commendable personal interest in the annual reports on the staff. We used to have a meeting of all the reporting officers (and staff-side scrutineers) so that he could hear and question their comments on the reportees; this was stopped by SRC! He would back very strongly staff whom he knew well and considered to be good.

There is no doubt that he did a great deal to build up the RGO and ground-based astronomy generally; he certainly deserves credit for building up the links with Sussex and Australia. My regret is that he appeared to me have a very narrow idea of the role of the RGO, so that we gradually shed such functions as the meteorological and magnetic observations; he also ran down the work of the Solar Department. (At an even earlier stage he had failed to support Gold's work on cosmic rays, but I doubt whether they could have worked together anyway.) I suppose that it could be said that he was anticipating the attitude of the SRC in wanting to concentrate on short-term astrophysical research rather than on the long-term astrometric and geophysical programmes for which the RGO is best known. At first he was very sceptical about the value of electronics and computing, and I felt that he actually held the RGO back in these fields. With hindsight it is easy to see that he did not make appropriate provision for the installation and operation of the Isaac Newton Telescope.

I do not feel that I can assess his contribution as an individual research scientist since I do not know enough about the fields in which he worked. He spent much more time at the telescope or measuring machine than I expected for a man in his position, but on the other hand he appeared to be successful in encouraging others in their research.

I hope that these comments will be helpful to you, although I realize that that they are unsuitable for an RS Biographical Memoir, and that they probably tell you more about my attitudes and interests than they do about Woolley himself. I will let you know if any other illustrative events occur to me; please let me know if you think that I could help you in any other way. Our librarian has prepared a bibliography which might be useful to you, and I hope that there is a good collection of his papers in the archives.

B.3 Notes about Dr Thomas Gold

Dr Thomas (Tommy) Gold was a Chief Assistant from 1952 to 1956. He was initially appointed by Spencer Jones to set up a cosmic-ray-monitoring unit. (See section 2.7.2). He resigned when he failed to obtain support for his work from Woolley.

B.3.1 A note on Gold from *EOS*

EOS, the newsletter of the American Geophysical Union, contains a report of a historical meeting on the discovery of the solar wind at which Gold and others spoke. [*EOS* 75, p.140, 1994-03-22] There is a photo that includes Gold, who is described in the caption as ‘the wide-ranging theorist’. The text includes the following items.

“Tommy Gold recalled his suggestion in 1953 that sudden commencements of geomagnetic storms were due to magnetohydrodynamic (MHD) shocks. This suggestion was met with skepticism because, at the time, relatively few people believed in MHD. Gold described his work on ‘magnetic bottles’, now generally identified with the coronal mass ejections discovered in the early 1970s, in the context of the great solar particle event of February 23, 1956.” [This was observed at Herstmonceux by the new cosmic ray detectors.]

“Gold humorously recalled that when he introduced the term ‘magnetosphere’ in the title of a paper in 1959, several people told him that the terminology would never be adopted because the structure was not a sphere. Gold also recalled that as late as 1956, Woolley, the Astronomer Royal of Great Britain, regarded space physics as ‘utter bilge’, a viewpoint that was instrumental in Gold’s subsequent departure to the United States.”

B.3.2 A note on Gold to Janet Dudley

The following note is a transcript of a manuscript note that I sent to Janet Dudley, then the RGO Librarian and Archivist, on 1987-02-14 about the ‘contemporary’ history of the RGO. George A. Wilkins.

I found myself talking to Prof. ‘Tommy’ Gold and Dr. R. Hide (Met. Office) during the lunch break of the RAS G-meeting on Friday, Feb. 13. Hide mentioned my involvement in MERIT/IERS and this prompted Gold to mention that he had been the first person to propose that radio interferometry (VLBI) could be used to monitor the rotation of the Earth. I was not aware of this and would like to trace the paper, which he thought was published in *Science* (or *Nature*) in about 1962. I would be glad if you could suggest how we might track this down.

But, and this is the main point of this note, he also said that he previously tried to interest Spencer Jones and then Woolley in the RGO developing radio techniques for astrometric purposes. Spencer Jones didn’t support him and this is consistent with H. M. Smith’s claim that S.J. refused the ex-radar equipment that eventually went to Jodrell Bank. Woolley quite definitely rejected the idea and I imagine this contributed to Gold’s decision to go to Cornell. Woolley also failed to support Gold’s work on cosmic rays etc. I often wonder what the Observatory would be like now if Gold and not Woolley had succeeded Spencer Jones.

Do we have any papers that refer to these matters? It would be interesting to find, for example, internal memos about Gold’s plans for radio astronomy work at Herstmonceux. Do we have any papers about Woolley’s appointment (or are these all held by the Admiralty)?

As far as I can recall, Janet Dudley did not respond to this enquiry.

B. 4 Closure of the Chronometer Workshop

This note by Herbert West was sent by email to George Wilkins on 8 May 2006.

The last few years of my service at Herstmonceux were not particularly happy ones. The Hydrographer was forced to make cuts in his staff, and decided to cast adrift the Chronometer Section. The Section came under the banner of DGSW(N) (Director General Surface Weapons). The headquarters were at Portsmouth, but no one there knew what we did or for that matter cared what we did. We were therefore shunted to the care of a sub section at Slough.

At the same time, the Officer in Charge of the Section (the late William Roseman) made it perfectly clear that he would never hand over His Section to anyone else but would kill it first! (don't ask!) I could not find out anything about his activities at Slough of with meetings at Portsmouth. He was due to retire at 60 years of age on 5.5.85 but just before that date a Director arrived from Portsmouth and announced that Roseman would serve an additional year in the capacity of O in C but on a half time basis!!! The Section would be wound down early in 86 and all the work carried out within the Section would be undertaken by a Contractor which Roseman had selected.

A very unhappy period for every one, especially the watchmakers who were all declared redundant. Once into 1986 I found myself waiting eagerly for my retirement in February. The only other member of staff kept on at that time was the late Dorothy Clark, (Jimmy Clark's wife) who was retained on half time in her capacity as a Clerical Officer. Roseman had arranged for all the equipment to be sold off by Sales Dept. but a few items were transferred to Slough. I have to admit that I used to go to the Castle for my lunch, and then go home! Well it was so demoralising to be in the Section all on my own and to watch all the furniture being dismantled.

Many of the Standards I had written over the years (Defence, Repair and Rating) went to the Contractor together with many thousands of pounds worth of spare parts; but I know not under what conditions. It would appear that DGSW were disinterested and only wanted to be rid of the whole Section.

I know this is of little interest to you, and has really nothing to do with the history of the Club, but now some 20 years after the events I have outlined above, I am able to write in a dispassionate way about the whole period.

On the bright side, I attend regularly the meetings of the Sussex Branch of the Horological Institute. We assemble at Ringmer, which you may remember is fairly close to Hailsham. Some of the members travel up from West Sussex, which is quite a journey (they must be keen!). On the 26th July, I shall travel with Branch members by coach to Greenwich for a guided tour! It will be interesting to see how my old friends the 4 antique chronometers by John Harrison are surviving. They have been moved from the Navigation room to a new display up on the hill in the Old Observatory.

I had a look on the National Maritime Museum web site, and noted that all the timepieces have been housed in swish new display cabinets.

[See also DCI RN 31-35, 1986]

B.5 Notes on Herstmonceux village and the surrounding area

Herstmonceux village was formerly known as Gardner Street and lies on the same main road between Hailsham and Bexhill to the east. The village Bodle Street was on a minor road to the NE of Herstmonceux. The village of Magham Down lay on the main road to the west of Herstmonceux, while Boreham Street lay to the east. There was a bus service between Eastbourne and Hastings that passed through Hailsham, Herstmonceux, Ninfield and Bexhill.

The village had a few shops and a pub (The Woolpack) in the centre. It had a barber shop in the early 1950s (until ?). It is well-known for the making of Sussex trug baskets. Some RGO staff (especially at first) lived in the two Council housing estates (Denefield and Fairfield) in Herstmonceux village. The nearest town was Hailsham, from where there were occasional buses to the Castle and a coach service to London.

The Castle and the Church are about 1.3 miles to the south of the village and at the end of fairly narrow lane. There is also a farm south of the Church, but the only other nearby house is Cleavers Lyng, which served afternoon teas and later (?) became a small guest house. The owners were Mr & Mrs Holden.

Herstmonceux Place was between the Castle and the village; there was a house in which Sir Paul Latham had lived for a while and a group of small houses (?). Another group of houses and 'The Welcome Stranger Inn' were near the main road; Gold lived in one of these houses. (Also, later, the Leatons and the Carters?) The pub was usually referred to as 'The Donkey' after a painting in one of the bars.

Windmill Hill lay between Herstmonceux and Boreham Street. It could be reached directly (on foot) from the Castle by a track that was said to be the original road to the north. The Horseshoe Inn was a small pub, but it became part of an extensive restaurant.

There was a road from Boreham Street that passed the East Gate of the Castle and then went through the small village of Wartling (with church, pub and school) across the Pevensey Levels to Pevensey. From where there was a road to Pevensey Bay Halt (for the stopping trains from Hastings and Eastbourne) and then to Pevensey Bay and Eastbourne. The main east-west road through Pevensey ran past Pevensey Castle and through the village of Westham to Polegate and the station for the trains to and from Lewes, Brighton and London. This stretch of road was later by-passed by the A27.

David Calvert's book on *The history of Herstmonceux Castle* contains a chapter with early photographs about the village.

B.6 The transformation of Herstmonceux Castle in the 1990s

This note is based on a rough, unfinished draft that I wrote in the autumn of 1994. George A. Wilkins

In 1993 the Queen's University of Ontario, Canada, purchased the Herstmonceux Castle estate and announced that it intended to use it for an International Study Centre. The purchase was made possible by the generosity of a former student, Dr Alfred Bader and his wife Isabel, who had second home in nearby Bexhill-on-Sea. The donation was sufficient to cover the cost of the conversion of the Castle to form the administrative and teaching centre, as well as the conversion of the West Building to

provide living accommodation for the students. It was also intended to use the Equatorial Group as the basis of a Science Centre.

I had the opportunity to make a brief visit to the Castle during the afternoon of 30 September 1994 and this note is based largely on a very rough unfinished note of my recollections of the changes that I noticed on that occasion. By then the necessary changes had been made to Castle and West Building so that the centre had started its activities. A special exhibition had been open to the public in the EQ Group during the summer. My visit had two purposes. Firstly, to see the progress on the satellite laser ranging facility; I had previously verified that Roger Wood, the officer-in-charge, would be there. Secondly, to discuss the request by the Centre for a selection of my slides about the RGO and the Castle.

I drove to the east entrance to the estate and found that it was marked by a large brown sign to "Herstmonceux Castle and Science Centre" and by another sign that indicated that the grounds were open to the public. There was a lady selling tickets at the hut opposite the side road to the EQ Group; her face seemed vaguely familiar, but I could not place her and she did not indicate that she recognised me. A few cars were parked on the grass opposite the Castle even though it was a very heavily overcast afternoon.

I went to the SLR building and two changes were immediately apparent. A wire grill fence had been erected around the door and the steps up to the dome so that the observers would not need to lock the door to the control room when going up to the dome. An office unit had been built by the dome since the observers no longer had the use of offices in the West Building. There was also a new radio mast for the reception of the GPS and time signals. There had been several technical improvements in the equipment. The timing of the returns was to a precision of 0.1 ns (equivalent to 3 cm) and a new photometer system had been fitted to the telescope. The productivity of the system had increased; Peter Standen had managed to observe 24 passes during one duty. This had been made possible by the improvements in the operational procedures and by an increase in the number of satellites carrying retroreflectors. In addition to monitoring the signals from GPS satellites, the team was about to start to make regular observations of satellites fitted with PRARE equipment. [My recollection is that this was a French system.]

At the Castle I found a crowd around the porters' cubbyhole, where I had been told to look for the receptionist. I then learnt that there had been a misunderstanding and the appropriate person was not there to talk to me. Moreover, the Operations Manager was in a meeting, but it was eventually agreed that one of the young members of the staff would show me around the Castle. He had, however, only been in his job for a week and so I was able to show him parts of the Castle that he had not previously seen.

We started in the Great Hall, which had been converted from a Library to the Dining Room. The balcony had been removed so that once again the full size and height of the Hall could be appreciated. The south wall had been partly opened up to give access to a completely new serving area where the students collected their meals. The Minstrels' Gallery, which had been used for the Library office, now had the sign "Executive Director" on the door. The rooms on the north side of the landing were in use for administrative offices.

My original note ends at this point. I recalled (10 years later) that I was pleased

to see that the changes that had been made were for the better. In particular, there was a single large room, instead of several small offices separated by partitions, over what had been the dining room in the south wing. On a later visit for an RGO staff reunion I visited the West Building and was able to see how our offices had been converted to very pleasant bedrooms, while the time-service control room was used for a lounge.

APPENDIX C. STAFF STRUCTURE AND CONDITIONS OF SERVICE

C.1 The staff of RGO before the move

C.1.1 The staff in 1946

When the decision was taken in 1946 to move the Observatory from Greenwich to Herstmonceux Castle, the departments of the Observatory were scattered in various parts of the country. The war-damaged buildings at Greenwich had been only partly repaired, and the principal telescopes could not be used, although the Airy transit circle was used (see section 2.5.1), meteorological observations were recorded each day and daily photographs of the Sun were taken when it was possible to do so. The Astronomer Royal and the administrative staff had returned to Greenwich from Abinger Hammer in July 1945; the secondary time-service at Edinburgh had been closed at the end of January 1945. [RAR 46,24] The Time Department (headed by H M Smith) was still based at Abinger, the Chronometer Department (headed by G W Rickett) was at Bradford-on-Avon and H.M. Nautical Almanac Office (NAO) (headed by D H Sadler) was at Bath. The non-industrial staff in post on 30 April 1946 were listed in the AR's report to the Board of Visitors.

Dr R d'E Atkinson and Dr W R Hulme, who were graded as Chief Assistants, were loaned to other departments of the Admiralty during the war; D H Sadler, the third Chief Assistant continued in post as Superintendent of the NAO, but was also given responsibility for the operational work of the Admiralty Computing Service (ACS). Atkinson returned on 1946 June 6, but Hulme resigned. Dr A Hunter, Assistant, had returned on 1945 November 1, but three Junior Assistants (B R Leaton, R H Tucker and G A Harding (NAO)) were still 'on active service'.

The staff of the Observatory retained their traditional gradings although the new grades of the Scientific Civil Service had been introduced in many other establishments. In the AR's Report to the Board of the Visitors the 'Observatory Staff' were listed separately from the 'Nautical Almanac Office Staff'. The grades and numbers (OS + NAO) of the scientific and technical staff (70 in total) were:

Chief Assistant (2 + 1), Assistant (6 + 1), Junior Assistant (Higher Grade) (9 + 5), Junior Assistant (12 + 6), Clerical Assistant (2 + 2), Temporary Clerk Grade II (3 + 3), and Temporary Clerk Grade III (9 + 5).

Staff in the last three grades were employed primarily on computational work and had earlier been known as 'computers'. [See article by E G Martin in CR 51, May & June] There were also the Head of the (Chronometer) Repair Shop and one Laboratory Assistant.

In general, the Chief Assistants were recruited externally (and most stayed only a few years) and were well qualified. On the other hand, many of the Assistants and Junior Assistants (Higher Grade), some of whom were in charge of departments, were promoted internally from the lower grades. As a consequence, the number of graduates was small. [2/6 + 1/1 and 1/9 + 2/5, respectively]

The administrative staff (9 in total) were headed by the 'Secretary and Cashier', then H G Barker; he was supported by 2 Departmental Clerical Officers, one Temporary Shorthand Typist and two Temporary Typists, while in the NAO there were a 'Junior Assistant as Secretary' and a 'Clerk-Shorthand-Typist'. There was a Hostel

Warden at Abinger. In addition there were 33 industrial staff, who were not named individually in the report.

The regrading of the staff had barely started at the time of the AR's report in 1948, and was still not quite complete at the time of the report in 1949. The 1948 report stated:

“Mr. W. M. Witchell, Assistant, retired on April 26 after nearly 54 years' unbroken service. This constitutes a record for the Royal Observatory, and is all the more remarkable in that during his whole service Mr. Witchell was never absent on sick leave.”

The following year it was reported that:

“Mr. P. J. Melotte, Principal Scientific Officer, retired on October 31 after 53 years 2 months unbroken service. This is only six months less than the record service of Mr Witchell, who retired last year.”

Mr. Melotte had previously been graded as an Assistant; he had discovered the eighth satellite of Jupiter in 1908.

The third retirement after long service was that of R. T. Cullen in 1950 after 49 years; he had been head of the Meridian Department from 1934.

These retirements may be said to mark the break from the 19th century. The many new appointments that took place in 1948 and 1949 heralded the major changes that were to take place during the second half of the 20th century.

C.1.2 The new structure of the Scientific Civil Service

Up to this time each department of government had its own systems of grading for staff engaged on scientific work; I believe that some of the grades and pay scales in the Observatory were unique. There was also a wide variety of grades for engineering and technical work. Consequently, there were many anomalies and the negotiation of pay and conditions was a protracted and bureaucratic process. The concept of a Scientific Civil Service was introduced in 1946 to overcome, or at least alleviate, these problems. The structure that was introduced involved three classes, each made up of several grades; these classes were based largely on academic qualifications at entry. Staff normally worked their way up the class into which they were recruited, but class-to-class promotion was possible for those who gained additional qualifications or were otherwise able to show that they were capable of working at the levels that were appropriate to the other class. The latter proved to be particularly difficult and led to many cases where staff were doing very similar work but were in different classes - sometimes the pay was similar, but anomalies were not uncommon.

The 'senior' class was the 'Scientific Officer' class, for which the normal minimum entry requirement was a good honours degree. The main grades were Scientific Officer (SO), Senior Scientific Officer (SSO) and Principal Scientific Officer (PSO), which was the 'career grade' that all SOs were expected to reach. Above that were Senior Principal Scientific Officer (SPSO), Deputy Chief Scientific Officer (DCSO) and Chief Scientific Officer (CSO) that were normally associated with the supervision and management of larger and larger groups of scientific staff. In broad terms, those in grades SO to PSO carried out the research, while the SPSOs and above were expected to manage the research. The SO-class was the scientific equivalent of the Administrative class of the general civil service.

The bulk of the scientific work was carried out by the 'Experimental Officer' class, which was the equivalent of the Executive class in the general civil service. The main grades were Assistant Experimental Officer (AEO), Experimental Officer (EO), and Senior Experimental Officer (SEO); there was also a grade of Chief Experimental Officer (CEO), but posts at this grade were rare. The normal minimum entry level was at Higher Schools Certificate level (later A-level), but most later recruits were at degree level.

Support was provided by the 'Scientific Assistant' class, for which the normal minimum entry level was at General Schools Certificate level (later O-level). The only promotion in the class from the grade of Scientific Assistant (SA) was to Senior Scientific Assistant (SSA); possibly because it was expected that most SAs would either gain higher qualifications and move to AEO or would leave. The RGO staff lists give the grade as 'Assistant (Scientific)', but 'Scientific Assistant' was normally used.

As far as I can recall there was only one class for 'Professional and Technical Officers' (PTO), and this covered an enormous variety of types of work.

The assimilation of the staff of the Observatory proved to be a long drawn out process as many of the older staff who were in responsible posts did not have the qualifications appropriate to that level. In looking to the future, the AR clearly wanted the 'approved complement' to contain an appropriate number of posts in the three classes; in particular he would have wanted the head-of-department level to be graded at PSO level, but two of the current holders of these positions did not match the expectations for the grade. The situation was probably even more difficult in the EO class as, apart from Richards and Scott in the NAO, none of those that were assimilated as SEOs or EOs had a degree.

The first person in the RGO to be graded on the new scheme was John Pope. He was initially graded as an 'Assistant (Temporary)', but he obtained a BSc by part-time study and applied directly to the Civil Service Commission for an established position by entering an open competition; he was successful and so in the 1947 staff list he is shown as an AEO, above the Junior Assistants. The following year he is still the only member of the EO class, but he is shown below the Junior Assistants, and even below the Assistants (Temporary)! Of the three with this grading, one (Barocas) had a PhD, one (Miss Penny) had a BSc, and one (Wellgate) had no recognised qualification. By 1949, the Junior Assistants had become Experimental Officers, while Barocas had become a Temporary EO and Wellgate had become a Temporary SSO; Miss Penny was still in the same grade, but had lost her BSc and was listed above the AEOs! During the following year Miss Penny was transferred to the grade of Temporary EO and had regained her degree.

The greatest anomaly of all was that the AR was graded as Chief Scientific Officer at the upper level (A). This meant that he was three grades above his Chief Assistants who were graded as SPSOs. The grade probably represented Spencer Jones' personal standing and the honour associated with the title of Astronomer Royal, but it was out of line with the level of responsibility as indicated by the normal civil service standards of the number of staff and the size of the budget for which the holder of the post was responsible. This was to become significant later.

The Report of the Royal Commission on the Civil Service 1953-55 made a large number of detailed recommendations about the pay scales for the various classes, but not about the structure itself. It also made many recommendations about hours, leave and other conditions.

There was, however, another major change in the grading system as a result of the Fulton report of 1968, which recommended a unified grading structure for the Civil Service. In the event three groups were formed for the administrative, scientific and 'works' staff. The three scientific classes were amalgamated into a single series of grades: ASO, SO, HSO, SSO, PSO, SPSO, DCSO and CSO. Grade skipping was possible, but was rare, although well-qualified scientists moved more quickly through the grades. There was a similar change for engineering and technical staff, who were then graded below 'principal level' in a numbered series of grades of Professional and Technical Officers (PTO).

.Some years later (198?) the various senior grades were amalgamated into a single series of numbered grades so that, for example, PSO and PPTO became grade 7, SPSO and Supt. Eng. became grade 6, etc.

C.2 General staff conditions

The staff referred to in section C.1 were non-industrial civil servants and their conditions of service were markedly different from those of the 'industrial staff' who carried out the 'blue-collar' jobs. The 'white-collar' staff had better pay and pension arrangements; they worked shorter hours and the higher grades, at least, had more annual leave. There were probably other differences in such matters as sick leave and time-off for dental appointments. There were separate 'complements' for the two types of staff. The complement, which was set by the Admiralty, specified the maximum number of employees in each grade, or group of grades.

The industrial staff on the complement of the Observatory included the craftsmen in the engineering workshop and in the chronometer workshop, as well as messengers, watchmen, cleaners, stokers, gardeners and foresters. At first, there was a separate canteen for industrial staff, but even after it had been abolished very few of them used the main canteen for hot lunches as they preferred to bring sandwiches, which they ate in their restroom in the Works Pound (or in the gardeners' shed).

In addition, in the early years at Herstmonceux much of the basic work for the buildings and grounds was carried out by men of the Works Unit, which was based at Chatham, although some of the men were probably recruited locally for a few years. The work on the external fabric of the Castle was carried by staff of the Department for Ancient Monuments. The major new buildings themselves were built by independent contractors. I must admit that I have no knowledge of the detailed arrangements for this work. Eventually, some of these men, such as the electricians, were transferred to the complement of the RGO.

Within the non-industrial staff there was also a contrast between established and non-established service. At that time only the former counted towards a pension, although there was a long-running national campaign to change this arrangement. Most staff were recruited into temporary positions and then became 'established' after a fairly short period of satisfactory service. Usually, as in my case, the establishment was backdated to the date of the original appointment, but there were a few apparent anomalies. For example, Phillip Gething was recruited, with a PhD, at roughly the same time as Patrick Wayman and myself, but was still listed as a Temporary Scientific Officer over three years later; not surprisingly he left, and had a successful career at GCHQ.

Many of the junior staff who were recruited at Herstmonceux came from the neighbouring towns, especially Eastbourne and Bexhill, and villages. Most of them

were teen-age girls, who became Scientific or Clerical Assistants or typists. A few became Assistant Experimental Officers or Clerical Officers, but in general the recruits for these and higher grades were from other parts of the country.

By the time that I joined the RGO, the policy seemed to be that staff could stay on in a 'disestablished' capacity after 60, normally in a lower grade, but not beyond the age of 65. (The rules for industrial staff were presumably different, with the normal retirement age being 65, when they would be entitled to the state retirement pension. Jack Pike, the forester stayed on beyond 65, but he may have been an exception to the normal rule.) The reversion to a lower grade meant that a younger member of the staff could be promoted to the original grade as the number of staff of each grade was normally fixed. The promotion did not always occur in the same department as the retirement. Sometimes two grades were treated as one for the purpose of complementing, so that promotion from the lower to the higher grade (e.g., from S.O. to S.S.O.) did not depend on their being a vacancy in the complement at the higher level.

In the AR's reports up to 1956 the staff lists show the grades but not the departments in which the staff worked. The report for 1957 gives only the changes in the staff — promotions and those who had joined or left; it merely gives the total number of industrial staff. The report for 1958 gives a full listing by grade and department. This practice continued up to the last such report for 1964 before the Board of Visitors was disbanded by the Science Research Council. The subsequent annual reports that were published in the *Quarterly Journal of the Royal Astronomical Society* do not contain staff lists. Full staff lists are then not available until 1974 when Dr. Hunter introduced full reports that were published independently by the Observatory. The last such list was for 1979 September 30. As far as I am aware there are no later full staff lists except those for 1985 August 31 and 1987 September 30, which were published in the reports for 1980/1985 and 1985/1987, respectively.

There is a group photograph of the staff at Cambridge in 1996, but the caption lists only names and some staff were not present.

C.3 The Whitley Councils and trade union activities

See appendix G.9 for some references.

C.3.1 Whitley Councils to 1965

As civil servants our conditions of service were laid down very precisely in regulations at national, Admiralty, Observatory and office levels. These regulations were the result of negotiations between the 'Official Side' (OS) and the 'Staff Side' (SS), which contained representatives of the trade unions that represented the staff concerned, at various levels of the 'Whitley Councils', which were named after the chairman of the committee which recommended them in about 1917. The changes in the Admiralty regulations and other announcements were made in series of printed 'booklets' that were issued regularly. The contained lists of appointments, promotions and retirements came out in a duplicated series known as the Navy List (?).

The Civil Service was generally regarded as a 'good employer' and at this time staff were positively encouraged to join the appropriate trade union. Scientific and technical staff joined the 'Association of Astronomers', which was rather a misleading name for the local branch of the Institution of Professional Civil Servants. Well over 90% of the eligible staff were members of the Association. The AR was not only a

member, but he was also chairman of the Association when I joined the RGO. This was fine when the Association was seeking improvements at a national level, but it was inappropriate for negotiations on local matters. Most of the administrative staff were members of the CPSA (Clerical and Public Servants Association ?).

The Association of Astronomers used to hold its annual general meeting in the Chapel during normal working hours. This concession was granted because of the isolation of the site, which meant that most staff could normally only get home on the official transport at the end of the working day. I believe that staff from Greenwich and Abinger were encouraged to attend and that it was sometimes possible for them to arrange duty visits to Herstmonceux around the time of the AGM. I recall very little of the detail of the early meetings; the 'Chamberlain-Rickerby case' seemed to be a perennial item on the agenda. The secretary at the time was E G Martin of the Greenwich staff.

Negotiations about local matters, such as housing, transport arrangements, and so on were carried out through the Local Whitley Council. This consisted of the 'Official Side' (in particular, the AR, the Chief Assistants and the Observatory Secretary, Mr Barker) and the 'Staff Side', which was made up of representatives of each of the non-industrial trade unions. Similar, but separate, arrangements applied to the industrial staff. The notes in later sections usually refer to non-industrial staff only.

As has been mentioned in section 3.1.2.4, Woolley expanded the concept of staff-scrutiny of the annual reports on staff.

C.3.2 Trade Union activities from 1965

The change of control from the Admiralty to the Science Research Council in 1965 SRC led to the complete rewriting and renegotiation of the conditions of service since SRC included the Rutherford and Daresbury Laboratories that were not civil service establishments in the strict sense and so had slightly different conditions of service. This consumed (wasted?) an enormous amount of time of staff at many levels. (See section 4.1.2)

This section ought to be expanded to give an account, for example, of the major contribution of Joy Penny. who was secretary of the Herstmonceux section of the SRC Branch of the Institution of Professional Civil Servants until her premature retirement in 1976. Until 1969, I served as chairman of the section, represented it on the committee of the branch, and served on the computer sub-committee of the IPCS Scientific Staff Group. From 1970-1972, I served as an SRC representative on the Higher Grades Committee of the Group. Many other members of the staff were involved in the activities of IPCS and of the various unions that tried to achieve better conditions for all staff, whether they were members or not.

C.4 Women in the RGO at Herstmonceux Castle

C.4.1 Appointments

Major changes in the role of women within the scientific grades in the RGO took place during the period that it was at Herstmonceux. The changes in the administrative grades appear to have been much less marked. As far as I am aware no woman was employed in the Observatory at Greenwich or Abinger at the Assistant level before 1948, although there were some Junior Assistants. In the AR's

report for 1948, Miss C. M. Chapman and Miss E. M. Moore were Junior Assistants, Miss C. J. A. Penny was listed as an “Assistant (Temporary)”, and Miss P.M. Morris was a ‘Temporary Assistant (Scientific)’. (Miss Penny was then working in the Royal Observatory at Edinburgh where there was still a wartime out-station of the Time Service.) The 2 Clerical Assistants and the 5 women Temporary Clerks were probably engaged on scientific or technical work. On the administrative side Miss H. Pettican (at Abinger?) was the only Clerical Officer and most of the other clerical staff, and all of the typing staff, were women..

In the Nautical Almanac Office (NAO), which was still at Bath at that time (1948), Miss F. M. McBain was an Assistant and Miss M. R. Rodgers was a Junior Assistant. Mrs E. M. Freeman was a Temporary Clerk (II), but was (probably) engaged on scientific work. She was listed above Miss D. M. Fooks, an Assistant Experimental Officer, who was one of the first members of the RGO staff to be appointed in the new grades of the Scientific Civil Service. Miss E. J. Grove was appointed as Temporary Assistant (Scientific); she was recruited in Sussex, but started to work in Bath. Miss J. E. Perry and Miss Y. I. Reddy were Clerical Officers, but the latter may have been engaged on scientific work. Miss I. M. Restorick was a Clerical Assistant, but was also (probably) engaged on scientific work.

By the time of the AR’s report in 1949, most of the scientific staff had been regraded. For example, Miss McBain became a Principal Scientific Officer and Miss M Rodgers an Experimental Officer in the NAO. Most of the new appointments were listed as ‘Temporary’, but many were confirmed later.

The number of females in the junior scientific staff increased as each of the departments moved to Herstmonceux. Many of the Assistants (Scientific), who are referred to here as Scientific Assistants (SA), were girls with good O-levels from the local girls’ schools of the area. (The schools for boys and girls were then still separate.) Two women graduates (from Glasgow), Miss M. M. S. Gibson and Miss A. M. James, were recruited in the NAO as Assistant Experimental Officers (AEO). In the annual reports of the Astronomer Royal there were separate lists for the Royal Observatory (RO) and for the NAO. The statistics are as follows:

In RAR 50:	RO:	8 women SAs out of 24;	no women AEOs
	NAO	7	10; 3 out of 4
In RAR 53:	RO	12	24 no women AEOs
	NAO	5	6; 3 out of 5

In 1950 Miss F. E. A. Jeffries was graded as a Senior Assistant (Scientific), (SSA) , whereas in 1948 she had been a Clerical Assistant.

In RAR 58 the staff are listed by department and there were 7 women SAs out of 9 in the Meridian Department and 6 out of 7 in the three departments for astrophysics and astrometry. Most of the young SAs left after a few years, although a few stayed on and gained higher qualifications and promotion.

Miss Penny, as an SEO in the Time Dept., was the only woman above the Scientific Assistant grade in the old-RO departments for many years. One graduate woman AEO is listed in RAR 62 and three more AEOs (2 graduates) are listed in RAR 64. In addition Miss H. H. Swope of the Mount Wilson and Palomar Observatories worked as a Principal Research Fellow in 1964. Otherwise, before Dr Margaret Burbidge’s appointment as Director in 1972, there was only one female appointment, Dr. B. Louise Webster, in the Scientific Officer class; she was appointed as an SO in

1969. In later years a few other women (see C.4.5) were promoted to SSO, but none were promoted to PSO at Herstmonceux.

In the following sections, first names and maiden names (sometimes followed by the married surname) are normally used.

C.4.2 Observing

It is possible that Betty Collett was the first female member of the Observatory staff to be engaged on night observing, as she had joined the RO Time Department at Abinger in 1943 and used to observe at night on the small transit. Pamela Morris also observed on the small transit later. Joy Penny also joined the Time Department in 1943 to work at the reserve time-service station at the Royal Observatory Edinburgh. She had previously been on the staff of ROE. Her first recorded observation was on 1943 October 18. My understanding is that none of the women employed at Greenwich carried out night observing duties except that Joy Penny observed at Greenwich when the reserve time-station was moved back from Edinburgh.

There is doubt about when women started observing at Herstmonceux. I hope that the observing logs are available in the RGO archives at Cambridge to settle this issue, but it seems that in 1959 Linda Mather and Mary Dann were the first women to use the 36-inch telescope. Sheila Osbon observed on the astrolabe from 1959 Nov. to 1962 Sept., and Irene Saunders observed from 1960 March to 1963 Feb. It is possible that Virginia Papworth was the first woman observer on the PZT. David Thomas recalled in June 2006 the following incident.

“There is an interesting story concerning Virginia’s appearance at a Civil Service Board – can’t remember whether Establishment or Promotion. Anyway when asked to describe her work she described how she operated the PZT which was a fixed telescope that only observed stars at the zenith. The so-called scientist on the panel refused to believe her. When she reported back to Hunter he had to ring up the Panel Chair to assure him that V was right, and I presume she was passed after all.”

Rosemary Cornford (Yallop) recalled in December 2005 that she and other Meridian Department ‘girls’ observed on the astrolabe and the PZT around 1962. One of them was Maureen Harmer, and on one occasion her scooter broke down when she was returning home after observing, and she had to push it all the way home. After that it became a rule that women observers had to stay in the hostel in the Castle after their duties. Valerie Page also observed on the PZT. It appears that Pat Baker was the only girl to observe on the RTC, although others acted as micrometer readers.

Margaret Evans (Penston) thought that Lady Woolley insisted that the girls should observe in pairs, and not singly, at night, but it is not clear whether this was made a formal rule. In later years, Diane Pottinger (Harmer) observed regularly on the 30-inch reflector and Louise Webster used the Isaac Newton Telescope. Margaret Evans (Penston) may also have done so.

C.4.3 Sports and social activities

The appointment of many more women led to changes in the sporting and social activities of the staff compared with these at Greenwich. These activities are described in appendix D on the RGO Club, but a few examples may be noted here. Men’s hockey was replaced by mixed and women’s hockey and the Sussex game of stoolball was played by mixed teams. Mixed-doubles tennis and table tennis were also

popular, especially as they could be played at lunch-time and in local leagues. The increased proportion of women on the staff made possible new social activities at Herstmonceux. In the early years an annual pantomime and a party for children were held on a Saturday afternoon and were followed by a staff party, with dancing and social games, in the evening. Some dances were arranged in local villages. Woolley introduced folk dancing soon after his arrival. After the building of the Clubhouse, badminton was played during the evening and a ballroom-dancing section was started. In addition the Club arranged well attended occasional Saturday evening dances in the Clubhouse and in the Castle.

A netball team was entered in the SRC Sports Days at Chiswick and ladies also played in the mixed-doubles tennis with some successes. Others went along as supporters of the various teams. Later ladies took part in the SRC Indoor Sports Days in badminton and, possibly, in table tennis and volleyball.

C.4.4 Marriages

Not unexpectedly, there were many marriages amongst the young staff who were appointed during the early years at Herstmonceux. Some were between couples who had lived in the hostel at the same time, while others were between couples who had served in the same group of departments. Sports and social activities may have been the meeting points for others. Donald and Flora Sadler used to claim that Margaret Evans and Michael Penston became friends after being guests for dinner at their home while they were vacation students in 1962.

One surprise wedding was that of Sir Richard Woolley, after his retirement and the death of his wife, to Mrs E. M. P. Marples, who had been the Canteen Manageress while he had been AR.

A list of marriages between Herstmonceux staff is given in C.12. It does not claim to be exhaustive or free from misunderstanding. The list also includes the marriages after 1948 amongst the staff at Abinger and Greenwich where the couple subsequently moved to Herstmonceux. The AR's report for 1950 lists two such marriages, but then comments that several other marriages took place.

In later years there were many examples of wives who rejoined the staff, or who joined for the first time. Many of the wives served in a part-time capacity.

C.4.5 Notes on some individuals

The following notes on individual members of the staff are intended to illustrate the wide variety in the career patterns of women in the RGO. These notes are incomplete in respect of both the individuals included and the details of their careers. They are based largely on my memory and on points that I have noted in the past while glancing through Information Bulletins and Reports. Some additional information and corrections have been provided by other members of the staff. They are listed in alphabetical order.

Rosemary Brett joined the AR's Department as a Scientific Assistant (SA) in 1967. It was said that she had been a Carnival Queen in Bexhill. She married Lester **Selmes** in 1970 and went part-time soon afterwards. She was a contributor to *Astronomers at Herstmonceux*, where it is stated that she spent seven years working on the quasar research programme and that this involved working as a night observer on the Thompson 26-inch refractor.

Margaret Burbidge's brief period as Director in 1972 and 1973 is described in section 5.2. She continued her distinguished research and was awarded, jointly with her husband, a Gold Medal by the RAS in 2005.

Anneilia Isabel Cassells came as a vacation student from Edinburgh in August 1962 and joined as an AEO in AR's Dept. in 1963. She married **Wal Sargent** in the following year, and they both resigned a few months later to move to California. In recent years she has served as the President of the American Astronomical Society (1999-?) and has given the George Darwin Lecture to the Royal Astronomical Society (200?).

Ann Coleman was appointed as an SA in the NAO in 1965. She was encouraged by Sadler to gain further qualifications and she took a sandwich course at the Brighton College of Technology in 1966-1970. Much to Sadler's dismay she did not spend any of her four 'sandwich' periods in the NAO; instead she gained experience in electronics and physics. She married **Richard Savage** in 1969. She rejoined the RGO as an AEO in the AR's Dept., and went on to obtain an M.Sc.(Sx). She started to work for a Ph.D under the supervision of Margaret Burbidge, but completed it under Roger Taylor (U. Sussex) and John Bolton (U. Sydney). She was seconded to the radio observatory at Parkes, N.S.W., in 1974 and was promoted to SSO in 1975. In 1978 she returned to RGO and her Ph.D. examination. She was then transferred to the ROE and hence to the UK Schmidt Telescope Unit in Australia in 1979 to 1982. She spent another 3 years at ROE in 1982-1985, but then returned to UKSTU. She appealed unsuccessfully against her non-promotion to PSO in 1993 and retired early in 1995. She and her husband have a farm near Coonabarabran.

Janet Dudley was appointed as the Librarian in 1978 after serving at the Royal Aircraft Establishment. She identified the rare books to form the Airy Collection, which was housed in special cabinets in the chapel. More importantly, she emphasised the importance of the archives of the Observatory and persuaded Graham Smith and the SRC that they should not be transferred to the Old Royal Observatory at Greenwich. Moreover she obtained approval for the appointment of a Conservation Officer and the setting up of a conservation laboratory. Later, she set up the 'Laurie Project', which was funded by the Manpower Services Commission, to catalogue the archives.

Janet was reprimanded for her participation in the IPCS campaign against the move of the RGO to Cambridge and in 1987 she resigned to take up the post of Librarian at the Royal Radar Establishment. In 1993 she became the head of the Information and Library Services in the Department of Trade and Industry.

Elizabeth Epps joined as an SA in 1960 and was promoted to AEO in 1964. She resigned to take a degree course at U Sussex and rejoined as an AEO in 1968. She was promoted to HSO in 1972. She married **Richard Bingham** in 1975 and was working in a part-time capacity when she resigned in 1987.

Margaret Evans was a vacation student in 1962 and joined as an AEO in 1963 and served in several departments before returning to the AR's team in 1964. She married **Michael Penston** in 1965. She obtained her M.Sc. (Sx) and was promoted to SO in 1968 and HSO in 1971 while she was working at the Hale Observatories as a Guest Investigator with Michael. She obtained her Ph.D. (Sx) in 1973. She took special leave to work at the AAO and on the IUE before returning part-time in 1981.

She was secretary of the local branch of the IPCS and, like Janet Dudley, was reprimanded for her role in the branch's opposition to the move to Cambridge. She was

a Liberal Alliance candidate for Pevensey in the elections for the East Sussex County Council in 1985. [See *Eastbourne Herald*, 1985-04-08, with photo.] She remained with the RGO until its closure in 1998. She served as Secretary of the RAS (1997- ?) and President of the Society for Popular Astronomy (200?- ?). She was awarded the MBE in the New Year Honours in 2002.

Mavis Gibson was appointed as an AEO in the NAO at Bath (on, I believe, the recommendation of Prof. W. M. Smart of the University of Glasgow) just before the move to Herstmonceux. She and I [GAW] worked together in organising the evaluation on the punched-card machines of the series for the nutation for 100 years. She was also a keen tennis player. She married Patrick **Wayman** in 1954 and resigned at the end of 1955. She went to South Africa with Patrick in 1957 to 1960 and then to Ireland in 1964 when he was appointed Director of the Dunsink Observatory.

Anita and Celia Hewerdine are twins who joined as shorthand-typists in November 1949. Anita became Woolley's personal secretary in March 1956 and was promoted to Senior Personal secretary in 1966. Celia became head of the Typing Pool and was promoted to CO/Sec when she became secretary to Dr. Hunter and Dr. Eggen in 1964; she was promoted to EO in 1974. They both resigned in October 1976; Anita became the secretary to the Vice-Chancellor of the University of Sussex, while Celia started a BA course at the University. Anita later also studied at the University and was awarded a PhD.

Catherine Hohenkerk joined the Solar Department as an SA in 1971 and after further studies was promoted to SO in 1974, on appeal with the support of Dr. Hunter. She transferred to the Computer Department in 1974 and to the NAO in 1978. She obtained a B.Sc. in 1978 and upgraded it to an Honours degree in 1981, after which she was promoted to HSO. She moved, still with the NAO, to Cambridge in 1990 and was promoted to SSO in 1991. She moved to the Rutherford Appleton Laboratory in 1999 after the closure of the RGO and to the UK Hydrographic Office at Taunton in 2006. She now plays a key role in the NAO, which has a staff of only 3 persons for the production of the almanacs and other paper and electronic publications. In 2005 she received the Superintendent's Award of the United States Naval Observatory "in recognition of distinguished service and extraordinary dedication to the joint publications of Her Majesty's Nautical Almanac Office and the United States Naval Observatory".

Dorothy Hutchings was a vacation student in 1960 and joined the NAO as an AEO in 1961. She married John **Hobden** in 1964. She was promoted to EO in 1968 and was regraded as an HSO in 1971. She supervised the operation of the ICL 1909 computer in 1969 onwards until she was transferred to the Astrometry Division for work with the GALAXY measuring machine. In 1981 she transferred to the computer section of the La Palma Division, where she remained until the RGO moved to Cambridge. She was one of the contributors to *Astronomers at Herstmonceux*.

Flora McBain worked in the NAO during the vacation in 1935. In 1936 she went on the University of Aberdeen eclipse expedition to Siberia. She joined the NAO in 1937 as a Junior Assistant, was promoted to Assistant in 19??, and regraded as a PSO in 1946. She served as a Secretary of the RAS in 1949–1954 and as an editor of *Monthly Notices of the RAS*. She married Donald **Sadler**, the Superintendent of the NAO at the end of 1954 and retired in 1973. She died in 2000 at the age of 88.

Lesley Murdin (the wife of Paul Murdin) is a historian who worked for a few years (1979 to 1982) in the library and archives. Her first book, *The new astronomy*,

was published in 1977 and the dust cover of her second book, *Under Newton's shadow*, describes her as follows.

“Lesley Murdin took her first degree at Oxford in 1963, and has studied literature and history at postgraduate level in the US and Australia. She holds an MA from Macquarie University, Sydney, and has written widely on the cultural background of the history of astronomy. She has carried out research on 17th century astronomical subjects in the archives of the Royal Greenwich Observatory, and is now a part-time member of the staff of the Open University, for which she teaches courses on the history of ideas.”

Jacqueline Pardoe spent three months (1967 July to September) as a temporary SA in the NAO (computer?) at the same time as Simon **Mitton** was working in a similar capacity in Lynden-Bell's RT. They subsequently married. She is the author of several popular astronomy books, including OUP's *Concise Dictionary of Astronomy*. She has also served as the Public Relations Officer for the RAS.

Joy Penny joined the staff of the Royal Observatory at Edinburgh in 1941. She went to Edinburgh to be with her twin sister, Angela, who was studying in the University for a PhD. Joy joined the ROG Time Department in 1943 and her duties at the reserve station of the Greenwich Time Service at ROE, included night observing. She later observed at Greenwich. (See also C.4.2 and C.14) She was promoted to SEO in 1957 and was head of the GTS section within the Time Department at Herstmonceux. She took voluntary premature retirement in October 1976 for family reasons

In addition to her work for the Greenwich Time Service she was a very active secretary of the RGO section of the Institution of Professional Civil Servants. In addition to the negotiations with the Astronomer Royal on local matters, she was involved in the negotiations about the changes in the conditions of service when the responsibility for the RGO was transferred from the Admiralty to the Science Research Council in 1965. (Further details are given in section 4.1.2 of the main account. See also appendix C.14.)

Joan Perry joined the NAO in Bath in 1943 and was promoted to CO(Sec) in 1947. She continued to serve as secretary of the Office until 1965, when she was promoted to EO and appointed as the RGO Librarian. She had previously been in charge of the NAO Library in the West Building. She was awarded the Queen's Silver Jubilee Medal in 1977 and she retired in 1979.

She served as secretary of the RGO Social & Sports Club from 1950 to 1956. She organised the Ballroom Dancing Section from 1961, then in the Clubhouse and later in the Castle, until 1989. During her retirement she became a qualified dancing teacher. (See appendix D.6.2)

Sue Pocock joined the Magnetic Department as an AEO in 1966, but transferred to the AR's Dept. in 1968. She gained her MSc at Sussex in 1969 and was promoted to SO in 1970. Later that year she married Keith **Tritton**. They were given special leave in 1974 to spend two years at Chiangmai University in Northern Thailand, where they were responsible for initiating courses in astrophysics and for the installation of a small telescope. She returned to the Royal Observatory at Edinburgh (and not to the RGO) to work in the UK Schmidt Telescope Unit.

Diane Pottinger joined as an AEO in Bernard Pagel's Research Team in 1967 and married Charles **Harmer** in the following year. She observed regularly on the 30-inch reflector. She was promoted to HSO in 1973 and to SSO in 1975 after obtaining an

MSc (Sx). She was working in the Astronomy Research and Support Division when she resigned at the end of 1985. My only information about her subsequent career is that she has been working for many years at the Kitt Peak Observatory.

Janet Purdy joined as TSA in 1962 and served in the AR's Dept., the Solar Dept. and the Astrometry Dept. before she resigned in 1964 to go to St. Andrews University. She spent the summer of 1965 in the Astrometry Dept. and rejoined as a TSA in 1966 and was promoted to AEO in 1971. She married Andrew **Sinclair** in 1970 and took unpaid leave in 1975/1976 to go with him to Australia for a year. She was promoted from SO to HSO in 1977 when she was in the Galactic Astronomy Dept. She moved to Cambridge and was transferred to the support team for the Isaac Newton Group until the RGO was closed in 1998.

Iris Restorick, who was always known as **Flip**, joined her elder sister, Kay, in the NAO at Bath in 1944 as a temporary clerk. She was involved in the computational work of the Office and was regraded as an Assistant (Scientific) in 1947. She moved to Herstmonceux in 1949 and operated the punched-card machines. She married Norman **Rhodes** in 1952 and resigned in 1962. Unfortunately, Norman died in 1966 and so Flip rejoined the NAO in 1967, and later transferred to the Meridian and Photographic Astrometry Departments. She had another short interruption of service before she retired in 1987.

Marion Rodgers joined the NAO, then at Greenwich but separate from the RO, as a temporary computer in 1933. She was promoted to Junior Assistant (Lower Grade) in 1937. She was evacuated to Bath with the NAO in 1939. She considered moving to the Tidal Branch of the Admiralty, but decided not to do so when she realized that the NAO was much more advanced. She was regraded as an EO and was later offered promotion to SEO in 1961, but she declined. She was, however, promoted to Acting SEO in 1966. She retired in 1969 and moved back to London in 1972. She kept in touch with many former members of the NAO and she kept me informed about them. She attended the NAO Reunion at Greenwich in 1993, when she and Flora Sadler were presented with bouquets. She died in 2003, aged 93.

Christine Thoburn worked on cosmic rays as a Ph.D. student at Bristol University. She joined the Meridian Department as an SO in 1977 and was promoted to HSO in 1977. She was listed as an SSO in Meridian astrometry in 1985 and in the Astronomical data group in 1987.

Louise Webster had a PhD when she joined as an SO in 1969. She observed on the Isaac Newton Telescope. She was promoted to SSO in 1970 and to PSO in 1974; she transferred to the Radcliffe Observatory (via the Sahara) in 1972 and to the AAO in 1975. She married Tony **Turtle** of the University of Sydney in 1978. Unfortunately, she died a few years after having one of the first (if not the first) liver-transplant operations in Australia.

Sue Worswick had a PhD when she was appointed as a Research Fellow in 1978 in the Instrument Development Division. In 1981 and 1982 she was funded by the RGO for work on optics with Professor Wynne at Imperial College. She rejoined as an SSO at the beginning of 1983 and worked in the optics group in the Instrument Sciences until the RGO closed in 1998.

C.5 Staff conditions in more detail

C.5.1 Hours and leave

The hours and leave allowances when I joined the RGO are described in section 2.1.2.4. These were based on a six-day week and so were changed when a five-day week was introduced in 195?. The total hours of attendance were reduced from 44 to 42, of which 5 were for lunch breaks. The normal starting time was brought forward to 8.30 and the normal departure time was changed to 4.30 on Fridays. The actual times varied for those using official home-to-duty transport. (Sadler also continued to come in at 9.00 and so he left at 5.30 or later.) There were corresponding changes in leave allowances, so that I had 30 days, instead of 36.

Staff were also allowed to take short absences on sick leave without a doctor's certificate. I was not aware of any abuse of this privilege, although it may have occurred.

Time off was usually granted for attendance at meetings of scientific societies, such as the Royal Astronomical Society, even if the subject of the meeting was not directly related the work of the individuals concerned. (See section C.5.3)

Time-off was also allowed for some special events, such as participation in Civil Service sports championships and later SRC sports days. (See appendix D.6)

C.5.2 Home-to-duty transport

Initially, (as has been described in section 2.1.2.2) transport was provided to and from the Castle at the beginning and end of each day for staff living locally, while a hostel was provided for those who were recruited from more distant places. The local staff were taken either to Herstmonceux village (or to Boreham Street), where there were bus connections to Hailsham and Ninfield, or to Pevensy Bay Halt, where there were train connections to Bexhill and Hastings or to Eastbourne and Brighton. The Royal Navy lorry was replaced by a more suitable coach after a few years.

Eventually, more and more staff used their own cars to get to and from the Observatory. but the provision of home-to duty transport was continued on a reduced scale.

Transport was also provided at lunch-times between the West Building and the Castle for the benefit of elderly members of the staff (such as Miss Rodgers). It may have been used by others in times of inclement weather, but I believe that most used cars as such times. Staff usually used their own cars when travelling between buildings in the course of their work, although I believe that official transport may have been available.

C.5.3 Travel and subsistence on duty

When staff were required to travel to other places in the course of duty, there were several options: (1) to use their own cars to and from their homes; (2) to use public transport, such as rail for journeys to London; (3) to go in an official vehicle; or (4) some mixture of the these, such as use their own cars or an official vehicle to go to and from the station. Approval in advance was necessary and, at first, vouchers were provided for travel by rail. A mileage allowance was paid for journeys by car.

A 'privilege' enjoyed by staff above certain grades was that of first-class travel on the train. Staff in lower grades travelled third-class except when there was good

reason for them to travel with a higher-grade officer. My recollection is that I became entitled to first-class travel when I was promoted to the grade of Senior Scientific Officer in 1956, but it might have been to PSO in 1970. This had two advantages other than greater comfort; firstly, there was less chance of having to stand on a crowded peak-hour train; secondly, it was easier to work as it was quieter and as papers could often be placed on the adjacent seat. (Then the first-class seats were in small compartments with three seats on each side.)

Staff on 'detached duty' were also allowed to claim subsistence allowances that depended on the time away from home, such as a half-day, full day or overnight. These allowances were intended to cover the extra costs of meals and accommodation; they were at fixed amounts and it was not necessary to provide detailed accounts. The allowances were such that it was usually possible to keep the extra expenses within the allowance.

My recollection is that the allowances for short visits abroad were fixed for the country concerned, but this may not have been the case. Flights and hotel bookings were usually made through the General Office, which in turn used a travel agent in Eastbourne. I found that journeys abroad by car at the standard mileage allowance usually cost less than the sum of the air fare, subsistence allowance while travelling, and public transport in the places being visited. Consequently, I often travelled by car, and took annual leave for the days spent on the journey.

C.5.4 Attendance at RAS meetings

I understand that the Fellows (and others ?) at Greenwich used to attend meetings of the Royal Astronomical Society as a matter of course since it took little time or money to get there. The situation was different at Herstmonceux as it entailed the cost of the fare, unless one went on duty. It was, however, not necessary to take a half-day's leave for an afternoon's absence from work as 'time-off' was usually allowed. If we went on duty we were able to get transport to Polegate after lunch, and then a train to Lewes, where we changed for the train to Victoria station in London. Otherwise, it was necessary to leave earlier in order to go via Pevensy Bay Halt.

Later, the IPCS negotiated a concession so that Fellows could go on duty to 2 meetings a year even if they were not presenting a paper or were not on the Council of the Society. I believe that Sadler and other senior staff always went on duty since it was possible for them to arrange other meetings in London for the same day. I also did this once I had good reason to do so, but I only went occasionally to RAS meetings.

C.5.5 Foreign service allowance

Staff who served abroad on duty for an extended period were paid a foreign service allowance to cover the extra costs of accommodation and other living expenses. When I went to the USA in 1957/1958 (see section 3.3.1.1) I was paid the allowance for a single man, even though my wife and child went with me, since I was to be there for only one year instead of the usual three. Nevertheless, we were able to live comfortably and we were able to save enough to travel cabin class, instead of tourist class, on the return journey.

C.6 Staff training.

Staff were encouraged to encouraged to undertake further education courses

that would lead to additional qualifications and hence improved chances of promotion, either within the same class or to another. I do not recall the level of support that was given. Some staff obtained first degrees by part-time study at evening classes and later by taking 'sandwich courses' during which they returned to the Observatory for the work experience part of the sandwich. (See Anne Coleman in C.4.5.)

The link between RGO and the University of Sussex led to several of staff with first degrees taking MSc courses and some went on to undertake research at PhD level.

Much of the work of the Observatory was specialised and so it was appropriate to organise classes that were held at the Observatory. I started a series of lunch-time talks for Scientific Assistants in October 1955 in order to give them a general background in astronomy. Other members of the staff gave some of the talks. These were followed up by a more formal and comprehensive programme in the autumn of 1956. (See section 3.4.5) Lectures on various aspects of computing became almost a regular feature as it was first of all necessary to introduce staff to the concepts of programming and then to the particular systems that we adopted. I gave many of the early lectures as I was then the only one with any experience of using a computer and I wrote much of the basic software for the ICT 1201 computer. In 1962, an IBM programmer gave the first lectures on the use of Fortran for the IBM 7090 computer. Later, staff from the University of Sussex took over some of the in-house training for the ICL 1909 computer. Some members of the staff, including me, also went on courses organised by the computer supplier.

During the early 1970s I attended two management seminars at the Civil Service College at Sunningdale. These were residential and covered a wide variety of topics, including new ideas, such as 'management by objectives', as well as basic topics, such as interviewing techniques. The opportunity to meet other staff from a wide range of backgrounds and establishments was particularly stimulating. I do not know whether any other senior RGO staff went on these courses.

The position of part-time training officer is first shown in the staff list for 30 September 1976. It was held by H M Smith, with B D Yallop as his deputy. Yallop took over the main post in the following year, while J W Gietzen became the training officer for technical staff. Alfred Heath became training officer in 1980. He was also safety officer and he organised first-aid courses. Others were involved at other times, but I do not have details at hand.

C.7 Long-service staff

The Prologue contains a brief review of the staff of the RGO before the move and notes the retirements in 1948 of W M Witchell and P J Melotte, who each served more than 53 years at the Royal Observatory at Greenwich. (See section 1.3) Two years later, Mr R T Cullen retired from the post of Head of the Meridian Department on 1950 December 31 after 49 years in the Observatory. I did not meet these men, who were allowed to stay on long after the age (60) at which they were entitled to retire and draw their civil service pensions. They had probably served for many years as temporary staff before they became 'established' civil servants, and so they would have wished to continue working in order to qualify for a larger pension. Other pre-war staff were not able to serve so long, but nevertheless some achieved long-service records.

H G Barker	RO 1936-07-19 to 1964-04-30 [120]
Harold H J Barton	RO to 1961-09-30 [96] [RAR 62 > 50 years]
Kenneth C Blackwell	RO 1927-03-28 to 1976-10-09 [219] (with a few months in NAO in 1934)
Albert E Carter	RO 1931-01-01 to NAO 1934-08-23 to 1977-06-30 [223]
E A Chamberlain	RO to 1956-07-31 [52]
R T Cullen	RO c.1901 to 1950 [183]
Arthur J Daniels	RO 1899-11, to NAO 1912 to 1951-12-23 [117]
Sydney G Daniels	RO 1901-11, to NAO ??? to 1949-12-04
C C Harris	RO 1928 to 1962-05-30 (died in service) [99]
Alan Hunter	RO 1937-11-08 to 1975-12-31 [213]
F Jefferies	RO 1906-04-30 to 1953-01-03 [11]
A J Johnson	RO 1928-10-01 to 1975-03-31 [209]
Phillip S Laurie	RO 1935-01-28 to 1977-05-24 [221]
B Richard Leaton	RO 1937-07-02 to 1967-09-01 [150]; in NERC to 198?
E G Martin	RO 1911-09-04 to 1957-01-15 [56]
Flora M McBain	NAO 1937-09-20 to 1974-04-11 [192]
Harold W Newton	RO 1910-04-08 to 1955-05-31 [36]
Harold W P Richards	NAO 1931-06-29 to 1961-09, then RGO Admin to 1967-05-31 [146]
P L Rickerby	RO 1925 to 1967-11-22 [152]; in NERC to 19??
George W Rickett	RO 1918-03-18 to 1968-01-19 [153]
Marion R Rodgers	NAO 1933-03-01 to 1969-07-15 [164]
Donald H Sadler	NAO 1930-10-13 to 1972-02-18 [182]
Walter A Scott	RO 1921-04-30 to NAO 1926-05-10 to 1966-12-31 [143]
Arthur Shortland	RO 1929- to 1974-09 at RO Cape then to SAAO to 1976-06-30 [216]
Eric Smith	RO 1924-01-07 to NAO 1930-03-31 to 1972-06-30 [185]
Humphry M Smith	RO 1936-10-01 to 1976-07-03 [222]
Norman South	RO 1947-02 to 1987-09-22 [Gem 18]
L S T Symms	RO 1913-01-20 to 1968-02-29 [153]
R. H. Tucker	RO 1939-06-01 to 1982-09-24 [82/10]
George F Wells	RO 1916- to 1960-12-13 [92]
A C S Wescott	RO 1932- to 1956-06-30 [49]

Only a few of those that joined the Observatory after the war were able to serve long enough to complete the 40 years necessary for a full pension; many left after a few years in order to take up posts with better pay and prospects elsewhere. Others had attended university before joining the RGO and so were already in their 20s when they were recruited. Post-war staff with long-service records included:

Michael E Buontempo	1955-12-05 to 1997-10-20?
Fred. A. R. Everest	ROA 1948- to 1980-09- [251]
Claude Knell	1955-04 to 1987-09-22 [Gem 18]
Michael Lowne	1950-02-25 to 1989-05-12 [89/85]
Arthur S Milsom	1949-09-08 to 1985-03-03 [85/04] re-emp. to 1988-10-12 [check]
Leslie V Morrison	1960-09-16 to 1998-10-31?
C Andrew Murray	ROG 1950-02-10 to 1986-01-06 [86/02]
William Nicholson	1954-09-23 to 1986-05-11 [86/06]
Bernard E J Pagel	1956-07-30 to 1990-01-03?
John D Pope	ROA 1945-11-25 to 1984-04-14 [84/05]
I M (Flip) Restorick (Rhodes)	NAO 1944-01-03 to 1987-05-30, with gaps [87/07]
Gordon E Taylor	1949-05-16 to 1985-08-07 [84/09]
G. B. Wellgate	ROA 1943- to 1977-04-04 [221]
John H. Whale	ROG 1947- to 1975-05-31 [210]
George A Wilkins:	1951-10-01 to 1989-07-04 [89/115]
Bernard D Yallop:	1960-11-01 to 1996-10-14

In 1990 SERC made long- service awards to staff who had served in SRC/SERC since it was established in 1965. They are listed with a group photograph in *Gemini 31*. See also appendix G.12.4 for a list of awards by PPARC.

C.8 Honours

C.8.1 Civil honours

Knighthood

Harold. Spencer Jones	K.B.E. 1955, but knighted in 1943. (AR 1933 to 1955)
Richard v. d. R. Woolley	1963-01-01 (AR 1956 to 1971)
Francis Graham Smith	1986 (AR 1982 to 1990) (after service in RGO)

C.B.E.

Alan Hunter	1975-01-01 [211] (Dir. 1974-1975)
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O.B.E.

George A. Harding	1977-01-01 [220]
Paul G. Murdin	1988-01-01 [88/02]
Donald H. Sadler	1949-06-01 (?)
Humphry M. Smith	1973-01-01 [190]

M.B.E.

H. G. Barker	1958-07-22 [77]
Henry G. Gill	1981-06-01 [262]
Philip S. Laurie	1975-06-01 [211]
Brian Mack	1989?

Walter A. Scott	1965-01-01 [127]			
A. C. S. Westcott	1953-06-01 [17]	(Coronation Birthday Honours)		
B.E.M.				
M. Dermody	1976-06-01 (?) [217]			
George Gutsell	1979-01-01 [233]			
E. M. P. Marples	1975-01-01 [208]			
A. L. Jeffries	1973-01-01 [190]			
Coronation Medal 1953 [17]				
Sir Harold Spencer Jones (AR)				
E. A. Chamberlain (SEO)				
G. H. Pearce (Laboratory Mechanic)				
Silver Jubilee Medal 1977 [223]				
A. E. Carter	A. E. Cordwell	H. J. K. Duffell	J. E. Perry	
N. South	E. Stoakley			
Imperial Service Medal				
L. Mountain, 1964 [126] R. Blow, 1964 [126]				
Safe Driving Awards [& 98]				
J. Clarke	A. J. Hutchings	J. Manser		

C.8.2 Scientific and technical awards

Sir Harold Spencer Jones	For various academic awards see section 2.83 and IBs 3,19, 27, 31, 35.			
Sir Richard Woolley	For various academic awards see IBs 157, ... RAS Gold Medal, 1971 [174]			
Fellows of the Royal Society				
H Spencer Jones	R. v. d. R. Woolley	F. Graham Smith	A. Boksenberg	
Other awards				
R. d'E. Atkinson	RAS: Eddington Medal, 1960			
D. H. Sadler	RIN: Gold Medal, 1957 Adion Medal (Nice Observatory), 1969 [163] Hon. Doctorate, University of Heidelberg, 1970 Janssen Medal (Ast. Soc. Pacific), 1972 [187]			
C. G. Wynne	RAS: Gold Medal (1979) [233]			
J. G. Porter	BAA: Goodacre Medal, 1965 [131]			
G. E. Taylor	BAA: Merlin Medal and Award, 1962 & 1979 [99] [238] Minor Planet 2603 named Taylor in 1982 [AR 85] [Gem3, 10-11]			
A. Boksenberg	Minor Planet 3205 named Boksenberg in 1988 [88/106]			

H. E. West	Bronze Medal of the British Horological Institute	1956. [42]
C. C. Heal		1970 [173]
(several of the watchmakers were elected as Fellows)		
W. A. Roseman	2 Swedish horological medals	1964 [122]

The following topics might be added as new sections:

RGO staff who served as senior officers in national learned societies: might include officers of RS, RAS, RIN and BAA.

Also: as senior officers in international organisations: might include officers of ICSU, IAU, IUGG, COSPAR (if any), FAGS.

C.9 Duty overseas

Lengthy (1 year or more) overseas visits (prior to 1972) included:

L. J. (Joe) Bates to Cape, 1962, but he died there in 1964.

Robin Catchpole to Cape 1966 to 1969 ?

George Harding to Cape, 1960 to 1963 [85, 89, 111]

Geoff Harvey to Cape, 1968 to 1974

Derek Jones to California on Harkness Fellowship, 1961 to 1963

Derek Jones to Cape, 1965 to 1969

Stuart Malin to Cape, 1963 to 1965

W L (Bill) Martin, to Radcliffe 1971 to 1974 [178] and Cape 1974 to 1977

John D. Pope to AAO, 1967-09-01 to 1971-09-07 [152]

David Thomas to Cape, 1964 to 1967

Keith Tritton to Radcliffe, 1970 to 1971

Norman Walker to Radcliffe, 1966-11 to 1968-01

Roy Wallis to Cape, 1965 to 1969 the Radcliffe, 1969 to 1971

Patrick A. Wayman to Cape, 1957 [59] to 1960 [88, 90]

G B Wellgate to Cape, 1961 to 1964 [118, 121]

George A. Wilkins to USNO and Yale University Observatory, 1957 to 1958

Roger Wood to Radcliffe, 1968 to 1971

Bernard Yallop to Cape, 1964 to 1967

Perhaps add long visits after 1972 and up to 1981 (i.e. pre-La Palma).

C.10 Vacation students

Some students were employed individually before 1956 when Woolley started vacation courses for students (see section 3.4.5) who were not employed as members of the staff. They often, however, made useful contributions to the work of the Observatory. Some of them became astronomers, either in the Observatory or elsewhere, as is shown by the following list, which is probably incomplete.

Pre-1956 vacation students

F M McBain in NAO 1935 [192]

Mary Almond in NAO 1950 ?

J M A Danby (in NAO) 1950 [RAR 51]

V. C. Reddish (at ROG) 1950 [RAR 51]

List of post-1955 vacation courses with names of students who became astronomers.

* denotes those who joined the staff of RGO

Total number of students given in parentheses after date

1956 (late summer) (12) IB 52, 54

*D H P Jones *S R C Malin

1957 (late summer) (9) IB 67, but no names

P. W. Hill B. G. Marsden

1958 (early summer) (12) IB 77

*S. R. C. Malin *I. G. van Breda

1958 (late summer) no detail in IBs

P. W. Hill

1959 (early summer) (12) IB 83, but no initials

P. W. Hill R. B. Shobbrook R. D. Wolstencroft

1959 (late summer) (13) IB 84, but no initials

I. W. Roxburgh *I. G. van Breda *B. D. Yallop

1960 (early summer) (14) IB 90

J. Sykes ?

1960 (late summer) (14) IB 90

*D. E. Hutchings *L. V. Morrison *J. Saunders B. Warner

1961 (early summer) (16) IB 95

S. W. Hawking C. Jordan T. H. H. Lloyd-Evans J. V. Narliker R. C. Smith

1961 (late summer) (16) IB 96

*P. G. Murdin W. van Altena (USA)

1962 (early summer) (14) IB 100

*R. D. Cannon *M. J. Evans *G. M. Harvey *P. G. Murdin *M. V. Penston

R. S. Stobie

1962 (late summer) (16) IB 101

*A I Cassells W. McD. Napier R. C. Smith

1963 (early summer) no course [?? as AR in USA ??]

1963 (late summer) (14) IB 111, 113

*R. Wood

1964 (early summer) (18) IB 118, 121, but no list

1964 (late summer) no course [?? IAU GA in Hamburg ??]

1965 (early summer) (16)	IB 130		
*S. Pocock			
1966 (early summer) (15)	8 weeks	IB 140	
*K. F. Hartley S. A. Mitton			
1967 (early summer) (16)	8 weeks	IB 149	see also list of lectures
*A. J. Penny	*D. J. Stickland	*K. P. Tritton	D. T. Wickramasinghe ??
1968 (early summer) (15)	8 weeks	IB 156	
*R. A. E. Fosbury *S. F. McWilliam			
1969 (early summer) (12)	8 weeks	IB 164	
*D. J. King			
1970 (early summer) (12)	8 weeks	IB 170	
no names recognised			
1971 (early summer) (12)	8 weeks	IB 177	
no names recognised			
1972 (early summer) (12)	8 weeks	IB 185	
H. A. Couper *S. N. Henbest			

Listing of later courses deferred for time being (Jan 2004).

Note that Chris Benn has made a similar list in *Gemini* 17, 21-23.

C.11 Sandwich students and short-term appointments

The following list contains only a small proportion of these appointments as I did not look for them when going through the IBs. I will try to look up others and the projects on which they were engaged. I hope the relevant files are at CULib.

C.11.1 In NAO

Miss R L Briggs	TSA 1968-06-17 to 1968-09-20 [156, 159]
J W Bryce	TSA 1968-07-08 to 1968-08-16 [156, 159]
P. R. Burfitt	SS 1966-07- to 1966-12-
J A Coombs	SS to 1979-09-30 [172]
Miss J M Darke	TSA 1968-07-31 to ??[156,]
G. Frangarkis	Temp. AEO from 1967-06-26 to 1967-09-30. [148]
	Mature, probably a graduate, from Greece.
I L P W McLean	SS to 1970-09-11 [172]
Miss Jacqueline Pardoe.	TSA 1967-07-03 to 1967-09-30. [148]
	Married Simon Mitton. RAS press officer; author.
Miss A. R. Parkin	SS from 1971-08-02 to [178]
Miss A. Maxwell	SS 1974 with BDY on night-sky brightness
C S Back (U Surrey)	SS to 1975-07-01
A Stamper	SS to 1977-09-23 [224]
K P Rogers	SS to 1977-09-23 [224]

Saied S Rezavi SS 1978/1979 -> BSc (2) [252]
 G A Winbow TSA 1962-06-13 to 1962-09- [100]

C.11.2 In other departments

Denis E Winch Temp. SSO, from 1968-04-01 to 1968-07-31 [154] [158]
 Lecturer on sabbatical leave from University of Sydney; to Magnetic Dept.
 Later became Professor of Applied Mathematics.

David R. Wilkins Temp. SA, working for Bernard Pagel.
 1978-01-03 to 1978-06-30 [225, 227]
 1978-12-07 to 1979-01- [232]
 1979-06-18 to 1979- [237]
 1979-12-10 to 1980-01-11 [244, 245]
 1980-07- to 1980-09-18 [253]

Son of author. Now lecturer in mathematics at Trinity College Dublin.

There were probably many others of whom I have no records.

C.12 List of marriages between RGO staff

This list is intended to include marriages after 1949 in which both partners were, or had been, members of the RGO staff at the same time. There are probably errors and omissions in this list.

* resigned immediately before wedding

~ resigned some months before wedding

(A) the staff were at Abinger before moving to Herstmonceux

The numbers in brackets are those of the Information Bulletins or other sources.

In the hostel: Angela James and Keith Jarrett 1953-04-04 [16]
 Mavis Gibson and Patrick Wayman 1954-06-19 [28]
 *Cynthia (Scrap) Ryall and David Smith 1955-09-17 [40]
 Virginia Papworth and Eric Mitchell 1956-03-31 [49]
 Julia Burman and ~Bob Airlie (site engineer) 1958-06-14 [76]

In the same department; (A) = Abinger

Ethel Moore and B John Harris (A) 1949/50
 Rosemary Pavey and Henry Gill (A) 1949/50 [29]
 Monica Lawrence and Fred Everest (A) 1949/50 [33]
 Rosemary Harrison and John Pope (A) 1949/50
 Betty Collett and R. H. (Tommy) Tucker (A) 1949/50
 Joan Phillips and Peter Lamb (A) 1954-08-07 [29]
 Audrey Nevell and Mike Candy 1954-09-04 [29]
 Flora McBain and Donald Sadler 1954-12-22 [33]
 *Evelyn Grove and ~John Green 1955-04-09
 H. Howe and ~Michael Nunn 1955-08-28 [41]

*Margaret Newman and ~Ron Teague 1955-12-03 [42]
 Margaret Jeffery and Eric Shepherd (A) 1956/57
 Jill Beaver and Roy Wallis (A) 1956-08-12
 Patricia Scott and Brian Scales 1956-12-05
 Janet Pumfrey and Harry Cook 1958-03-29 [75]
 Linda Mather and John Alexander 1962-09-22 [102]
 Sheila Osbon and ~Philip Hill (vacation student) 1962-10-06 [102]
 Rosemary Cornford and Bernard Yallop 1 1964-01-11 [118]
 Annelia Cassells and Wallace Sargent 1964-08-05 [123]
 Susan Bailey and Leslie Morrison 1965-06-07 [129]
 Alison Gaydon and Bill Martin 1967-01-14 [144]
 Marion Whale and Martin Fisher 1969-09-20 [166]
 Sue Pocock and Keith Tritton 1970-06-05 [171]
 Mrs Jeannette M Northcott and H. Emrys Davies 1971-09-18 [179]
 Lynda Swift and Richard Martin 1972-09-02 [187]
 Wendy Duffy and Jim Sadlier 1986-09-12 [86/10]
 Vanda Bennett and Max White 1987-04-04 [87/04]
 Mrs Barbara (Seward) Mutter and Adam Perkins (Laurie Project)
 1988-09-02 [88/85]

In other circumstances (usually different departments):

Violet Strong and Gordon Taylor 1951-03-19
 Iris (Flip) Restorick and Norman Rhodes 1952-08-16
 Rosemary Weakley and Philip Christie 1954-07-10 [28]
 Valerie Terry and ~Gilbert Satterthwaite 1957-03-30
 Virginia Knight and Ken Long 1958-09-05 [78]
 Diana Damen and Michael Lowne 1958-12-13 [80]
 Janet Holloway and Michael Buontempo 1961-09-16 [96]
 Irene Saunders and Stuart Malin 1963-03-30 [108]
 Dorothy Hutchings and John Hobden 1964-09-19 [123]
 Margaret Evans and Michael Penston 1965-09-25 [132]
 Gillian Romain and John Carey 1966-10-08 [143]
 Ann Tidmas and Arthur Milsom 1967-07-01 [147]
 Dianne Pottinger and Charles Harmer 1968-03-29 [154]
 Marilyn Harris and Brian Carter 1969-07-05 [164]
 Janet Purdy and Andrew Sinclair 1970-01-30 [170]
 Sue Cowen and Ken Hartley 1973-02-05 [221]
 Pauline Watson and John Thomas 1974-01-12
 Elizabeth Epps and Richard Bingham 1977-09-24 [224]
 Gillian Edmonds and Philip Gibbs 1982-03-20 [271]
 ~Maureen Berry (nee Winter) and Tony Seabrook 1979-04-07

C.13 Deaths of RGO staff

The following lists are based largely on reports in the RGO Information Bulletins etc up to July 1989, but they may not include all such reports. Moreover, it is likely that the Bulletins recorded only the deaths in retirement of senior and long-serving members of the staff.

An asterisk indicates that a reference to a published biographical article or obituary is given in appendix G.7.

C.13.1 Deaths of RGO staff while in service after 1948

1959-05-19	Rosemary A Wilder	Road accident [82]
1962-05-29	J. R. Hill	[99]
1962-05-30	C. C. Harris	[99]
1964-12-09	L. J. Bates	In South Africa [127]
1966-11-20	Norman S. C. Rhodes	[143]
1967-01-09	R John Manser	Road accident [144]
1971-06-06?	John H. Barry	[178]
1971-08-14	David R. Coulthard	[179]
1973-07-19	Cyril E. Taylor	[195]
1975-03-27	E. Reynolds	[210]
1975-07-29	J. P. Robinson	[211]
1987-08-21	Richard Worth	Road accident [87/09]
1987-10	Tony Farrington	Road accident on La Palma [Gem 18]
1990-12-23	*M. V. Penston	[Gem 31, 32]

C.13.2 Deaths of staff who retired or transferred after 1948 and before closure in 1998

The following list contains only those whose deaths I have noticed in IBs etc
The IB Reference may refer only to a note at time of retirement.

1965-12-05	D. S. Perfect	[127]
1972-01-29	R. T. Cullen	[183]
1977-03-26	L. S. T. Symms	[222]
1977-06-21	H. W. P. Richards	[223]
1980?-	Flora I Penfold	[220]
1981-09-13	*J. G. Porter	[94]
1982-04-27?	W. G. Grimwood	[258, 261]
1982-08-23	*P. S. Laurie	[82/11] [Gem 3]
1982-10-28	*R. d'E. Atkinson	[Gem 4]
1982-12-03	H. G. Barker	[83/01]
1983-03-26	W. A. Scott	[83/04]
1985-12-09	H. W. Newton	[36]

1986-04-28	*G. A. Harding	[255]
1986-11-	Jack Pike	[OC 85/86]
1987-05-02	E. A. Chamberlain	[87/06]
1987-10-24	*D. H. Sadler	[Gem 18]
1987-12-08	A Shortland	[Gem 18]
1989-07-03	*A. E. Carter	[223]
1991-11-10	*H. F. Finch	[146]
1992-10-05	Jack Hutchins	[Gem 38]
1994-11-03	*M. P. Candy	[163]
1995-12-11	*A. Hunter	[213]
1996-03-04	H. P. C. Cook	[145]
1997-11-18	Irene Saunders/Malin	
1998-10-02	*O. J. Eggen	[147]

C.13.3 Deaths of former RGO staff after closure (from November 1998)

The IB Reference may refer only to a note at time of retirement.

???	Louise Webster/Turtle	
1998-12-21	*Patrick Wayman	
1999-05-03	*K. C. Blackwell	
1999-05-11	Ann Heather/Strong	
1999-01-13	*William L Martin	
1999-10-01	*Charles Wynne	
2000-12-25	*Flora M. McBain/Sadler	
2001-11-12	Pat Hanning	[83/04]
2001-03-30	Derek A. Harragan	[98]
2002-05-27	Brenda Harris	[85/04]
2002-11	Philip F. Cottrell	
2003-11-03	Marion Rodgers	[164] [A&T Newsletter no 1, 2000]
2003-05-02	R. H. (Tommy) Tucker	[Gem 3]
2004-11-14	*David S. Evans	[157]

Later deaths are (probably) available in the records of the RGO Society. They include:

???	G B Wellgate
2005-08-11	Richard Bingham
2005-08-15	Bill Roseman
2006-02?	Maureen Harmer/Napier
2007-10-09	Keith Jarrett

C.14 Notes on individuals

I have given notes on some of the ladies on the staff in C.4.5, but I had not intended to give similar notes on any of the men, although the main text contains some notes on senior staff and particular even. I have since, however, decided to include the following note where the circumstances were unusual. Notes on others will be added when it seems to be appropriate.

G. B. Wellgate

The following note was supplied by Nathy O’Hora in 2005.

On the day of his funeral prior to the service we wondered why in his obituary in *The Guardian* he was described as Dr Wellgate. All was revealed during the service when we heard of his early days in the UK. He got an appointment at Cambridge, where he had just submitted his PhD thesis when the war commenced, and he was arrested as an enemy alien and sent to the Isle of Man. Amongst the things he took with him to the I.o.M. was a copy of his thesis. This puzzled the “intelligence” agents who decided it was coded intelligence of military importance and destroyed it forthwith. His thesis at Cambridge was accepted but (acting on the advice of MI6?) the Cambridge authorities lost it. About 45 years later somebody at Cambridge found it again and the University then bestowed the degree of PhD on him.

[He joined the Time Department at Abinger on 1943-03-15.]

C J A Penny

This note about Joy’s initial appointment is a supplement to the paragraph above in C.4.5

I have a note (but no reference) that Joy Penny joined the Time Department at Abinger as a Temporary Junior Assistant on 1943-09-27, but it appears that she was actually at ROE since it was stated in IB 220, when she took premature retirement in 1976, that she joined the Observatory at the Edinburgh outstation in 1944. Nathy O’Hora suggests [email to GAW on 2006-01-15] that Miss Penny joined the staff of the Royal Observatory at Edinburgh in 1941, immediately after she had graduated, but the date and grade are not known as the staff lists for ROE for that period have not been found by David Thomas. She made her first time-service observations on 1943-10-18

I do not have the AR’s report for 1944, but Miss Penny is not listed in the report for 1945. She is listed as a Junior Assistant in the reports for 1946 and 1947, but in the AR’s reports for 1948 and 1949 she is listed as an Assistant (Temporary). There is a statement in the report for 1950 that she “was transferred from the anomalous grade of Assistant, Temporary, to that of Temporary Experimental Officer”. She was first listed as an Experimental Officer in the report for 1952.

APPENDIX D. THE ROYAL GREENWICH OBSERVATORY CLUB AT HERSTMONCEUX CASTLE

D.1 General overview, 1948 to 1956

D.1.1 Organisation and facilities

The 'Royal Observatory Social and Sports Club' was formed at Herstmonceux Castle on 28 October 1948 and the Astronomer Royal was invited to be the President. This probably followed the tradition of the pre-war clubs at Greenwich. (Greenwich was not used in the name until it was changed to the RGO Club in 1959, but I shall normally use the later shorter name from now on.) There was already a separate Club at Abinger; it was formed on 11 July 1947 and was affiliated to the Civil Service Sports Council. It was called the 'Royal Observatory Abinger Social and Sports Club'. As far as I know the staff at Greenwich did not have any such organisation after the war. (The history of the pre-war clubs at Greenwich and of the post-war clubs at Abinger and Herstmonceux is described in the booklet that was produced at the time of the opening of the RGO Clubhouse in 1960. There are also articles about the RO Hockey Club by Whichell in *The Castle Review*.)

The Club was open to all persons working at Herstmonceux Castle, and so it covered both non-industrial and industrial staff, including members of the Works Department from Chatham who were then working at Herstmonceux. Others who came to work for limited periods, whether civil servants or in a few cases staff of commercial companies, were also eligible to join. The first chairman of the Club, E G Rowlands, was a member of the Chatham staff. When he left in 1949 his place was taken by Norman Rhodes, a scientific assistant in the Solar Department. Arthur Shortland, then in the Chronometer Department, was the first secretary, and H G Barker, the Secretary and Cashier of the Observatory, was the first treasurer. They in turn were replaced in 1950 by Joan Perry, who was the secretary of the NAO, and John Whale from the General Office.

The Club had the use of two large rooms in the huts by the South Courtyard. One was used primarily for table tennis, although it had a stage that was used for the annual pantomime. The other was used as a lounge and for darts, draughts/chess and billiards/snooker. The subscription of 6d. per week was supplemented by promoting dances in local village halls. A first-class billiard table was bought on hire-purchase (H.P.) terms for £145 10s., which was soon recovered by a charge of 6d. per half hour.

"The Astronomer Royal offered the hard tennis court (just behind the north wall of the formal garden) for the use of the Club, but it had suffered badly from neglect. To put it in order, a sum of £145 was estimated by private tender, but as the Club could not afford this sum a 'do it yourself' scheme resulted in which members rolled up their sleeves and tackled the necessary repairs for a total cost of £32." [RGO Club booklet, 1960, p. 5.]

The sports field on the hillside to the east of the Castle was also brought into a useable condition by voluntary effort, led by George Harding and Eric Smith. The traditional RO game of hockey was supplemented by cricket and stoolball, which was a very popular Sussex game.

D.1.2 Early activities

The first Club Pantomime (??) was held at Christmas 1949 ?. The floor of the raised stage in the table-tennis room was made by cutting out part of the floor of one of the huts that was not in use. Audrey Nevell and Evelyn Grove, both from the NAO, were the principal girl and boy, respectively, and they took these roles in some later years, too. Afterwards a party was arranged for the pantomime cast and hostel residents with a budget of 35/-. In the event, many of the senior staff (including Sir Harold and Lady Spencer Jones and Mr Barker) attended, and this set a precedent for later years.

The first issue of *Castle Review* appeared in January 1951. It contains accounts of many of the activities of the Club, as well as interesting articles on other topics. In later years it became less regular, and it was supplemented by an Information Bulletin, which also gave notice of coming events. Early in 1951, the Club printed a leaflet on the history of Herstmonceux Castle, which had been written by Joan Perry and George Harding; it was sold to visitors in aid of Club funds. (A official *Guide for Visitors* was issued free from June 1952.) The Club also endeavoured to raise funds by organising dances in local village halls on occasional Saturday evenings. The music was provided by a small group, which I believe used to consist of a pianist, a violinist and a drummer. One of them was Freddie Parsons, a packer in the Chronometer Workshop. Such a group also used to play at the annual party at the beginning of each year. These parties included social games as well as ballroom and party dances.

The staff party was preceded by the children's party in the afternoon, which started with games (for the tots in the Castle and for the others (up to 15) in the Clubhouse), then tea in the canteen followed by presents from Father Christmas (usually the AR or George Harding) in the Staircase Hall. Before each party the members of the Club Committee were each given a list of children for each which they had to buy a present for about a given price. Finally, there was a pantomime in the Clubhouse. Subsequently the pantomime would be presented in Herstmonceux itself (and sometimes in other villages) for the benefit of the other children of the local school.

As I lived in the hostel for two years, I was able to take part in many of the activities of the Club. For example, I became a member of the second table-tennis team, which was then made up mainly of ladies, and was known as the RGO Comets. The first team, which was entirely of men, including Mr Sadler and Gordon Taylor from the NAO, was called the RGO Stars. These teams played in the Eastbourne league, so our away matches were in Eastbourne, Hailsham or Herstmonceux, whose teams were called the 'Zoo lions' and the 'Zoo cubs', since the local pronunciation of Herstmonceux ended in 'zoo' not 'sew'! I soon became the treasurer of the Club.

In 1953 Gordon Taylor won the Eastbourne Men's Singles Table Tennis Tournament, but he and Winnie Barton lost in the final of the Mixed Doubles; the finals night was held on Eastbourne Pier. [The RGO booklet gives 1956 for Gordon's win; I have an annotated programme for the 1953 Finals night.] In 1955 Aileen Grogan and I also reached the finals of the mixed doubles, but we were well and truly beaten by a couple who played for Eastbourne in the county league; Aileen won the Ladies Championship in 1959.

Most of the activity in the Clubrooms took place at lunch-times as after-hours transport was not available to most of the members. Each autumn there was an tournament for the *Spencer Jones Indoor Sports Trophy*. This had four sections:

billiards, snooker, table tennis and darts. My recollection is that each person who had entered a section played one game against every other person and 3, 2 or 1 points were awarded for the best three. Then the person with the highest total from all four sections won the Cup. Mr Sadler won the cup on at least one occasion (1955). (In later years, chess was added.) The trophy was presented by the Club's President at the annual party. Richard Woolley kept up this tradition when he became AR at the beginning of 1956; it was the first occasion on which he was seen by most of the staff.

The Club had a mixed hockey team that played friendly matches with clubs in the surrounding villages. I had my first initiation to the game in a practice match with the formidable ladies of the Hailsham Ladies Hockey Club. During the summer the Club played cricket and stoolball, a local Sussex game that was usually played by mixed or ladies teams; it had rules like those of cricket, but a square board on a post was used as a wicket, the bat had a circular face and the ball was softer and smaller. These games were then played in the evenings, rather than at weekends.

Tennis was played throughout the year as it was possible to fit in about half-an-hour's play during a lunchtime. As we only had one (very rough) court, and not many players, we could not play in league matches. We did, however, enter a knock-out tournament for small clubs that was organised by the *Sussex Express and County Herald*. In the first year (1953) we were beaten at Mayfield in the first round — but a photograph of our all-NAO team appeared in the paper. The Club used to organise its own tournaments each year for both singles and doubles. Mr Sadler dominated the men's singles, but doubles partners were chosen by a draw and so the results were much less predictable.

The Club used to arrange occasional visits to entertainment in Eastbourne, or even Brighton, by hiring a coach. A visit to the Festival of Britain — to both the exhibition in the Dome of Discovery and a concert in the Festival Hall — was made on 1951 June 24 (before my time!). I recall, for example, a concert at the Winter Garden with Moira Lympany as the soloist; I had had very little experience of classical music and so I was amazed when Arthur Milsom complained that she had left out (or changed) a cadenza in a piano concerto. We also went to a performance of the Gondoliers at Brighton — again a first for me, I believe.

The Club was allowed the use of an official vehicle (and driver) for transport to away sports matches (and for the pantomime cast), but I do not know what limits (or charges) were imposed.

A Sussex custom was the holding of bonfires and fireworks, preceded by processions in costume, with tableaux, on or before Guy Fawkes night. The really big celebration was on November 5 at the county town of Lewes, where there were about half a dozen bonfire societies that would vie with each other to produce the most spectacular show. The villages around Hailsham would hold their celebrations on the preceding weekends to an agreed schedule so as to avoid clashes and so that the tableaux could go to the different villages during the 'season'. The Club's float won the Herstmonceux competition on several occasions.

There was probably some resentment amongst the local community that the RGO staff should be given special treatment in the allocation of Council houses, but we hope that most people welcomed the boost the Club must have given to local activities, such as in sports and the pantomimes.

Shortly after his arrival, Woolley started a country dancing group that met each

week in the clubroom that was normally used for table-tennis matches and other events. There was, however, one occasion when the Club wished to use the room for a special event on one of the evenings that would have been given to dancing. Woolley was annoyed and later had the office partitions in the Long Gallery in the Castle taken down so that it could be used by the country dancing group, which was then organised separately from the Club. The Long Gallery had a sprung floor as it was originally intended for dancing and so it made an ideal venue for other social events and it became known as “the Ballroom”.

D.2 Changes in 1957 to 1960

It was realised that the Club would lose the use of the huts once the new buildings were in use and so attempts were made to raise funds that could be used later for building a new clubhouse. For example jumble sales were held in local village halls. The huts were demolished in 1957, but the Club was then able to use the Long Gallery in the Castle for some functions and the canteen in the West Building for evening league table-tennis matches until the Clubhouse was completed.

The completion of the West Building made possible the move to Herstmonceux from Abinger of the staff of and associated with the Time Department. This led to a major increase in the number of members of the Club and to major changes in its officers and committee members. Some of the newcomers had new ideas and were prepared to put in the effort necessary to bring them to fruition. I was in the USA at the time and on my return in February 1958 many changes had taken place. Norman Rhodes remained as chairman, but Leslie John (Joe) Bates was the secretary and Henry Gill was the treasurer.

A major improvement of the sports field was made in 1957 and 1958, largely on the initiative of George Harding and Eric Smith, after it had been ruined by straying cattle. It was levelled and extended by transferring earth from the slope of hill on the east side to the south-west corner of the field. A wooden pavilion was built by members in the north-east corner, using timber from a small chapel that was demolished in Bexhill. Unfortunately, the field had only a thin covering of topsoil, but not long afterwards Woolley arranged for one of the ponds to be drained prior to restocking with fish. The silt on the bottom dried and cracked and so Eric and I started to transfer some of it to the field. Woolley, who was a keen cricketer, agreed that the job could be carried through by some of the ground staff.

Agreement to a proposal for the building of a new clubhouse was given at the Club AGM in May 1958. One member suggested that it should be built in Herstmonceux village and the minutes record that this was supported by G. Wilkins, but that Dr. G. Wilkins objected! (Our second initials of C and A were not given.) It was realized that it would be necessary for the club members to provide labour as well as money and ideas, and work was started in the spring of 1959. The project was largely organised by Joe Bates with Harold Rodemark as the site foreman and chief instructor; he also did most of the skilled work, such as bricklaying. The most popular time for work was on Saturday mornings, but some work was done on Sundays and in the evenings. Luckily it was a dry summer and the main construction phase, including the roof, was completed by October. The Astronomer Royal laid the ‘foundation stone’ high in the south wall in September.

The progress report in October 1959 shows that during the 28 weeks some 4000 hours had been worked. There is a list of the “hours worked by gentlemen club

members”, but there is no list for the contributions of the lady members, even though I have a photograph that clearly shows Rosemary Cornford at work with a shovel. The list has 70 names, starting with: H. Rodemark, 481 hours; L. Bates, 301 hours; E. Turner, 188 hours, G. A. Wilkins, 143 hours; E. Smith, 128 hours; and 5 others with above 100 hours; and ending with 11 others with less than 10 hours each. A small core worked during the winter, but work almost came to halt in the spring when the local council claimed that the building did not have planning permission and should be demolished. By chance one of the councillors lived near me and so I sought his support. He had not realized that the clubhouse was being built by the members and that the Club did have the approval of the Admiralty. Eventually the matter was resolved and work was finished during the summer of 1960. It had cost £2400 (met partly from loans from the Civil Service Sports Council) and 9000 working hours. The formal opening ceremony was held on October 1. A booklet giving the histories of the Abinger and Herstmonceux clubs and of the building of the Clubhouse was issued at this time..

At the AGM of the Club in May 1959 its name was changed to “The Royal Greenwich Observatory Club” in order to facilitate trading as a source of income and as a service to members. The Clubhouse included a bar and the small kitchen also served as shop. In 1965 the income from these activities was about £200 out of a total income of £500. The Clubhouse included a main area that was sufficient for a badminton court, although the ceiling was too low; it was used also for table tennis and dancing. At first there was only one full-sized snooker table, but after some time one of the supporting interior columns was replaced by a joist so that a second table could be installed. There was also a lounge and space for playing darts. The Clubhouse was well used at lunchtimes and there was some activity during many evenings.

D.3 General overview 1957 to 1990

D.3.1 1957 to 1971

The Club catered for a very wide range of indoor and outdoor sports activities and also for social events of varying kinds. After a while the General Committee was unable to properly arrange and supervise all these activities and so a series of sections, each with their own officers, was set up. Section representatives met with the General Committee at meetings of the Club Council. *The Castle Review* was supplemented by a more frequent *RGO Club Information Bulletin* that gave details of current activities. Unfortunately the *Review* appeared only occasionally after 1959 and the *IB* became less frequent after 1968. There were several changes of the principal officers after about 1965 and, although the activities flourished, the attendances at the AGMs dropped and it became more difficult to find members who were willing to take on offices in the Committee.

In addition to the regular evenings for indoor sports, the annual competitions for the Spencer Jones Indoor Sports Trophy were continued with the addition of Chess. The Clubhouse was regularly used for ballroom dancing sessions with a professional instructor and from time to time for a variety of social evenings, such as a Jazz Dance, a Tramps Supper Party, children’s Christmas parties and so on. Some informal dances (to records) as well as dance with a live band (the Blue Stars) were held in the Castle Ballroom. In addition, from about 1965, the Clubhouse was used for film shows (often of documentaries on free loan), travel talks with slides (mainly by members who had been overseas on duty) and slide competitions. A photographic section was formed in

1966. The attendances for these activities also dropped off, presumably as television took over many Saturday evenings.

Cricket, stoolball, hockey and tennis continued. From 1968 onwards the Club participated in the SRC Sports Days that were held at the Civil Service Sports ground at Chiswick. In addition to cricket and tennis there were also netball and bowls. Players and spectators were allowed to go as if on duty as the event was intended to encourage good relations between the staff of the establishments in the Science Research Council. The Club had a fair share of success.

The Motoring Section organised events from time to time. Visits were arranged to places such as the Dungeness Power Station. Collections of clothes were made for Oxfam and there was a fund-raising jumble sale. A small library was formed from donated books and loans from the county library. Angling and gliding were added to the list of sections. A float was entered in the Bexhill Carnival in 1971. Other less popular activities included cleaning and maintenance work!

For some of this period, I acted as the Social Secretary and then Assistant Secretary before I became the Vice-Chairman. I had been Treasurer before I went to the USA in 1957, but I declined to take on the offices of Chairman, Secretary or Treasurer after 1960 as I was not prepared to be a member of the Bar Committee. My principal activities in the Club were tennis, table tennis and ballroom dancing. I also arranged some film shows and slide-talks.

D.3.2 1972 to 1981

The official Information Bulletins contain occasional references to the activities of the RGO Club but the Club IBs ceased in about 1975 and so the principal source of information about the later activities in the Club is the annual report of the Secretary. In 1976/77 there was an appeal for loans from members for the purchase of furniture and fittings for the Clubhouse. The general support for the Club gradually fell, but Graham Smith was very helpful.

In 1975 the Clubhouse was used for slide shows for the public who visited the Observatory at the time of the celebration of its Tercentenary. In the same year, the SRC started to pay the Council rates on the Clubhouse. In 1978 the Clubhouse was transferred to the SRC and the RGO assumed responsibility for heating, lighting, maintenance and decoration.

Swimming became a new activity in 1976 as Dr. Alan Hunter gave back the staff contributions to his retiring present as a donation to the Club for the purchase of a filtration plant for the swimming pool in the north end of the formal garden. This proved to be very popular on fine days in the summer. The hedges near the pool provided two changing cubicles! Another new activity was rock-climbing.

Snooker continued to be a popular activity and 110 members and friends were entertained by Terry Griffiths, World Snooker Champion in 1979, on 13 October 1980.

Various outings were also arranged.

The SRC sports days were, not unexpectedly, also popular. The summer outdoor sports were supplemented by indoor sports. My recollection is that the first was held at Runcorn as it was held on the initiative of the staff of the Daresbury Laboratory. The RGO fielded a volley-ball team even though none, or hardly any, of us had played the game before; needless to say we were 'slaughtered' by the other teams that played

regularly in local leagues. Later events were held at the Oasis Leisure Centre at Swindon and were followed by a disco and supper at the Central Office in the evening. The Oasis had a swimming pool that I used to visit when I was in Swindon for meetings of the SRC staff review boards.

The Club used to make occasional use of the Castle Ballroom for various events, such as socials. One of the members, Jim McConnell, was a member of the Hailsham Photographic Society and arranged for it to present its "Colour Show '80" in the Castle in November 1980. The show consisted of a series of audio-visual sequences of colour slides on a wide variety of topics. The Society used to give the show in village and church halls in the area to raise money for charity.

The production of an annual pantomime was also resumed after a lapse of about 30 years. In 1979 Mother Goose included a guest-star appearance by Graham Smith; it was followed by Aladdin in 1980. The pantomime was held in the Castle Ballroom on several evenings and on the Saturday afternoon so that it could be seen by audiences that included old folks, a youth club and schoolchildren, as well as the families and friends of members of the staff. There was also a children's party after the Saturday afternoon performance.

The first twenty years of the Clubhouse were celebrated by a social on 1980 October 1. A short while later (November 15) a party was held in the Ballroom to mark the retirement of George Harding, who had made major contributions to the Club in its early years.

When Graham Smith retired in 1981 he too returned double his retirement present from the staff on the understanding that it would be used to provide social and sporting facilities for the staff on La Palma. Subsequently, a branch of the Club was formed on La Palma

D.3.3 1981 to 1990

The RGO Club continued to play an important role in providing sports and social activities for its members in spite of the increase in the amount of spare time that many spent in watching television. These shared activities included staff of different departments and grades and helped to keep up the morale of the staff even when faced, first of all, with the cutting of staff numbers and, later, with the relocation to Cambridge.

The general activities of the Club continued much as in the previous years. Details, and sometimes photographs, of some of the following special events and new developments given in the official information bulletins.

A barbecue, a disco in the Clubhouse and dancing to the Catsfield Steamers in a marquee on 1985 August 10 to mark the 25th anniversary of the opening of the Clubhouse.

A pantomime, 'The Sword in the Stone' was held in December 1985.

Children's Christmas parties were continued, but a large drop in attendance was noted in January 1987. For the older children there was a treasure hunt around the Castle.

A rally for Hot-air balloons was held at Herstmonceux in September 1987 and 1988.

The Club participated in raft races at Lewes in 1987 and 1988 and raised money for charity.

A bonfire and firework display was held on 1988 October 29.

The Club had some successes in SERC Sports Days.

Inter-departmental darts tournaments proved to be very popular.

Archery was added to the list of activities.

The RGO Golf Society (!) hosted an SERC Golf Tournament at the Royal Eastbourne Golf Club on 1987 June 19.

Weekly Oxfam Bread-and-Cheese lunches raised a total of £?? since they were started in 19??

A “Farewell to the Castle” social evening was held in the Castle on 1989 April 22.

The Club gave up any claim on the Clubhouse when it was established that the new building at Cambridge would include a Clubroom with space for a kitchen/bar, a billiard room, and a general area that could be used for table-tennis as well as for a lounge. Staff would be expected to use other facilities in Cambridge for other sporting activities. Unfortunately, many members of the RGO Club lost their jobs as a result of the flawed decision to move the RGO to Cambridge.

D.3.4 1990 to 1998

I had no involvement in the general activities of the Club at Cambridge after my retirement and I have not seen any record of them, nor of any activities on La Palma. They are not even mentioned in the final issue of *Spectrum*.

There was, however, an RGO staff reunion at Cambridge on 1998 June 21. This was fine sunny day for an outdoor barbecue.

D.3.5 1999 to 2009

After the closure of the Observatory the RGO Club was replaced by the RGO Society, and its activities are described briefly in section 7.3.6 of the main text.

At first I tried to keep in touch with the staff who had been in or associated with the A&T Division and I prepared and distributed A&T Newsletters in November 2000 and December 2001. I have, however, not made the effort to produce another one as the level of correspondence with former members of the staff has fallen considerably in recent years and the web-site of the RGO Society provides a place where staff may record their recollections and activities.

D.4 Principal officers of the RGO Club

At Abinger the President of the Club was Humphry M. Smith, while at Herstmonceux the Astronomers Royal and then the Directors of RGO became Presidents of the Club.

The other officers of the RO Club at Abinger are listed in the booklet about the RGO Club that was issued in 1960 when the new clubhouse was opened.

The following list of the officers at Herstmonceux is to be completed if possible.

Chairman	Secretary	Treasurer
E . Rowland, 1948	A. Shortland, 1948	H. G. Barker, 1948
N. S. C. Rhodes, 1949	J. E. Perry, 1950	J. H. Whale, 1950
	G. E. Satterthwaite, 1956	G. A. Wilkins, 1952
	L. J. Bates, 1957	H. G. Gill, 1957

G. A. Harding, 1966	W. Nicholson, 1963	J. S. Griffiths, 1967
E. Mitchell, 1969	M. Fisher, 1968	P. J. Willmoth, 1968
P. Cottrell, 1974	K. P. Tritton, 1969	
R. E. Wallis, 1974?	W. L. Martin, 1970	
	R. Selmes, 1971	
E. Mitchell, 1976	J. Emery,	C. A. Parker, 1976
R. H. Tucker, 1977	R. E. Wallis, 1976	S. F. Griffin, 1977
R. A. Nicol, 1980	R. W. Argyle, 1979	J. D. Brooke, 1980
B. D. Yallop, 1984,		G. E. Gibbs, 1985?
P. J. Willmoth, 1985		P. E. Eldridge, 1988

I have not yet been able to complete the following lists.

Bar Secretary	Assistant Secretary	Vice-Chairman
	Janet Cook, 1958	George Harding, 1958?
Ray Foord, 1962?	George Wilkins, 1962	???
		Eric Smith, 1966
John Pharoah, 1967		Eric Mitchell, 1967
Ken Long, 1972?	Rosemary Selmes, 1970	George Wilkins, 1970
David Harman, 1976	Pauline? Green, 1971	Bernard Yallop, 1980
Philip Gibbs, 1978		W. L. Martin, 1984

Other posts included (at various times):

Social Secretary	Canteen Manager	Shop Manager
Trading Secretary	Editor	Librarian

as well as the chairmen &/or secretaries of the individual sections.

I have no information about the officers at Cambridge from 1990–1998.

D.5 Lists of sources of information about Club activities

I am not sure how much information about the activities of the Club is held in the RGO Archives in the Cambridge University Library. I will, however, try to list here the copies of *Castle Review*, Club Information Bulletins, AGM reports and minutes, etc, that I have and that will be deposited in the RGO Archives in due course.

An important source of information for the period before 1961 is the booklet “A short history of the RGO Club” (October 1960) that was issued at the time of the opening of the Clubhouse. The prefatory note indicates that it was “compiled from the Records of the various Clubs” by L. J. Bates, General Secretary, and H. E. West, Editor. It has a photograph of the new Clubhouse on the cover and contains 13 pages of text and 2 pages of lists of officers and winners of competitions.

Initially the main source of information about forthcoming and past activities was *The Castle Review* from 1951, but after a few years its frequency and coverage

decreased. From 1962 until about 1969 the *RGO Club Information Bulletin* largely took the place of the Review, but it did not include articles of general interest. From then on the official information bulletins tended to take the place of the Club IBs and sometimes even included photographs of special events, although the standard of reproduction was poor. Announcements about forthcoming activities was usually made by individual circulars. It is necessary to refer to the annual report by the secretary to obtain an overall view of the activities of the Club.

D.5.1 The Castle Review

Copies of *The Castle Review* were duplicated from typescripts for distribution to members of the RGO Club. The first issue was dated January 1951 and there were ten issues in 1951, but the frequency dropped to quarterly and then to only two issues (or less) from 1960 to Autumn 1965. (I am not sure that I have a complete set.)

A new series was started at Christmas 1981, but as far as I am aware there was no further issue. An issue was planned for 1985, but I do not have a copy..

The editors were: David C Smith, 1951– 1952(5); Arthur S Milsom, 1952(6)–1957; H (Bert) E West, 1958–1963; Roy Wallis & Dilys Holter, 1965; David Calvert & Philip Gibbs, 1981.

The review contains mainly reports on Club activities and current news about members and future events. There are, however, some articles on other topics.

The following list gives the titles of the principal articles and, except for the first issue, it excludes the reports of regular activities, such as table-tennis league matches, and also minor notices and short articles. Some give notes on engagements, marriages, births and deaths. The month of issue is given in parentheses when it is uncertain.

The issues for 51–53(4) and 58–63 were 20.5 x 16.5 cm; while 53(5)–57 were 20.5 x 13 cm; 1965 was 24 x 19 cm & 1981 was 21 x 15 cm.

- I, 1. 1951 January Editorial; Hockey games to date; Dances; Dr. Coleman's lecture; The Club Party; Table tennis; The children's party; Table tennis tournament; The Brewer Cup; The pantomime "Dick Whittington"; Snooker tournament; (Postcards for sale); Leaving members; Thank you..
- I, 2 1951 February Games Field; Bertram Mills' Circus at Olympia; Letter re orchestral concerts in Eastbourne; Bonfire Tableau prize; Dr Coleman's lectures (music); Balance sheets for a Dance & Parties.
- I, 3 1951 March Tennis court; Future trips; Ice hockey at Brighton; Chess matches; Indoor sports trophy
- I, 4 1951 April Royal Observatory Hockey Club: Former days (1); Visit of the Monkey Puzzle Club; Lecture by the Astronomer Royal (at Lewes).;
- 1, 5 1951 May RO Hockey Club (2) by W. Witchell; Stoolball as she is played; Sunday cricket; Article on the Castle (now on sale); Basket ball (at Brighton); Memories of the Computer grade (1), by E. G. Martin.
- I, 6 1951 (July) RO Hockey Club (3); Computer grade (2); Yokels in London (South Bank Exhibition).
- I, 7 1951 (August) 4th Annual Report of RGO Social & Sports Club; RO Hockey Club (4); [Many cricket match reports].
- I, 8 1951 (September) Report on AGM of Club; RO Hockey Club (5).

- I, 9 1951 (November) How to send parcels to America, by J. G. Porter; Halley's transit instrument, by P. S. Laurie; Music diary, by Celia V. Hewerdine; RO Hockey Club (6).
- I, 10 Christmas 1951 (in blue cover) On Christmas past (anon); Herstmonceux ghosts (anon); Star talk – December 1951, by J. G. P.; A short history of the R. G. O. at Abinger, by R. H. Tucker; Our tableau wins again; Yuletide decorations.
- II, 1 1952 (c. February) Club parties; American impressions, by D. H. Sadler; R.O. Edinburgh, by R. H. Tucker; Circus visit; Panto time; Magham Down Dance; Music diary; Some historical items, by E. G. Martin; Table tennis; Spencer Jones Trophy (GET v RT)
- II, 2 1952 (c. May) (separate cover sheet) Star talk, by J. G. Porter; Dunsink Observatory, by R. H. Tucker; American impressions 2 (food), by D. H. Sadler; Visits; Bedtime story of 2152; Hockey; Table tennis.
- II, 3 1952 (c. June) (advertisement at back) SGM for new rules; Music diary (CVH); The first woman computer of the Nautical Almanac (PSL); Visit to RO Belgium, Uccle, 1951 (RHT); Astronomy at Burlington House (AH); Sports.
- II, 4 1952 (c. July) The Gondoliers (D'Oyly Carte at Brighton (DCS) American impressions 3 (misc) (DHS); Flat or round (Earth) (DCS) Mosquitos (DCS); Train travel in India (GAH) Sports
- II, 5 1952 (August) Paper and papers (DCS); Appeal for volunteers for Home Guard at Obs. (GAH) 18th century view of H Castle; Where are we? (Spelling of H'ceux etc); Sec's report to 5th AGM; Hints to travellers abroad; Music diary; Sports.
- II, 6 1952 October Report on 5th AGM; Rome, Sept. 1952 (PAW); Outing to Eastbourne Herald printing works (ASM); Music; Sports.
- II, 7 1952 Christmas (green cover) Lewes on Bonfire Night (PAW) Evening at the opera (Iolanthe) (WJS) First impressions (CGH from USA) Canterbury Tale (ghost story in RO records) (PSL) Tennis tournament final (HGB) Eastbourne return (walk at night) (ASM)
- 3, 1 1953 February (cream cover) Children's Xmas Party & Panto (DWE) Annual Club Party (HGB) Babes in Wood (outing to Brighton) (HPCC) Treasurer's report (GAW) Sports Music Crossword (CGH)
- 3, 2 1953 March (pink cover) Senlac refought (squirrel shooting) (Anon) Abinger Club Growing your own tobacco (1) (ASM) Music Sports Anniversary of RO – GMT by telegraph (PSL) Crossword (CGH)
- 3, 3 1953 Coronation (blue cover) Visit to flour mills (WGG) Musical evenings (ES) Brighton Music Festival (successes) Visit to Wisley (ASM) Youth Hostel trip (ACM) Tobacco (2) (ASM) Sports Music Crossword
- 3, 4 1953 August (orange cover) Trip to Blackboys Youth Hostel (JL) Alfriston YH Re-visited (EJMG & ABG) Farewell party to Herricks & Jeff Tobacco (3) (ASM) Visit by party from McDougalls Mill Report to 6th AGM Sports Music Crossword
- 3,5 1953 November (no cover) Report of 6th AGM Flamsteed's will (PSL) Tobacco (4) (ASM) Sports Music Crossword
- 3, 6 1953 Christmas (red cover) Astronomical alphabet A – F

- Musical observations (CVH) Ancestry of the Castle Review (HGB) Sports
 Crossword (ASM)
- 4, 1 1954 February (orange cover) Children's Xmas Party (JGP)
 Future of the Club (ES) Panto in Brighton Tournaments (DHS)
- Astron alphabet 2 On the way & at home (Mrs Herrick) Sports Crossword
 The Argus & Astro Magazine — Time Dept. c 1900 (HMS)
- 4, 2 1954 May (pink cover) Music diary Caesar at Herstmonceux (PSL)
 Sports Crossword
- 4,3 1954 September (cream cover) Report for 7th AGM Report on 7th AGM
 Behind the Iron Curtain (USSR) (DHS) A trip into Sikkim (NR) Sports
 Sweden and the eclipse (JGP) Crossword
- 5, 1 1955 March (no cover) Approach to realism in sound reproduction (ASM)
 Fireworks at the ROG (bomb in 1894) (PSL) Exeter's underground passages (NR)
 Panto & parties Sports results (inc. Sussex win by GET)
- 5, 2 1955 September (no cover) Funeral of Sir Almanac + note by DHS
 International Geophysical Year by HSJ at Royal Inst. (report by RHT) Sports
 Report to 8th AGM (loose) Looking at people (with illustration) (Anon)
 Sports Crossword
- 6, 1 1956 April (no cover) Desks and tables (TEN) Report for 9th AGM
 An old country church (AN)
- 6, 2 1956 September (no cover) A sideline of the past, (testing binoculars at ROG
 in WW1 (EGM) Rules of the Club (loose) Report on 9th AGM Sports
 Report on Folk Dancing Group (HPCC)
- 1957 February Several humorous articles inc. Rhapsody (poem by WPP)
 Notes on CSSC (=Civil Service Sports Council) Behind scenes of Panto (HEW)
 Folk dancing (HPCC)
- 1957 November/December (no editorial) Notes on future activities (inc.
 dinner-dance at De la Warr Pavilion, Bexhill on 1958 Jan 17) Music diary (CVH)
 Swimming by RGO Ladies in CS events (later issues contain other such reports)
 H'ceux bonfire night (RGO float won) Sports reports. New Pavilion Sports field
- 1958 Early Summer (no cover) Club visit to London planetarium (anon)
 Life in the USA (GAW) Report on activities
- 1958 Late Summer (pink cover) Club visit to Stanmer Park Brighton (HEW)
 Note on Chairman (Norman Rhodes) Holiday in Scotland (poem by Brenda
 Denman) Tenacity (rebuilding a car) (Frank Heaton) Sports
- 1958 Autumn (pale blue cover) Report on Club barbecue Note on
 Secretary (Joe Bates) Note on making home-made wines Music diary
 Result of referendum on Club Room (House) Wedding of Virginia K & Ken Long
 Bonfire float
- 1958 Christmas Poem re Christmas at Observatory. Christmas anecdotes
 Note on Treasurer (Henry Gill) Report on new Club House Sports
- 1959 Spring (pink cover) Note on vice-chairman (George Harding)
 Notes on Club activities
- 1959 Summer (yellow? cover) Note on social secretary (Arthur Milsom)
 Ann Heather as a speed cyclist First cricket match on extended sports field

Progress report on building of Club House

1959 August (pale green cover)	German adventures (folk dancing (ASM))
That driving test (Keith Jarrett)	Laying of foundation stone of Club House
A musical holiday (CVH)	
1959 Christmas (pink cover)	A split second (Ladies swimming team) (SP)
Spanish interlude (Pat Hanning)	“This is the house some Jacks built”
1960 Summer (pink cover)	Progress report on the Club House
Report on Garden Fete on June 18	Report on 13th AGM

1960 Autumn Special publication to mark the opening of the new Club House giving a short history of the sports and social activities of the staff of the RGO. Includes lists of former officers and winners of external competitions.

1960 Christmas (pale green cover)	Appeal for blood donors
Secretary's report	
1961 Spring (pink cover)	Report on annual dinner and dance on March 25
Report on Club Party on January 7	Lessons in ballroom dancing (ES)
Improving your holiday snapshots (Mike Lowne)	Interclub games evenings
1961 Christmas (cream cover)	Secretary's reports
Christmas Party on Dec 16	Barbecue on Oct 14
1962 Christmas (pale green)	Visit to Greece (Elizabeth Portch)
Children's Christmas Party (HEW)	List of marriages etc (new series)
1963 Christmas (orange cover)	Battle victory (of Bonfire float) (HEW)
Report on motoring section	Children's Christmas Party (HEW)
none in 1964	
1965 Autumn	Humorous articles
Isaac Newton Telescope (AH)	Crossword
	Cricket 1965

1981 Christmas (No. 1 new series) Spencer Jones Indoor Sports Trophy
Sports results Echoes from the past (1787) Ballet Guide (Janet Dudley)
Exhibit (Great Galactic Museum of Life) (Richard Swifte)

D.5.2 RGO Club Information Bulletin

A series of *RGO Club Information Bulletins* was started in 1962 (by me when I was Assistant Secretary) to give information about forthcoming events, decisions by the committee and similar short items of current interest.

I have the following copies but it may not be a complete set.

1962	Aug (GAW)	Oct			
1963	Feb	Sep (WN)	Dec		
1964	Feb	July	Nov		
1965	Jan	June (NOH)	July	Nov	Dec
1966	Mar	June	Sep		
1967	Jan	June (MEB)	Oct		
1968	Jan	Apr	May	Aug	Oct

1969 Feb Oct (GAW) Nov (GAW)
 1970 Oct (anon)
 1971 Feb (GAW) July (anon)
 1972 May (anon) Aug (GAW)
 1973 Oct (anon)
 1974
 1975 Feb (GAW)

Editors: WN = Bill Nicholson; NOH = Nathy O'Hora; MEB = Maureen E. Berry

Some of the issues of the RGO Information Bulletin and other official publications contain information about Club activities, but I have not made a systematic search.

D.5.3 Annual reports and minutes

The other main sources of information about Club activities are the annual reports to the AGM and the minutes of the AGM and of the meetings of the General Committee. I hope that there is a complete set in the RGO Archives, but I doubt whether the minutes of the meetings of the section committees have been saved.

Some of the issues of *Castle Review* (see above) contain annual reports to and of the AGMs. for the following years.

1950/51	1951/52	1952/53	1953/54	1954/55
1955/56		1959/60	1961/62	

I have a ring-book containing my personal set of Club papers for the period 1958 to 1972 and an arch-file for the period 1973 to 1989. I have not, however, made a full list or search of them. They contain the following annual reports and minutes of some of the AHMs.

1958/59	1966/67	1967/68	1969/70	
1980/81	1982/83	1983/84	1984/85	1985/86
1986/87	1987/88	1988/89		

There are also papers about the principal changes in the rules in 1959, 1963 and 1974?.

D.5.4 Other sources

Quest was the SRC House Magazine from 1968 to the beginning of 1978. It includes some articles and photographs about Club activities, especially for the SRC Sports Days. Appendix G.12.1 includes a list of both official and Club items.

Quest was followed by the *SRC Bulletin*, but I do not have any copies of this journal at home and I do not recall whether it contained any items about the off-duty activities of staff.

I have photographs, both slides and prints, of Club activities, although they relate only to the activities in which I was personally involved. I hope eventually to digitise a representative selection of them.

I also have a collection of cuttings from (mainly) local newspapers that relate to the RGO and activities of RGO staff. Most of these were given to me by Joan Perry. They are, however, in need of TLC!

D.6 Reviews of individual Club activities INCOMPLETE

I had hoped to include a few paragraphs about each of the activities listed under the headings of the following sub-sections, but I now consider that it would be better to 'publish' what I have at hand in the hope that others may be able to supply the missing reports and details. I have given a few specific references to sources of further information, but otherwise it will be necessary to search the sources listed in D.5 or in the RGO Archives (see H.1.3).

D.6.1 Indoor sports**D.6.1.1 Snooker and Billiards**

1 table in clubroom
1 then 2 tables in Clubhouse
Displays

D.6.1.2 Table-tennis

League teams – 'Stars' and 'Comets'
Eastbourne tournament (e.g. Gordon Taylor)
GET v RT in SJT

D.6.1.3 Badminton

In the Clubhouse (low ceiling)
Friendly matches

D.6.1.4 Darts**D.6.1.5 Spencer Jones Trophy**

Interest fell off and the event was cancelled in 1964, but then revived.
A list of winners is to be added if possible.

D.6.1.6 SRC/SERC Indoor Sports Days.

Locations: Warrington ?? Swindon ??
Badminton
Volley-ball
Table tennis

A list of winners is to be added if possible.

D.6.2 Social activities**D.6.2.1 Bar, kitchen, shop and trading**

Bar
Kitchen (for light refreshments)
Shop (what was sold?)
Trading: discounts obtained from local suppliers to benefit the Club and the members.

Slot machine for a short while?

D.6.2.2 Pantomimes and Children's parties

In the hut by the South Courtyard

Try to list dates, titles and principals

Author was G W Rickett

Repeated in some village halls

In the Castle Ballroom

D.6.2.3 Occasional social events

Announcements and reports on social events will be found scattered throughout the sources of information listed in D.5

Annual Christmas parties

Early dances in village halls

Dinner-Dances at local hotels

Socials and Dances in Clubhouse

Socials and Dances in Castle

Film shows

Travel evenings (slide-talks)

Photographic competitions etc

Projector screen bought from Norman Rhodes Memorial Fund [IB 67/1]

Concerts (usually piano) in the Castle

Fireworks

D.6.2.4 Ballroom dancing

The following note on ballroom dancing was written by Joan E. Perry in 1982 for publication in the *Castle Review*, but as far as I am aware the hoped-for issue did not appear.

21 years of ballroom dancing

“In the autumn of 1960 there was a certain amount of interest among staff to learn the rudiments of ballroom dancing and so, on behalf of the RGO Club, I obtained the astronomer Royal's permission to use the Ballroom [or Long Gallery in the Castle] during the lunch hour. Flora Penfold and Mary Budd agreed to help me and we decided on Wednesdays from 1 – 1.30 p.m. We demonstrated basic steps in the waltz, quickstep and foxtrot and, although attendances varied, I think about forty members of the staff took part in at least some of the lessons.

As the group flourished, we decided to have classes on Friday evenings twice a month (first and third to avoid RAS meetings) with a qualified instructor. Arthur Levett, AISTD, started on 21st April 1961. In the autumn the Ballroom Dancing Section became a recognised section of the Club. We had twenty registered members, and the members were augmented by relatives and friends, several of whom attended regularly and became Associate Members of the Club. Classes normally took place in the Clubhouse, but six informal dances to records were held in the Ballroom during the first

year. The first committee was elected: George Wilkins (Council representative), Joan Perry (Secretary), Eric Smith and Wally Grimwood. In 1964 David Coulthard replaced Eric Smith. After Wally's departure for South Africa in 1967 and David's sudden death in 1971, George and I carried on rather more informally.

Arthur Levett left for New Zealand at the end of 1966 and we later obtained the services of Phyllis Godfrey, FISTD, between May 1968 and June 1971. As she was unable to come regularly, practice classes were held on some evenings and on others from June 1970 to October 1971 John Taplin, MISTD, gave instruction in sequence dances. Since 1974 we have used the Ballroom. [This was mainly to avoid the conflict with the use of the Clubhouse for indoor sports, such as table tennis and badminton, that required a non-slip floor.]

The section meets regularly on alternate Friday evenings and I give instruction and guidance on a wide range of dances. Members pay a small amount on each attendance and the balance is transferred regularly to the main Club account. Party dances are held from time to time and the 21st anniversary of the Section was held on 30 April. We would welcome more members of the staff and their families at our practice classes and general dancing evenings."

The following CR-editor's note is given on the draft: "Joan retired 3 years ago and the Club is grateful to her for continuing to run this section and for all her work over the past 21 years".

I (GAW) believe that dancing section continued until the RGO lost the use of the Castle in 1989. My wife, Betty, and I attended regularly. I usually acted as MC and put on the records or, later, tapes. Arthur Levett, the first instructor, had insisted that husbands and wives, for example, should not learn the dances together and so each person learnt to dance with a variety of partners. This reduced the risk of couples persisting in using wrong steps, but it also meant that there was a very friendly atmosphere and each member usually danced with a variety of partners during the 'party dances'. Joan became a qualified dancing instructor.

D.6.2 5 Folk dancing

The following report on the Folk Dance Section was written by R. H. Tucker, for the AGM on 27 May 1981

25 years of folk dancing

This rather unusual Section of the Club continues the activity started by Sir (then Dr) Richard Woolley soon after he took office as Astronomer Royal in 1956, and the Section has therefore just celebrated its Silver Jubilee. It was probably because of his interest in folk dancing that he decided to remove the partitions that had converted the Long Gallery into a suite of offices, This magnificent room, 100 feet long, then became available for not only folk dancing:, but also conferences and staff meetings. Since that time, the club's Folk Dancers have used the room regularly on Wednesday evenings for English (and Allied) folk dancing, mainly in the Country Dance traditions associated with Cecil Sharp. The leadership of the meetings is undertaken in rotation by three experienced dance-class conductors, and a high standard of performance has been attained in a large number of dances, some of which are fairly difficult and complex.

Visiting dancers are always welcome, and beginners are given the necessary assistance and guidance; but the main emphasis is on dancers who dance regularly

together for the pleasure of doing something reasonably well.

It was natural that this highly social activity should be related to the other social and sports activities at RGO, and so become a part of the Club. The result is that the folk dancers have a “double identity”; we are a Registered Group of the English Folk Dance and Song Society (and the certificate proving this can be seen in the Long Gallery); and we are the Folk Dance Section of the RGO Club.

The enthusiasm of the Astronomer Royal encouraged many members of the staff to take up regular folk dancing, and in the early years there was no shortage of willing RGO staff to assist in the running of the group. We remember, among others, Harry Cook (and his wife Janet), Mike Candy, Don Palmer, Peter Willmoth, Arthur Milsom, Phil Cottrell, and the famous twins, Celia and Anita Hewerdine. Since the Hewerdines left the staff in about 1976, the main burden of organisation has fallen upon myself, but with the splendid support of the non-RGO dancers the folk dancing has continued to thrive. In fact, it regularly provided a small surplus contributed to the Club funds, which, not so long ago, were in serious difficulties, and glad to have this help.

The installation of security barriers in 1976 made life a little difficult, but passes were issued to two of the dance leaders, who waited at the gates to let the other dancers in and out. In 1980, security was tightened, and one dance leader was given a pass, to look after one gate, while I attended at the other with my staff pass. It would, naturally, have been easier for me if one or two colleagues had been able to share the duty with me. But, although there are several keen folk dancers on the staff at present, none of them give allegiance to our own folk dance club,

So far, so good — but now we come to the crunch! I shall retire from RGO in 1982, and unless one or two RGO folk dancers come forward to take over the running of the section, it will have to close. It is well and faithfully supported by its non-staff dancers, who do all the real work, but it is clearly impossible for the group to regain in existence as a Section of the RGO Club unless it has a nucleus of RGO staff members. As a matter of fact, I tried to close it down last year, when security problems became severe, but I was over-ruled by the Director, who told me plainly “You can’t do that!”.

The Director will leave us in October, and so I shall then be free to close the section. In anticipation of a closure at the end of 1981, I propose to remove the name of the Herstmonceux Castle Group from the EFDSS 1982 list of Registered Clubs. If anybody is able and willing to come forward and take over the section, I shall of course be delighted to pass on my responsibilities to them.

Otherwise — we close at the end of the year! Farewell!

PS. The section did continue and was flourishing in 1989. I understand that it was meeting in Bodle Street in 2006.

D.6.2.6 Folk singing

There is a reference to a Folk Singing Section in a circular dated 16 September 1976.

D.6.2.7 Visits to theatres and places of interest

Announcements and reports on visits will be found scattered throughout the sources of information listed in D.5

Musical events

Pantomimes

Local places of technical interest

Events in London e.g.

1970 Tutankhamun

D.6.3 Outdoor sports

D.6.3.1 Cricket.

Evening matches

Sunday matches from 19??

RGO v World in 1971

Teak seat in memory of Ernie Croxton c 1967/68

D.6.3.2 Tennis.

Internal tournaments

Matches with other clubs

Use of court at Cleavers Lyng

Joint social with the Hailsham Lawn Tennis Club on 1975 May 17.

D.6.3.3 Hockey.

Ladies

Mixed

Men

D.6.3.4 Stoolball.

Ladies

Mixed

D.6.3.5 Croquet

In formal garden of Castle

External competitions

D.6.3.6 Swimming

Informal outings to Pevensey Bay

Ladies in Civil Service championships

Pool in Castle garden from 1976 ?

D.6.3.7 Golf

[c. 1987]

D.6.3.8 SRC/SERC Outdoor Sports Days

Locations: Chiswick 1968? to

Birmingham ?

Cricket

Tennis

1968 GAW & RJD won MenD 1969 GAW and DVT won MenD

1971 DEH & GAW won MixD

& others later

6-a-side football

Netball

Bowls 19?? Jack Pike and Jack Johnson ?

A list of winners is to be added if possible.

D.6.4 Other outdoor activities

Announcements and reports on other outdoor activities will be found scattered throughout the sources of information listed in D.5

Building of floats for bonfire processions (mainly in early years)

Youth hostelling

Motoring section

Angling

Gliding

Archery in 1980s

APPENDIX E. BUILDINGS, TELESCOPES AND EQUIPMENT

The aim of this appendix is to collect together the basic information about the various facilities and items of equipment used in the RGO. In particular it will try to give the dates of their development, building and use; brief descriptions if the name is not sufficient, and references to further information, especially to the main account. In some cases, I have given further detail to supplement that in the main account. I had hoped to give estimates of the costs of the new developments, but this does not appear to be possible. I have not found precise dates for some of the changes.

E.1 Herstmonceux Castle and nearby buildings

E.1.1 The Castle

The Castle was built in c. 1440 for Sir Roger de Fiennes. Much of it was demolished in c. 1776. Rebuilding of the south wing started in 1911 for Col. Lowther, who used it until his death in 1929. The rebuilding of the other three sides was completed by Sir Paul Latham during the 1930s.

The Castle was used by Hearts of Oak Friendly Society during the war. Some temporary buildings were erected on the south side of the moat.

The Castle and the estate of 375 acres was bought by the Admiralty in 1946 for £76000. Work on adapting it for use by the RGO began in 1947. The Astronomer Royal and the General Office moved into the Castle in August 1948.

The ownership of the Castle and estate passed from the Ministry of Defence to the Science Research Council in 1965 and later to the Science and Engineering Research Council. It was bought by James Developments in May 1989 and it was sold to the Queen's University, of Ontario, Canada, in early 1993.

The initial uses by the RGO of the principal parts of the Castle are as follows.

The **AR's Residence** was in the north part of the east wing and in the north-east tower. The **AR's Office** was a large room in the south part of the east wing on the ground floor. The **General Office**, including the **Typing Pool**, was in the south-east tower; it subsequently took over the room that Spencer Jones had used for his office.

In 196? Woolley gave up some of the residence for use for offices and other purposes. The light-oak panelled lounge on the first floor was used for committee meetings and the dining room on the ground floor was eventually used for the first **Conservation Laboratory**. In 198? these rooms were converted to provide extra accommodation for visitors.

The deconsecrated **Chapel** in the centre of the east wing was used for lectures. In 1984 it was used for the **Airy Collection of Rare Books**.

The **Staircase Hall** in east part of the south wing was mainly used for presentations to staff and similar occasions, but it was sometimes used for committee meetings.

The **Drummer's Hall**, above the south gatehouse, was used mainly for interview boards for new staff and for some committee meetings.

The **Staff Dining Room** was in the west part of the south wing on the ground floor and the **Kitchen** was in the adjacent south-west tower. At first there was also a

temporary hut in the south-west corner of the courtyard that was used for the serving hatch, but this was removed in 195? and the window was replaced. The canteen manageress had a first-floor flat in the south-west corner. These rooms were used for the second **Conservation Laboratory** from 198?

The **Great Hall** in the west wing was converted for use as the **Library** from 195? by the addition of a balcony for additional book-stacks. The Minstrels Gallery was, at first, used for the librarian's office.

The rooms below the library was used by the **Chronometer Department** as rating rooms. These were later used for **Archives**. The rooms on the north side of the Library landing were used for Chronometer Department's office. These were later used for the librarian's office and for more Archives.

The **Long Gallery** on the first floor of the north wing was divided by wooden partitions for use as offices by the **Astrophysics Department**. The rooms below the Long Gallery were used by the **Meridian Department**. The partitions were removed in 1958? and the Long Gallery became also known as the **Ballroom**. It was used for conferences, etc, as well as for social events. The lower rooms were converted for use for the **Exhibition** in 1976.

The attic rooms above the Long Gallery were used for the **Women's Hostel** until 196?. Other attic rooms, and some first-floor rooms, were used for accommodation for night observers, or for storage, or were left empty. There was a **Dove Cote** in the south-east tower.

E.1.2 Buildings near the Castle

Close to the West Entrance of the Castle was a house that was allocated to the Head Messenger. It was at the corner of a yard with the gardeners' 'shed' on one side and a garage for the AR's cars (official and personal) on the other. [I do not know when these were built, or extended.]

There was also a pair of modern semi-detached bungalows, usually referred to as cottages. One was allocated to the Leading Man of Works and the other to the Head Electrician. These were probably built in 1947/1948 by converting the garages used by guests of Sir Paul Latham..

There was also another house by the West Gate that was allocated to the Head Gardener. The **RGO Clubhouse** was built on the opposite side of the road by the gate in 1959-1960.

The **Nautical Almanac Office** occupied two 'huts' on the east and west sides of the South Courtyard. I suspect that were built specially for this purpose as it was Spencer Jones' intention that the NAO should use the attic rooms in the north wing. I suspect that they were built with breeze blocks. The hut on the west side housed for the punched-card equipment. It also had a store for other equipment. These huts were demolished early in 1958 after the NAO had moved to the West Building.

The large wooden huts on the south side of the road that linked the east and west gates were built for the Hearts of Oak Friendly Society during the ware. They were used for the **Chronometer Workshop** at the west end and there were two rooms for use by the RGO Sports and Social Club. (See appendix D.1.1) The Works Department used the huts for stores, but I believe that most were empty. There was a boiler room for heating in the wooden huts and, presumably, for the NAO huts as there was a

connecting pipe over the road. After demolition the site was used for surplus spoil from the construction of the West Building.

The **Men's Hostel** was on the south side of the wooden huts. (See section 2.1.2.1) This was probably built and demolished at the same time as the NAO huts.

There was a **sewage filter bed** to the south east of the huts. This was renewed to cope with a greater flow in 19??. An **electricity sub-station** was built in the same area in 19??. This was connected to two different supplies to reduce the risk of a complete loss of power.

There were **air-raid shelters** near the south-west corner of the moat. These were dug out and filled in 19??

E.2 Buildings in the West Building area

The term 'West Building' referred originally to the three three-storey blocks for the NAO, Time and Chronometer Departments and, possibly also, to the single-storey buildings for the Engineering Department that were linked to it around the courtyard on the north side. Later, the term tended to be used for the northward extensions and even for the Garage and Works Pound that were further to the north, near the West Gate. There were farm buildings beyond the boundary on the west side, and there was an access road between the farm and the fields on the east side of this area.

E.2.1 The main part of the West Building

Building work started in August 1954. Some time-service equipment was installed in 1957 and the buildings were occupied in October 1957 and onwards. There were two north-south spurs for the NAO and Time Departments and an east-west spur for the Chronometer Department. The NAO and Time spurs were 'staggered' as they were linked by the main entrance, which included a stairwell giving north-south views.

The basement of the NAO spur was above ground and was used for the punched-card system, for some offices and for stores for publications etc. The ICT 1201 computer replaced the punched-card machines in 1959, but in 1966 the ICT 1909 computer took over the whole of north end of the basement, displacing the publication store. This area was later used by the ICL 1903T and the VAX 750 computers. [Check the latter.] The top floor of the NAO spur included the NAO Library as well as the Superintendent's office, with its view over the Pevensy Levels to the English Channel and the South Downs, and the secretariat.

The Time spur had four storeys as there was a sub-basement that was completely below ground. This was used for a set of temperature controlled cubicles for the quartz-crystal oscillators, but these were superseded by caesium atomic frequency standards. This area was then used by the GALAXY measuring machine from 1972. The time-service control panels etc were on the basement level, while the ground floor was used for the Electronics Laboratory as well as for offices for the staff of the Time Department. They had to 'squeeze up' as the astronomers who were displaced from the Long Gallery were allocated to the top floor of the Time spur!

The Chronometer spur included a store for eclipse instruments, but this was used for the Chronometer Department from May 1962. The basement, which was mainly below ground, was used as a store for stocks of RGO publications and later for the Archives. It was converted to offices for the NHO team in 1976. The building had been designed to withstand enemy attack in the event of war and so it was a massive task to

drill through the reinforced concrete walls in order to make it possible to install windows!

The ‘atomic-clock cellar’ was at the south end of the Time spur; it was the full height of the sub-basement and the basement. It remained an empty hole for many years as the proposed atomic-fountain frequency standard was never built. A make-shift staircase was built in 1978? to allow it to be used a temporary store for the publications and archives that were displaced when the basement of the Chronometer spur was converted for use as offices. Later, in 198?, a new staircase and balcony was constructed so that it could be used properly for a much wider range of archives, including the solar-plate collection that covered 100 years of observations.

In about 1958 a wooden hut was built near the Time spur for the equipment for monitoring cosmic ray neutrons. It was, however, removed in 1969? when the programme was stopped. (See section 3.3.3)

A new east-west wing was added to the West Building in 1978. It was linked to the south end of the Time spur. Part of its above-ground basement was used for the VAX 780 computer and the associated image-processing facilities.

E.2.2 The northward extensions of the West Building

The west side of the courtyard on the north side of the Chronometer spur contained a loading bay and the stores for the Engineering Workshop on the north side of the courtyard. There was a bicycle shed on the east side. The buildings were completed before February 1958, but flagstones around the car-park by the Time spur were still being laid then. In 19?? more car-parking spaces were provided in an area below the east wall of the original car-park.

Further north, the east-west single-storey Physics Building was completed in 1969. It was linked to the Engineering Workshop by a new Drawing Office in a similar north-south building. These buildings were separated from the main garage on the south side of the Works Pound by an access road, which was also used by farm vehicles. The buildings of the Works Pound were arranged around a square courtyard, with access by a short road just inside the West Gate. It included a stonemason’s workshop, carpenter’s shop, stores and a canteen for the industrial staff. It was probably completed in 1957, but it may have been earlier. It also included the boiler house for the heating of the West Building.

E.3 Telescopes and their associated buildings

E.3.1 The Solar/SLR Dome

The Solar Dome was situated on the brow of the hill to the south-west of the Castle. It was built by staff from the Chatham Dockyard and was completed in April 1949. (See section 2.3.1). Apart from the dome itself, there was small attached office on the north side and a coelostat leading to a cellar on the south side. The cellar was completed after the dome in ?? 1951.

The dome was used for a refracting telescope (aperture ?? cm), which was donated by ? Newbegin, and to which was attached a **photoheliograph** (aperture c. 23 cm) from Greenwich. The system was mainly used for taking daily photographs of the Sun, but the telescope was sometimes used at night, for example, for timing occultations of stars by the Moon. A Lyot H-alpha filter was fitted to it in 1954 for direct

observations of the activity on the Sun. (See section 2.3.2)

The main mirror of the coelostat had a diameter of ?? cm and it was used with two **spectrohelioscopes**, one from Newbegin and one from Greenwich.

[What were the dates of the telescope, photoheliograph and coelostat?]

Solar observations ceased in 1977. (See section 5.5.5) The dome was later converted for use for **satellite laser ranging**. (See section 5.5.6.3) The original conventional dome (with a slit) was replaced by a eyelid dome in February 1981 and a small radome (for a radar system) was added to the roof of the office, which became the control room for the SLR system. The original dome was given (?) to the Hampshire Astronomical Society.

The SLR telescope was installed in July 1981, but the associated equipment (laser, detector, timer, computer) was not commissioned completely until March 1983. (See section 6.4.3.2)

The SLR system continued in use at Herstmonceux after the move of the RGO to Cambridge. Changes were made to the equipment from time to time and GPS equipment was added. A small building for use for office accommodation was added to the south of the main building in 199?.

The **Meteorological Station** was built on the east hill, just off the road to the Equatorial Group, and was used from 1952 to 1956. (See section 2.3.4) It was later brought into use again by the Meteorological Office in 19??.

E.3.2 The Meridian/Spencer Jones Group

The Meridian Group of astrometric instruments was to the north-north-east of the Castle, beyond the formal gardens. There was view down the valley and across the Pevensey Levels to the church at Pevensey, where an azimuth mark was set up. The Group was renamed the Spencer Jones Group in 195?.

The Pavilion for the **Cooke Reversible Transit Circle** was completed by November 1954 and the instrument was brought from Greenwich in ? 1955. The RTC was being commissioned at Greenwich at the outbreak of war in 1939 and commissioning continued from 1946 onwards at Greenwich. The first observations were made at Herstmonceux in 1956. (See 2.5.1, 2.5.2, 3.3.2.1) There was an azimuth mark with a lamp under a small wooden cover to the south in the field near to the cottages. There was a similar mark to the north. [?] There was an OS triangulation pillar close to the pavilion.

Observations with the RTC ceased in 1982. It was transferred to the Copenhagen University Observatory for use in developing software for La Palma.

There were two buildings for the operation of the **Photographic Zenith Telescope, or Tube, (PZT)**. A small one for the instrument itself and another for the control room. The latter also contained a lounge and kitchen for use by observers using the telescopes in the Group. The buildings were completed by November 1954.

The PZT was designed by Dr. D. S. Perfect, then in the Time Department at Abinger, and it was built by Grubb-Parsons at Newcastle. The first observations were made towards the end of 1955, and regular observations began in ?? 1956. (See 2.5.1, 2.5.2, 3.3.2.1).

Observations with the PZT ceased on 30 June 1984. The instrument is at the Science Museum, but I do not know the whereabouts of the control desk.

The fourth building in a group was for the **Bamberg small-transit instrument** that had been used for time determination at Greenwich, Abinger and then Greenwich. Abinger. The transit was used at Herstmonceux from April to October 1957 only. From 1960 to 1964 this small pavilion was used for a **Danjon prismatic astrolabe**, which also measured time and latitude. Later, it was used from time to time (?) by the Ordnance Survey after the astrolabe had been moved to South Africa for use there for a few years.

I believe that the PZT control building is now used as the estate office, but I do not know about the other buildings.

E.3.3 The Equatorial Group

The Equatorial Group consists of 6 domes, which were referred to by the letters A to F, or by the names of the telescopes in them, and two laboratory blocks, A and B. The buildings and connecting walls are arranged in a rectangle. The north side, from west to east, consists of dome A, lab. A, dome B, lab. B. and dome C, while the south side, from west to east consists of only domes, D, E, and F. There are walkways, with steps in places, around the area between the domes and there is also an ornamental pool between domes B and E. There is a formal pedestrian entrance on the west side, through wrought-iron gates flanked by flint-faced retaining walls. Work on the buildings started in 1953 and was nearly completed by the end of 1956, when the installation of the Greenwich telescopes began. They were all mounted and working by September 1958.

Dome A contains the 30-inch Thompson reflector, which was originally brought into use in 1897. The mirror was refigured in 1960 and a new coude spectrograph, made by RGO, was installed in 1963.

Dome B contains the Yapp 36-inch reflector, first used at Greenwich in 1934.

Dome C was intended for a new Schmidt telescope, but was actually used for smaller telescopes (with varying success) until 1982 when the Hewitt satellite-tracking camera was installed in it.

The small telescopes that were installed in Dome C for short periods included: the Isaac Roberts' 20-inch reflector on loan from the Science Museum; from ??? until July 1961;

a Cooke 6-inch refractor (built in about 1874) in December 1965; and

the Steavenson 30-inch reflector, which was returned from the Cape; it was tested at Herstmonceux before use in Spain.

Dome D contains the 26-inch refractor that was presented by Thompson in 1892. This dome has a 'rising floor' as the telescope was mainly used for short exposures for the determination of stellar parallaxes.

Dome E contains a 13-inch astrographic refractor, which was obtained in 1890 for participation in the Carte du Ciel programme.

The large Dome F was designed for the 28-inch refractor which has a focal length of 28 feet and which was built in 1894. This telescope was returned to Greenwich in 1971. It was later used for the Hargreaves, or Congo, 38-inch reflector, which was built in about 1960. It was designed for use in various modes, but it did not perform well.

Laboratory block A contained the aluminising plant, which was designed to take the 36-inch Yapp mirror. It was first (?) used in 195? for a 1-m mirror for the Vatican Observatory. Both blocks contained optics laboratories.

E.3.4 The Isaac Newton Telescope

Approval for the building of the Isaac Newton Telescope was given in 1946, but the design was not agreed until 1956. Work on the construction of the dome, on a site to the south of the Equatorial Group, began in March 1965 and the dome arches were fitted in February 1966. The exterior of the dome was finished by about June 1966, and the installation of the telescope began in September 1966. The telescope was in working order late in 1967 and was formally inaugurated by the Queen on 1 December 1967.

The telescope was taken out of service in 1979 and the parts were lifted out of the dome in June 1979 for eventual transfer to the island of La Palma.

See section 4.2.2 and other paragraphs in the main text for further details.

E.3.5 The Carlsberg Automatic Meridian Circle

The following note on the programmes of the CAMC was supplied by Leslie V. Morrison, 2005-02-05/ (See also sections 5.5.2.2 and 6.3.2.2)

The CAMC was operated on La Palma jointly with Copenhagen University Observatory and the Real Instituto y Observatorio de la Marina en San Fernando, Spain until the closure of the RGO in October 1998. The good observing conditions on La Palma and the efficiency of the automated telescope enabled the CAMC to make over a million observations in the period May 1984 to May 1998 with a positional accuracy and limiting magnitude unprecedented meridian circles. The telescope was operated remotely via the Internet from April 1997 onwards. The programme of stellar positions included reference stars for the extension of the HIPPARCOS reference frame to magnitudes fainter than $V=11$, and the determination of positions and proper motions for various programmes in galactic kinematics, with particular emphasis on variable stars and high proper motion stars. Positions of the outer planets, their satellite systems and many minor planets were measured, mainly in support of space missions, such as the *Galileo* mission to Jupiter and the *Cassini* mission to Saturn. The collected observations were published in 1999 on a CD-ROM by the three participating institutions.

E.4 Scientific equipment (except telescopes)

E.4.1 Computing and related equipment

E.4.1.1 Pre-electronic period

In 1949 the NAO brought its calculating equipment from Bath. At the time the most common desk machine was the **Brunsviga 20**, so named because the product register held 20 digits. This was a manually operated machine as was the Facit calculator, which was also in use. It had 2 electromechanical calculators, made by the American companies, Marchant and Friden. (See section 2.2.6.1)

The NAO also had two ‘**National machines**’; these were commercial accounting machines made by the National Cash Register Company. One worked in

decimal arithmetic and the other was adapted for sexagesimal arithmetic. These could print the results of building up the successive lines of a table. (See section 2.2.6.3)

The NAO obtained its own set of **punched-card machines** in 1951 on hire from the British Tabulating Machine Company. The system was supplemented by an IBM 602A calculating punch. (See section 2.2.6.4 &.5)

As far as I am aware none of the other departments of the RGO used calculating machines to any significant extent. The NAO did, however, carry out some work for the Meridian Department, and possibly for others, on the punched-card machines.

E.4.1.2 Main-frame and mini computers

An **ICT 1201 electronic computer** was installed in the NAO in 1959 for general use. (See section 3.3.1.2) It was taken out of service in September 1965 and was replaced by an **ICT 1909 computer** in May 1966. (See section 4.2.1) (In the meantime, use was made of IBM 7090 series computers in London.) It had four 7-track magnetic-tape drives.

A **GEC 2050 computer** was installed in June 1973 for use in a link to the ICL 1906A computer at the Atlas Computer Laboratory (Chilton). It continued in use until June 1983. (See section 5.5.3.1)

The 1909 was enhanced in several ways, including the addition of two 9-track tape drives and exchangeable-disc storage units. The central processor was replaced by an **ICT 1903T** unit in January 1974. (See section 5.5.3.1) It was taken out of service in March 1983.

A **VAX 11/780** was installed in March 1980 for image processing as part of the STARLINK network. A **VAX 11/750** was installed for general purpose computing was installed in March 1982. (See section 7.3.2.3)

A Calcomp 1039 drum plotter was shared between the ICT and VAX computers.

Mini-computers included:

An Interdata 7/16 was installed in 197? for use with instruments on the Yapp telescope; replaced in 1980 by an Interdata 7/32. Another was obtained for the INT.

A PDP 11/34 was installed in 1979 for use with the PDS microdensitometer.

A Nova was used with GALAXY (see below).

E.4.1.3 Programmable calculators and personal computers

I do not know how early in the 1970s hand-held programmable calculators became available and were first used in the RGO, but the NAO first published data for them in 1981.

Programmable desk calculators also became available in the 1970s. A PET was used in the Time department in 1979 [236] and a PET may have been tried in the NAO. Other types may have been used by Dickens and others in the research teams. (See section 5.5.3.2)

IBM Personal Computers (or compatibles) were first obtained in 198?. (See section 6.3.2.3)

E.4.1.4 Auxiliary equipment for printing

An IBM card-controlled typewriter was installed in March 1953 to produce high-quality copy for printing the Nautical Almanac and other publications. (See section 2.2.6.6) It was replaced in 1963 by a new system that was based on the IBM 870 Document Writing System. (See section 3.3.1.2)

The typists used Varitypers for the production of high-quality copy for scientific papers. (See section 2.6.4)

[Did the typing pool change to Flexowriters or other systems?]

The card-controlled typewriter was replaced in 1971 by a more flexible UDS 6000 Automatic Writing System, which used paper tape rather than punched cards for input. (See section 4.3.4.2)

Two Data Logic word processors were installed in February 1980. (See section 5.5.3.3)

Diamond word processors were introduced in 198?. (See section 6.3.2.3)

The special-purpose word processors were eventually replaced by IBM-compatible personal computers.

E.4.2 Measuring machines

It is probable that many items are missing from the following list as I did not attempt to note their acquisition and use when drafting the main account. The earliest measuring machines were used manually, but they were replaced by electronic systems. At present, I am not aware of any book or paper that reviews such essential equipment.

[Note: a microdensitometer measures the variations in density over an exposed photographic plate (e.g. of a spectrum), whereas a microphotometer is a microdensitometer that has been calibrated to give measurements of the initial intensity of the light that fell on the plate.]

The D-Mac digitising machine was not strictly a measuring machine as it was designed for the digitisation of graphical material for input to a computer. It was also used for the pre-processing of plates for GALAXY.

GALAXY = General Automatic Luminosity and XY. This large system was developed at the ROE and the second model was obtained by RGO in 1972. It was housed in the sub-basement of the Time spur of the West Building. It ceased operation in 198?. (See section 5.5.2.3 and AR 75) [Where did it go?]

PDS microdensitometer (linked to a PDP 11/34 computer). (See AR 75).

Zeiss Ascorecord measuring machine with automatic digital readout, for astrometry. (See section 3.3.2.1).

Coradograph, linked to GALAXY via Nova computer

E.4.3 Instruments for telescopes

See remark for E.4.2

The following items were designed and built by RGO:

An image-tube spectrograph in 1970 for the Radcliffe Observatory.

An image-tube spectrograph in 197? for use on INT (?) and 36-inch.

An electronographic camera – first test September 1974.

A spectrograph for the Anglo-Australian Telescope (AAT).

A CID = charge-injection device camera – first test April 1980.

A CCD = charge-coupled device detector – first test ???.

Prime focus camera for WHT on La Palma; in 198?.

CCD detectors for WHT; in 198?

Faint-object spectrograph (FOS) for WHT; in 198?

E.4.4 Workshop facilities

The Engineering Workshop was moved from Greenwich to Herstmonceux early in 1958. It built up a comprehensive range of machines and tools for construction of instruments of high precision. I do not know whether any of them were unusual, but it did have a telescope simulator that would not have been found elsewhere! This was built in 198? so that it was possible to test large and heavy instruments in situations that were similar to those on telescopes in use.

The Electronics Department transferred from Abinger in 1957. The new workshop was in the Time spur since at first it was primarily concerned with the maintenance and development of the equipment for the Greenwich Time Service. The Physics Building, which came into use in November 1969, also had facilities for the construction and maintenance of sophisticated electronic devices.

E.5 The gardens and grounds

In addition to the buildings described above the Herstmonceux estate contained the following non-technical facilities that were enjoyed by the staff:

formal gardens, parkland, and woodlands (see section 2.7.4.2);

a hard tennis court at the end of the formal garden;

a swimming pool (after 1975 – see end of section 5.3) ;

and a sports-field (see above and appendix D.2).

The gardens and grounds were open to the public at certain times. A very large number of trees were planted in the early years. The rest of the estate was rented out for farming.

I have a several hundred slides of the gardens and grounds, as well as a smaller number of the buildings. Almost all have titles and dates and so I hope that they will be included in the RGO archives.

APPENDIX F. PUBLICATIONS BY THE RGO

F.1 Series of publications by the RGO (except NAO)

The results of the major observational programmes of the Observatory were published in the annual volumes of *Observations made at the Royal Observatory Greenwich*, which were usually referred to by the short title of *Greenwich Observations*, for the years from 1836 to the year 1946. This last volume was published in 1955; it includes a separate complete list of appendices and reports on special investigations that were included in the annual volumes.

Three new series of publications were introduced in about 1958:

Royal Observatory Annals, which contained mainly extensive tabulations of observational or computed data.

Royal Observatory Bulletins, which contained mainly observational and theoretical papers by individual astronomers that would previously have been published in the *Monthly Notices of the Royal Astronomical Society* or in other refereed journals. Some of the issues were special publications; for example, no. 82 contained the proceedings of the Tercentenary Symposium on “The Galaxy and the Local Group”.

Royal Observatory Circulars, which were intended for the quick publication of current data, such as those for the Greenwich Time Service.

Initially these series used the full name of the Observatory, but ‘Greenwich’ was dropped when these series were also used for the reports of the work at the Royal Observatory at the Cape of Good Hope.

From 1836 until 1964 the work of the Observatory was described in narrative form in *Report of the Astronomer Royal to the Board of Visitors*. These reports were reprinted separately and were widely distributed. They contained details of work on the buildings, changes in the instruments and list of staff, as well as the reports on the astronomical and geophysical work. Summaries were given in *Nature* during the nineteenth century at least.

From 1974 to 1980-09 *Royal Greenwich Observatory Reports* were published annually in separate booklets with illustrated covers; these were similar in detail to the earlier AR’s reports. A single volume called *Royal Greenwich Observatory: telescopes, instruments, research and services* was issued for the period 1980-10 to 1985-09 and another volume was issued for the period 1985-10 to 1987-09. I am not aware of any later reports of this type. Brief notes on the contents of these reports are given in section F.5.

Reports on the work of the Observatory for the years 1961 to 1982 were published in the *Quarterly Journal of the Royal Astronomical Society*, but these were mainly restricted to summarising the scientific work in progress. Comprehensive reports on the work and staff of the Observatory were not published for the period 1965 to 1973 or from 1987-10 onwards. The annual reports that were submitted to the Science Research Council should be available in the RGO Archives in the Cambridge University Library.

F.2 Other publications by the RGO (except NAO)

Gemini. From 1982-05 to 1993-12 the RGO produced and distributed a

quarterly newsletter that was given the name *Gemini* to indicate that it applied to both Herstmonceux and La Palma. At first it was produced by photolithography from typescripts, but later issues were (presumably) produced from computer printouts with a wider range of typefaces and type-sizes. There was a special un-numbered issue for the Royal Inauguration on La Palma in June 1985; this issue has some coloured illustrations. The title page of issue no. 28 for June 1990 has a coloured photograph of the new building at Cambridge.

spectrum. This replaced *Gemini* in 1994-01 because a new telescope project for the N & S hemispheres was started. The contents of the last issue for 1998-10 are given in section F.6.

SLR Technical Notes. From 1982 onwards *SLR Technical Notes* were issued irregularly (without charge) to disseminate information concerning the satellite laser ranging system that replaced the photographic zenith telescope for the determination of the variations of the rotation of the Earth.

Forward look. The A4 booklet *The Royal Greenwich Observatory to 1990* was published in 1983. It gives an overview of the RGO with special emphasis on the future changes due to the coming use of the telescopes and new instruments on La Palma.

Historical workpacks. In 1987 onwards the Laurie Project Team (see section 6.3.5.3) produced a series of workpacks that each consisted of about 40 photocopied A4 sheets in a glossy white folder with an RGO heading. I have three packs, but there may have been more. They are illustrated by line drawings. Unfortunately there is no information about the members of the team who produced the first two workpacks, but the final page of the third one has a brief note about the team and the names of the contributors.

WP1. The history of Herstmonceux Castle. 36 pages.

WP2. Voyages of discovery. 50 pages.

WP3? The history of the Royal Observatory and Royal Greenwich Observatory. 40 pages.

F.3 Publications by H.M. Nautical Almanac Office

The following almanacs were produced by the NAO after it became part of the Royal Observatory in 1937.

The Nautical Almanac and Astronomical Ephemeris, up to 1959

Apparent Places of Fundamental Stars, 1941 to 1959

**The Astronomical Ephemeris*, 1960 to 1980

**The Astronomical Almanac*, 1981 to present

**Astronomical Phenomena*, 1960 to present

The Abridged Nautical Almanac, up to 1957

**The Nautical Almanac*, 1958 to present

The Air Almanac, 1937 to 1951

**The Air Almanac*, 1952 to 1997

The UK Air Almanac, 1998 to present

The Star Almanac, 1951 to present

These almanacs were published by Her Majesty's Stationery Office (known as The Stationery Office from 1997). Those marked with an asterisk were prepared in

cooperation with the Nautical Almanac Office of the U.S. Naval Observatory and were published jointly with the US Government Printing Office.

The following special publications were prepared by the NAO before the RGO moved to Cambridge in 1990. They were published by Her Majesty's Stationery Office unless otherwise indicated.

1939. *Seven-figure trigonometrical tables for every second of time*. (reprinted 1961)
1947. *Five-figure tables of natural trigonometrical functions (for every 10")*. (reprinted 1956 and 1960)
1952. Reduced observations of lunar occultations for the years 1943-1947. Appendix to *Greenwich Observations for 1939*.
1954. *Improved lunar ephemeris, 1952-1959*. A Joint Supplement to *The American Ephemeris* and *The (British) Nautical Almanac*. (xiv + 422 pages) Published by the US Government Printing Office.
1956. *Interpolation and Allied Tables* (pp. 80). (reprinted several times)
1958. *Subtabulation. A companion booklet to Interpolation and Allied Tables* (pp. 54).
1958. *Planetary Coordinates for the years 1960-1980* (pp. xix + 160).
1961. *Explanatory Supplement to the Astronomical Ephemeris* (pp. xi + 505).
1961. Nutation, 1900-1959. *Royal Observatory Annals*, No.1 (pp. vii + 41).
1968. *Man is not lost: a record of two hundred years of astronomical navigation with the Nautical Almanac 1767-1967*. (pp.44)
1979. *Planetary and Lunar Coordinates for the years 1980-1984* (pp. xiv + 84).
1983. *Planetary and Lunar Coordinates for the years 1984-2000* (pp. xiv + 321).
1985. *Compact Data for Navigation and Astronomy for the years 1986-1990* (pp. xvii + 70).

In addition the NAO produced a series of tables for astronomical navigation in cooperation with the USNAO and the US Hydrographic Office.

- 1951 onwards. *Tables of computed altitude and azimuth*, in six volumes.
- 1953 onwards. *Sight reduction tables for air navigation*, in three volumes.
- 1971 onwards. *Sight reduction tables for marine navigation*, in 6 volumes.

From 1966 ? onwards *NAO Technical Notes* were issued irregularly (without charge) to disseminate information concerning methods of computation, astronomical ephemerides and navigation. (A partial list is given in the 1992 revised edition of the *Explanatory Supplement*. RGO archives class 32 contains only a few issues.)

The NAO also distributed a numbered series of reprints of scientific and technical papers that were published in journals. (RGO archives class 34 contains a set of the reprints up to number 356.)

Post-1990 publications included:

1996. *A Guide to the 1999 Total Eclipse of the Sun*.
1997. *The RGO Guide to the 1999 Total Eclipse of the Sun*. (pp. 28)
2000. *NavPac and Compact Data 2001-2005*. (pp. 132 and a CD-ROM)

F.4 Internal ‘publications’ at Herstmonceux

Information Bulletin

A valuable source of information about the activities and staff is provided by the *Information Bulletins* that were circulated within the Observatory. The first is dated 26 February 1952 and gives only brief reports from the groups that observed the total eclipse of the Sun. The coverage soon became much wider and they were usually issued at intervals of one or two months. They were produced by duplicating typescripts. My set is not quite complete as I ‘inherited’ the early issues from Dr. J G Porter. My set ends with no. 271, dated 1 April 1982. A4 replaced foolscap with the issue for 14 October 1969.

The new series of *Gemini* was started but these did not include the items of local interest about staff changes etc. Consequently, the IBs were followed by *RGO Information Circulars* from May 1982 to October 1985, and then by a new series of IBs until March 1988. In turn, these were followed by a series of sheets of the *Reporter* containing a series of individually numbered items. My set ends with item 89/135 that was issued on 13 July 1989

Notes for new entrants

I have a copy of the spiral-bound* A4 booklet *Notes for new entrants* that was issued in 1974. I do not know if this was the first such document. It is another valuable source of information about the conditions of service of non-industrial staff. (I do not know whether a similar booklet was issued to industrial staff.) It includes background information such as a list of the abbreviations in common use.

* this may not be the correct term for the use of a plastic ‘comb’.

F.5 Notes on RGO Annual Reports 1974 to 1987

The RGO produced Annual Reports for the years 1974-1980 that were printed with coloured, illustrated covers. They are straight text, but with some photographs (indicated by P-) and diagrams on the front and end pages.

The reports for 1981-1995 and 1985-1987 were in two A4 volumes in a new style (“sexy” according to Boksenberg).

As far as I am aware there are no published printed reports for later years, but information is given in the house magazine, whose name was changed from *Gemini* to *spectrum*.

The following lists of the contents of the annual reports include mainly those items that are likely to be relevant to this personal account of the history of the RGO. They might be expanded in due course for general use.

1974

FC	INT dome
10	New control room for INT
25	50th anniversary of BBC 6 pips
27	LLR proposal
29	1909 replaced by 1903T
30	Revision of UDC 52
EP	P- electronographic image tube

1975 January – September

- FC Tercentenary plate
- 7 Decision to move INT assumed, not reported
- 32 Timation 3
- 36 RGO Archives
- 38-42 Tercentenary
- EP P- Anne & AH (+GAW)

1975 October – 1976 September

- FC Electronograph of a Seyfert galaxy
- FP P- FGS and AH
- 7 NHO approved
- 33 Work stopped on Danjon astrolabe
- 38 Archives moved to Castle
- EP Time distribution by satellite (diagrams)

1976/77

- FC Orion nebula
- 27 Photoheliographic observations stopped
- 33 Exhibition opened
- 35 Libraries and Archives made part of Almanacs and Time Division
- EP Ps- Exhibition
New prime-focus assembly for INT

1977/78

- FC M82
- 25 Remnant of solar activity service included in NAO
- 26 SLR proposal approved
- 50 J Dudley now Head of L&A
- EP P- new mirror for INT

1978/79 (edited by Wilkins and Yallop)

- FC Velocity map of Crab nebula
- 9 INT closed down
- 13 Preparation of proposal for STARLINK network
- 25 Proposal for Project MERIT
- 27 Solar activity service stopped
- EP P- Telescope simulator
Butterfly diagram

1979 October – 1980 September

- FC 4.2 metre mirror
- 6 New wing to West Building completed
- 11 VAX 11/780 computer installed

36 A R Bish appointed as Senior Conservation Officer

1980 October – 1985 September

2-6 Introduction

4 Diary of principal events giving month

6-7 Inauguration ceremony on La Palma 1985-06-29

8-45 Research (mainly astrophysics)

38-39 Motions of natural satellites

40-41 Inertial frames

42-43 Astrometric and space geodesy, inc. PZT, occ'ns, SLR, MERIT, 1884

44-45 Rotation of the Earth

46-89 Telescopes, instruments and facilities

72-73 Smaller telescopes: EQ group , inc Hewitt satellite camera

74-75 SLR

88-89 Computing at RGO

90-105 Services

90-91 Greenwich Time Service

92-93 NAO

94-95 Library and archives

104 Public information

105 Conferences and Workshops in Castle

106-128 Background information

106-107 Times of transition in RGO History (by J Dudley)

107 Students and the public

108-109 25th anniversary of the Clubhouse

110-111 RGO manpower and budget

112-113 Internal organisation 1985, with staff list

115-117 Publications: NAO (inc. TNs), RGO Bulletins etc, LP notes etc

118-128 Published papers (in alphabetical order of first-named RGO author)

1985 October – 1987 September

RGO: Telescopes, instruments, research and services

4-21 La Palma etc

22 Schools and the RGO (Margaret Penston)

23-25 SLR

28-29 Staff list on 1987-09-30

30-31 Publications: almanacs, TNs etc

31-36 Published papers (in alphabetical order of first-named RGO author)

F.6 Contents list of the last issue of *spectrum* in 1998

The house journal *spectrum* replaced *Gemini* from 1994-01 to 1998-10, when the RGO was closed at Cambridge. The final issue (16, October 1998) contains many review articles about the work of the RGO at Cambridge. These are listed below.

(Earlier issues not available to me at present.)

Note that the authors are not listed on the contents page, but have been taken from the text. The first number on the title line (in bold) is the page number.

- 5. The RGO 1978-98; A Personal View.** Jasper Wall, Director of RGO, 1995–1998
From rocky summit in 1975 to leading international observatory in 1998, the creation of the observatory on La Palma will live as a major achievement of the RGO.
- 8. Gemini – RGO’s Contribution.** Neil Parker, RGO. Eventually, the MOU [memorandum of understanding] and work package agreements were signed and the contracts that were under negotiation were converted into work packages.
- 13. Report of the ING Visiting Panel, April 1998** [ING = Isaac Newton Group] Rene Rutten, ING. Summary, principal conclusions and recommendations of the report.
- 15. Prime Time Telescope Stories.** Sue Worswick, RGO. Good image quality was required for direct imaging, while the use of fibres to feed a spectrograph also needed a large field and a means to correct atmospheric dispersion.
- 17. RGO CCDs – Review, Highlights and Update.** Paul Jorden, Paddy Oates, Percy Terry, RGO. Clearly the 2k x 4k chip is going to be the ‘industry standard’ for some time to come — at least for major observatories.
- 17. The Evolution of Computers at the RGO.** Ralph Martin, RGO. In less than a single generation, our computer systems have changed from isolated islands to interconnected meshes with 10 000 fold increase in network capacity.
- 20. The INT Wide Field Camera.** Derek Ives, ATC (formerly RGO). These new devices give the camera increased sky coverage, better resolution with faster readout rates and lower readout noise with the added benefits of using commercial devices.
- 22. Fun and Games with WYFFOS/AUTOFIB-2.** Terry Bridges, IoA (formerly RGO). It is certainly extremely gratifying to see about 100 simultaneous spectra, and to get literally thousands of spectra during an observing run.
- 26. Extending the Wavebands at ING.** Shaun Hughes, IoA (formerly RGO). Since its commissioning, WHIRCAM has been used to observe such diverse objects as Neptune’s rings, accretion discs, young stellar objects, brown dwarfs, cataclysmic variables, cepheids, Miras, galaxy bulges and haloes.
- 27. RGO, AAO, and the City of London.** Paul Jorden, RGO. The AAO and the RGO have a long tradition of co-operation, particularly with software systems for astronomical data acquisition.
- 30. The ING Archive and RGO Data Centre.** Jim Lewis and Ed Zuiderwijk, RGO.
- 31. Astronomy Research at the RGO.** Max Pettini, RGO. In the period 1993-95 papers written by astronomers at the two Royal Observatories attracted more citations per paper than any other astronomical institution in the world.
- 34. A Staff Photograph 1996.**
- 36. The Herstmonceux Conference Series.** Margaret Penston, RGO.
- 38. RGO Preprints.** Julie Loaker, RGO.

- 40. Holding the PATT baby.** Bill Martin, RGO. By about version 5, the schedules are ready for their first release.
- 41. Towards a 3D Stellar Reference Frame.** F. van Leeuwen, RGO. Measuring a stellar distance through measuring its parallax is doing trigonometry on a grand scale.
- 42. The UK Satellite Laser Ranging Facility.** Graham Appleby, RGO. Successful tracking of Lageos meant that the new UK SLR system had arrived on the international scene.
- 48. Eclipses and the Rotation of the Earth.** L. V. Morrison, RGO, and F. R. Stephenson, Durham University. Eclipses can be a tool for measuring the length of the day.
- 52. The NAO – Past and Present.** Catherine Hohenlerk, RGO. Since we have been in Cambridge we have managed to increase our income to over £220,000 per year.
- 54. New Generation Robotic Telescopes.** Anon.
- 55. All Astronomers Royal; the legacy of Airy.** Adam Perkins, RGO. “Sir George Airy single-handedly under-took duties fulfilling which today collectively occupies the resources of several entire research councils.” Sir William McCrea, 1990.
- 58. Historical Artefacts at the RGO.** Robin Catchpole, RGO. All the chronometers and clocks have detailed histories and several of the chronometers date back to the series of sea trials held in 1796 and 1797 aboard the Sans Pareil.
- 59. Public Understanding of Science.** Margaret Penston, RGO. One never knows what to expect when the phone rings or on opening a letter.
- 61. The Interview.** Margaret Carter, ex-RGO, and Robin Catchpole, RGO.
- 61. Spelling Existence.** A poem by Anne Reynolds, RGO.
- 62. The Equatorial Group, Herstmonceux, 1958-63.** Derek Jones, IoA, formerly RGO. Another afternoon I showed Mars to the famous Radio Astronomer, Sir Martin Ryle, who confessed that it was the first time he had looked through an optical telescope.
- 64. Views of Gemini.** Two photographs.
- 65. Bread and Cheese Lunch.** Andrew Johnson, RGO.
- 65. First Sighting.** An appreciative letter.
- 66. Friday the 13th.** Bernard Yallop, RGO (retired).
- 67. Cambridge Young Astronomers at the RGO.** Peter Ingram, Cambridge Young Astronomers. We estimate that over the years we have provided an insight to the workings of the universe to about 500 or so children.

APPENDIX G. REFERENCES ABOUT THE RGO

Note: The following lists are intended to give only a selection of the many post-1948 books and papers about the activities and staff of the Royal Greenwich Observatory.,

G.1 General history of the Observatory

(including the Nautical Almanac Office, but excluding those concerned only with the NAO)

(excluding those relating primarily to the RGO at Herstmonceux Castle and Cambridge)

G.1.1 Books

Arthur Beer & Peter Beer, Eds, 1976. *The origins, achievement and influence of the Royal Observatory, Greenwich: 1675–1975*. Proceedings of the Symposium held at the National Maritime Museum, Greenwich, 13–18 July 1975. Pergamon Press. (*Vistas in Astronomy*, vol. 20)

Eric Forbes, 1975. *Greenwich Observatory, volume 1: Its origins and early development*. London: Taylor and Francis.

Derek Howse, 1975. *Greenwich Observatory, volume 3: Its buildings and instruments*. London: Taylor and Francis.

Sir Harold Spencer Jones, 1943, rev. 1946. *The Royal Observatory, Greenwich*. London: Longmans Green. (The 1943 edition was published for the British Council as part of a series of pamphlets on Science in Britain.)

W. H. McCrea, 1975. *The Royal Greenwich Observatory*. London: H.M. Stationery Office.

A. J. Meadows, 1975. *Greenwich Observatory, volume 2: Its recent history, 1836-1975*. London: Taylor and Francis.

G.1.2 Papers

Derek Howse, 1993. Obituary of F. G. Carr. *Quarterly Journal of the Royal Astronomical Society* **34**, 571-572, contains notes on his campaign with Spencer Jones to ensure that the Old RO buildings were added to the National Maritime Museum and on his idea of saving the South Building by converting the Thompson Dome into a planetarium.

H. S. Jones, 1949. The Royal Greenwich Observatory. *Proc. Roy. Soc. A* **198**, 141-169 with 4 plates. (Lecture on 27 Jan. 1949.)

P. S. Laurie, 1967 & 1968. The Board of Visitors of the Royal Observatory, 1710-1830 & 1830-1965. *Quarterly Journal of the Royal Astronomical Society* **7**, 169-185 & **8**, 334-353.

P. S. Laurie, 1960. The buildings and old instruments of the Royal Observatory, Greenwich. *Observatory* **80**, 13-22.

Chas Parker, 1999. History of the Royal Greenwich Observatory. In 6 parts in *Modern Astronomer*.

F. G. Smith, et al., 1975. Seven articles under the heading 'Three Hundred Years at Greenwich'. *Nature* **255**, 581-606.

G.1.3 Minor items and unpublished notes

- R. d'E. Atkinson, 1956. The astronomical clock in York Minster. *Observatory*, **76**, 79- . Author & title to be checked. See also a booklet for visitors to York Minster.
- A. Hunter, E.G. Martin & P.S. Laurie, c. 1953 or 4. re testing of objective for Flamsteed's well telescope. *Observatory*. Full reference to be found.
- E. G. Martin, 1960. Letter re editors of *The Observatory* and the contributions of the RGO. *Observatory* **80**, 238.
- Lesley Murdin, 1982. The Flamsteed papers. *Gemini* 4, 5.
- Adam J. Perkins, 1992, edited 2000 by GAW. The history of the Royal Greenwich Observatory. 19 pages. [With some references not yet given above]
- Adam Perkins, 1996. Eye and Ear. (Kinnebrook and personal equation.) *Open Space* 8.

G.2 The Astronomers Royal and Superintendents of NAO**G.2.1 Books**

- John L. Birks, 1999. *John Flamsteed: the first Astronomer Royal at Greenwich*. London: Avon Books.
- Peter Lancaster Brown, 1985. *Halley and his comet*. Poole, Dorset: Blandford Press.
- Alan Cook, 1998. *Edmond Halley: Charting the heavens and the seas*. Oxford University Press.
- Derek Howse, 1989. *Nevil Maskelyne: the seaman's astronomer*. Cambridge University Press.
- Lesley Murdin, 1985. *Under Newton's shadow: astronomical practices in the seventeenth century*. Bristol: Adam Hilger Ltd. [Includes material on Flamsteed and Halley, amongst others.]
- C. A. Ronan, 1967. *Their Majesties' Astronomers*. London: Bodley Head.
- C. A. Ronan, 1970. *Edmond Halley*. London: Macdonald.
- Margaret Wilson, 1951. *Ninth Astronomer Royal: the life of Sir Frank Dyson*. Cambridge: W. Heffer & Sons Ltd.

G.2.2 Papers

- Allan Chapman, 2005, The celestial geometry of John Flamsteed: mapping the heavens from seventeenth-century Greenwich. *Bull. Brit. Soc. Hist. Maths.*, no 5, 1-8.
- Allan Chapman, 2005, The observers observed: Charles Dickens at the Royal Observatory, Greenwich, in 1850. *Antiquarian Astronomer*, 2, 9-20.
- Cunningham, C. J., 2004. Discovery of the missing correspondence between Carl Friedrich Gauss and the Rev. Nevil Maskelyne (1802-5), *Annals of Science*, **61**, 469-481.
- Sir William McCrea, 1988. Richard van der Riet Woolley 1906–1986. *Biographical Memoirs of Fellows of the Royal Society*, **34**, 923-982.
- D. H. Sadler, 1963. Obituary: Harold Spencer Jones. *QJRAS* **4**, 113-125.
- D. H. Sadler, 1961. Obituary: Sir Harold Spencer Jones. *ICSU Review* **3**, 49-51.
- G. Satterthwaite, 2001. The life and times of George Biddell Airy: a symposium. *J. Astron. History Heritage* **4**, 99-100.

G. Satterthwaite, 2001. Airy and positional astronomy. *J. Astron. History Heritage* **4**, 101-113.

G. Satterthwaite, 2001. Airy's transit circle. *J. Astron. History Heritage* **4**, 115-141.

Richard M. Sillitto, 1957. Maskelyne on Schiehallion or one man's geophysical year. See <http://www.sillittopages.co.uk/schie/schie57.html>

A. Perkins, 2001. 'Extraneous government business': the Astronomer Royal as government scientist: George Airy and his work on the commissions of state and other bodies. *J. Astron. History . Heritage* **4**, 143-154.

F. Ward, 2001. The Airys at Greenwich. *J. Astron. History Heritage* **4**, 155-161.

G.2.3 Articles in biographical dictionaries

In the 2004 edition of the *Oxford Dictionary of National Biography*:

Flamsteed, John (1614-1719). 19, 984-991. by Frances Willmoth.

Halley, Edmond (1656-1742). 24, 689-694. by Alan Cook. (Only one paragraph about period as AR.)

Bradley, James (c1692-1762). 7, 213-219. by Mari E. W. Williams.

Bliss, Nathaniel (1700-1764). 6, 225-226. by Anita McConnell.

Maskelyne, Nevil (1732-1811). 37, 155-158. by Derek Howse.

Pond, John (c1767-1836). 44, 795-796. by C. Andrew Murray.

Young, Thomas (1773-1829). 60, 945-949. by Geoffrey Cantor. (Only one paragraph relates to his period as Superintendent of the NAO.)

Stratford, William Samuel. (c1790-1853). 53, 32-33. by J. K. Laughton.

Airy, Sir George Biddell (1801-1892). 1, 521-524. by Allan Chapman.

Hind, John Russell (1823-1895). 27, 268-269. by Robert Hutchins.

Christie, Sir William Henry Mahoney (1845-1822). by A. J. Meadows.

Downing, Arthur Matthew Weld Downing (1850-1917). 16, 805-806. by G. A. Wilkins.

Dyson, Sir Frank Watson (1868-1939). 17, 510-511. by A. J. Meadows.

Cowell, Philip Herbert (1870-1949). 13, 777-778. by G. A. Wilkins.

Jackson, John (1887-1958). 29, 502-503. by G. A. Wilkins.

Jones, Sir Harold Spencer (1890-1960). 30, 506-508. by D. H. Sadler.

Comrie, Leslie John. (1893-1950). 12, 901. by D. H. Sadler, rev. J. Bosnell.

Woolley, Sir Richard van der Riet (1906-1986). 60, 277-278. by William McCrea and Donald Lynden-Bell.

Sadler, Donald Harry (1908-1987). 48, 557-558. by G. A. Wilkins

In 2004 edition of B. Lightman (ed.), *Dictionary of Nineteenth-Century British Scientists*. Thoemmes Continuum, London. ISBN 1 85506 999 7.

Downing, Arthur Matthew Weld (1850-1917). **1**, 610-611, by G. A. Wilkins.

There are probably others relating to the ROG.

In 1994 edition of *The Hutchinson Dictionary of Scientific Biography*.

Airy, 6-7; Bradley, 92; Dyson, 197; Eggen, 204; Flamsteed, 238-239;
Halley, 302-303; Jones, 372; Maskelyne, 464-465; Pond, 559-560;
Woolley, 734-735.

G.3 Longitude and time

(including H.M. Nautical Almanac Office, the Greenwich Time Service and related matters)

G.3.1 Books

Ian R. Bartky, 2007. *One time fits all: the campaign for global uniformity*. Stanford, California, Stanford University Press.

Derek Howse, 1980. *Greenwich time and the discovery of the longitude*. Oxford University Press.

Derek Howse, 1997. *Greenwich time and the longitude*. London: Philip Wilson. [Revised version of Howse 1980, with more illustrations.]

Stuart Malin & Carole Stott, 1984. *The Greenwich Meridian*. Southampton: Ordnance Survey.

D. H. Sadler, 1968. *Man is not lost*. London: HMSO.

D. H. Sadler, ed. by G. A. Wilkins, 2008. *A personal history of H. M. Nautical Almanac Office, 1930-1972*. On HMNAO's website at <http://www.hmnao.com/history>.

Dava Sobel, 1995. *Longitude*. USA: Walker Publishing Co. Republished, 1996: London: Fourth Estate.

Dava Sobel & William J. H. Andrews, 1998. *The Illustrated Longitude*. London: Fourth Estate.

G.3.2 Papers

Mary Croarken, 2003. Astronomical labourers: Maskelyne's assistants at the Royal Observatory, Greenwich, 1765-1811. *Notes and Records of the Royal Society*, **57**, 285-298.

Janet Dudley, 1984. Longitude Zero, 1884-1984. *Observatory* **104**, 209-211.

H. F. Finch, 1950. On a periodic fluctuation in the length of the day. *Mon. Not. Roy. Astron. Soc.* **110**, 3-4. See also RAR 51, 24.

H. D. Howse, 1977. The story of Greenwich Time. *Occ. Tech. Paper no. 6 (1977)*. National Maritime Museum. (8pp)

D. S. Perfect, 1959. The photographic zenith tube of the Royal Greenwich Observatory. *Occ. Notes Roy. Astron. Soc.* **3**, no.21, 223-233.

D. H. Sadler & G. A. Wilkins, 1984. The astronomical background to the International Meridian Conference of 1884. *Journal of Navigation* **38**, 191-199.

H. M. Smith, 1952. The estimation of absolute frequency in 1950-51. *IEE Monograph No. 39*, 6 pp. Also in *Proceedings IEE* 99(4).

H. M. Smith, 195?. Phonic motors for quartz clocks. *British Science News*, **2**, 169-172.

H. M. Smith, 1969. Dissemination of astronomical and atomic time. *Nature* **221**, 221-223.

- H. M. Smith, 1972. International time and frequency coordination. *Proceedings of the IEEE* 60(5), 479-487.
- G. A. Wilkins, 1999. The history of H.M. Nautical Almanac Office. In A. D. Fiala & S. J. Dick (eds), *Proceedings of the Nautical Almanac Office Sesquicentennial Symposium, U.S. Naval Observatory, March 3-4, 1999*, 52-81. Washington, D.C.: U.S. Naval Observatory.
- G. A. Wilkins, 2000. Project MERIT and the formation of the International Earth Rotation Service. In S. Dick, D. McCarthy and B. Luzum, (eds), *Polar motion: historical and scientific problems*, 187-200. Proceedings of IAU Colloquium 178 held in Cagliari, Sardinia, Italy, 27-30 September 1999. *ASP Conference Series*, 208.
- G. A. Wilkins, 2003. The making of astronomical tables in H. M. Nautical Almanac Office. In M. Campbell-Kelly, Mary Croarken, Raymond Flood & Eleanor Robson (eds), *The history of mathematical tables: from Sumer to spreadsheets*, 294-320.. Oxford University Press. ISBN 0 19 850841 7.
- G. A. Wilkins, 2006. The genesis of the IAU Working Group on Astronomical Data. In A. Heck (ed.), *Organisations and strategies in astronomy* 7, 355-366, Springer.

G.3.3 Articles in magazines

- BBC (assisted by H M Smith), 1958. Time in broadcasting. (For booklet on an exhibit at the centenary exhibition of the British Horological Institute. (*HMS))
- C Booker, 1961 Oct. ... have you the right time? *Hi-Fi News* **6**, 298-302.
- H Heaton, with illus. by Emmet, 1952 Feb 27. Got the time, Mister. *Punch*.
- H S Jones, 1945. The 6-pips. (on 21 years of the Greenwich time-signal, with photo of H M Smith in pre-war Greenwich wireless room. *The Listener*. **33**, 151-152.

See also articles in *Quest* (see G.12.1) and *SRC/SERC Bulletin* (see G.12.2).

G.3.4 Minor items and unpublished notes

- W. P. Roseman, 1981. Chronometer Section: 1914 – 1981. (6 pp) & Chronometers, clocks and depots: Dates etc. 1728-1919. (2pp) See also appendix B.4.
- H M Smith, 1990 (notes only). BBC time signals and the six pips.
- H. M. Smith, 1993. Unpublished script for talk on “Time, frequency and Earth rotation” to the IEE Sussex Centre at Sussex University on 23 November 1993. 12 pp.
- G A Wilkins, 1984 (draft only). 60 years of the 6-pips: Part 1, 1924 -1926. Revised 2002 as ‘The early years of the BBC 6-pips Greenwich Time Signal’.
- G A Wilkins, 2002. Links between the NLO and the RGO. *J. Norman Lockyer Observatory Society* **3**, 5-6.

G.4 The RGO after 1948

G.4.1 Books

- David Calvert, undated, c. 1976? *The history of Herstmonceux Castle*. Herstmonceux Castle, Sussex: Royal Greenwich Observatory.

- David Calvert and Roger Martin, 1994. *The history of Herstmonceux Castle*. Herstmonceux Castle, Sussex: International Study Centre.
- Paul Murdin and Chas Parker, editors, 1987. *Royal Greenwich Observatory[at] Herstmonceux Castle*. (Swindon:) Science and Engineering Research Council.
- Peter Tarplee, 1996. *Abinger and the Royal Greenwich Observatory: the recording of magnetism and time*. Surrey Industrial History Group of the Surrey Archaeological Society.
- Anthony Wilson, editor, 1999. *Astronomers at Herstmonceux: in their own words*. Herstmonceux, Sussex: Science Projects Publishing.

The following illustrated booklets were produced and published by the RGO for sale to visitors.

- c.1966. *The Royal Greenwich Observatory Herstmonceux*. (brown and orange cover)
- c.1974. *Royal Greenwich Observatory: Illustrated*. (orange cover)
- c.1982. *Royal Greenwich Observatory: Illustrated*. (blue cover) Much of this second edition is taken from the first edition.

G.4.2 Papers

- A. Hunter, 1958. The Royal Observatory at Herstmonceux. (Presidential address, 1958.) *J. British Astronomical Association*, **69**,
- ???, 1958. *JBAA* 69, 103. Footnote on the improvement in the number of days per year suitable for solar observations.
- G. A. Wilkins, 2009. A personal review of the History of the Royal Greenwich Observatory at Herstmonceux Castle, 1948-1990. *The Antiquarian Astronomer*, issue 4, 69-80.

G.4.3 Leaflets and other ephemeral items

I have the following items, but others may have been produced.

- 1950? The RGO produced a duplicated sheet as a *Guide for visitors to Herstmonceux Castle: The home of the Royal Greenwich Observatory* and this was issued free.
- 1950? onwards. The RGO Club produced a printed leaflet with the title *Herstmonceux Castle* for sale (price 4d) to visitors to the gardens. It included a few short paragraphs about the Observatory and these were updated from time to time. I have a copy that postdates the opening of the INT in 1967.
- 1953-12-15. RGO Information Bulletin 21, contains notes on archaeological discoveries.
1967. The RGO produced a leaflet about *The Isaac Newton Telescope* for visitors to the INT.
1975. Guests at the royal garden party to mark the Tercentenary of the Observatory were given a small programme that included brief historical notes and a sketch map of the site.
- 1975 onwards. At the time of the Tercentenary celebrations in August 1975, the RGO produced duplicated leaflets of one sheet each about different aspects of the work of the Observatory. In addition to a general *Guide* (on green paper) with

a map and list of displays, there were the following sheets:

Astrometry; Astronomical spectroscopy, Chronometers, Computers, Electronography, Geomagnetism, Herstmonceux Castle, Meridian astronomy, Her Majesty's Nautical Almanac Office, Photometry, Telescopes, Time, The Sun and the Earth, Sundials.

1980. A general leaflet (of 4 sheets) in French about the history of the RGO was made available. (It was written by N P J O'Hora.)

undated, c.1985. Jane Murray. *Nature Trail*

This booklet has no title page, no publisher's imprint, no preface, no pagination (it is 24 pages with a thin card cover) and no price. It is illustrated by line drawings and map. The first page contains only the following:

“Acknowledgement

The Director wishes to express his thanks to Miss Jane Murray for the work she has undertaken in “blazing” the nature trail and compiling the text for each station.”

Advertising leaflets about the opening arrangements and the exhibition in the Castle were also distributed. [I have only a few.]

G.4.4 Articles in books, journals and magazines

Chas Parker, 1999. Castle in the sky – the Royal Greenwich Observatory at Herstmonceux. In: Patrick Moore, *Yearbook of Astronomy for 2000*.

R. v.d.R. Woolley, 1964. The Royal Greenwich Observatory. *The Times Science Review*, no. 52, 10-12.

In addition to the articles listed here, information about the activities and staff of the RGO may be found in the journals and magazines listed in section G.12.

The Civil Service Sports Journal contains articles about the building of the RGO Clubhouse in the following issues:

J. H. Middleton, Alone they did it. 14 (6), 184-185. with 2 illustrations, January 1960.

R. G. B., Short article about the opening in *Roving Cub Reporter*. 15 (6), 169.

Anon., The Concreting heroes. 15 (7), 218-221, with 2 illustrations and cover picture (see note on p. 215)

.See also the booklet produced by the Club for the opening ceremony.

Astronomy and Geophysics, which replaced the *Quarterly Journal of the RAS*, has also included short news items about the RGO.

G.4.5 Unpublished articles

G. A. Wilkins, 1998. Review of Almanacs and Time Activities. Prepared for F G Smith for a talk at an RAS meeting. (See appendix A.2)

G. A. Wilkins, 2003. A review of the history of the Royal Greenwich Observatory at Herstmonceux Castle, 1948-1990. (12 pp) Based on a lecture to the Bristol Astronomical Society on 2002-02-01. (See appendix A.1)

G. A. Wilkins, 2003. Recollections of the Royal Greenwich Observatory at

Herstmonceux Castle 1951-1990. Edited and extended version of an article in *Gemini* 23 (March 1989). (See appendix A.3)

G.5 Isaac Newton Telescope and the Isaac Newton Group on La Palma

G.5.1 Books

R. J. Taylor, Ed., 1987. *History of the Royal astronomical Society, vol. 2*. See chapter 3, section 5, on pp. 116-118, for an account of the Presidential address by Professor Plaskett and the subsequent actions of the Society that led to the decision to build the Isaac Newton Observatory. See section 2.7.3 and *RAR* 47, 21.

G.5.2 Papers

P. Fellgett, 1994. (Comments re design of INT.) *QJRAS* **35**, 352. See comments by W. McCrea in *QJRAS* **36**, 69-72, and reply by PF on p. 73.

B. Lovell, 1991 (NHO) *QJRAS* **32**, 1-16.

B. McInnes, 1981. (NHO site testing.) *QJRAS* **22**, 266-

Nathy O'Hora, 1980. l'Observatoire de la Roque de los Muchachos. *l'Astronomie*, , septembre 1980.

F. Graham Smith, 1981. The new observatory on La Palma. *QJRAS* **22**, 254-265.

F. Graham Smith & J. Dudley, 1982. The Isaac Newton Telescope. *J. Hist. Astron.* **13**, 1-18.

F. Graham Smith, 1985. (Isaac Newton Telescope). *Vistas in Astronomy* **28**, 431-
(Title to be checked)

R. v. d. R. Wooley, 1962. The Isaac Newton Telescope. *QJRAS* **3**, 249-258.

See also:

Lee T. Macdonald, 2008. The origins and construction of the Isaac Newton Telescope, Herstmonceux: 1942-1967. MPhil Dissertation, Department of History and Philosophy of Science, University of Cambridge.

G.5.3 Unpublished notes

John Pope, 1999. Where on Earth shall we put our big telescope? Some of the events leading up to the establishment in the 1980s of Britain's national telescopes on La Palma in the Canary Islands recalled by a Superintending Engineer at the RGO. Photocopy of typescript (14 pp) and illustrations (8 pp)

John Pope, 2005. The story of the Isaac Newton Telescope Mirror. (1 page) See also John Pope, 2008, in G.7.3, as this includes some paragraphs about his work on the Isaac Newton Telescope.

G.6 Royal Observatory at the Cape & other overseas observatories

This section is intended for references relating to work by RGO staff at overseas observatories, except La Palma.

J. D. Laing (ed.), 1970. *The Royal Observatory at the Cape of Good Hope 1820 – 1970: a sesquicentennial offering*. (44 pp) The Royal Observatory, Cape Town.

B. Lovell, 1985. (Southern hemisphere facilities). *QJRAS* **26**, 456-

G.7 Obituaries and biographical articles about RGO staff

(excluding the Astronomers Royal and the early Superintendents of NAO in G.2)

See appendix C.12 for a list of deaths of RGO staff with references to articles and notes in RGO IBs etc.

G.7.1 Obituaries

- Robert d'E. Atkinson (1898-1982) *QJRAS* **25**, 100-104, 1984.
- Richard E. Bingham (1940-2005) *Observatory* **125**, 415, 2005.
- Kenneth C. Blackwell (1911-1999) *A&G* **41**, 1.35, 2000.
- Michael P. Candy (1928-1994) *JBAA* **105**, 56, 1995; *QJRAS* **36**, 285-286, 1995.
Australian J. Astron. **5**, 191-192, 2005.
- Albert Edward Carter (1915-1989) *QJRAS* **32**, 67-68, 1991.
- Olin J. Eggen (1919-1998) *A&G* **41**, 1.36, 2000.
- Thomas Gold (1920-2004) *A&G* **46**, 1.38, 2005; *The Guardian*, p. 21,
2004-06-24. See also the Press Release from Cornell University that was
distributed by the RAS Librarian, Peter Hingley.
- David S. Evans (1916-2004) *Observ.* **125**, 118-120, 2005; *A&G* **46**, 3.42, 2005.
- George A. Harding (1920-1986) *QJRAS* **28**, 177-178, 1987.
- Alan Hunter (1912-1995):
1995-12-21 *QJRAS* **37**, 457-459, 1996; *The Times*, p.21,
- Philip. S. Laurie (1913-1982) *QJRAS* **24**, 362-363, 1983.
- W. (Bill) L. Martin (1940-1999) *A&G* **41**, 1.37-1.38, 2000.
- Bernard E J Pagel (1930-2007): *The Observatory* **127**, 367-368, 2007; *A&G* ??.
- Michael V. Penston (1943-1990) *A&G* ??, : *The Guardian*, p.29, 1991-01-02.
- J. Guy Porter (1900-1981) *QJRAS* **24**, 346-347, 1983; *JBAA* **92**, 137, 1982.
- Donald Sadler (1908-1987)
350, 1988? *QJRAS* **32**, 59-65, 1991; *J. Navigation* **50**, 346-
- Flora M. McBain Sadler *A&G* **42**, 4.34, 2001; *Biographical Dictionary of
Scottish Women*, 2006.
- Humphry M. Smith ???; *Bexhill Observer*. p. 12, 2005-04-15.
- Patrick A. Wayman (1927-1998) *A&G* **40**, 2.37, 1999; *Observ.* **119**, 253-254, 1999.
- Charles G. Wynne (1911-1999) *A&G* **41**, 2.37, 2000.

G.7.2 Biographical articles

Margaret Burbidge: the astronomer who came back: by Ian Ridpath, *New Scientist*,
572-574, September 1972.

F. Graham Smith: congratulations on appointment as Astronomer Royal: by Janet
Dudley, *Gemini*, no. 5, 9, January 1983.

Danny Elliot; a stonemason who worked on the Castle and carved the bust of Flamsteed
for the Tercentenary celebrations: by anon., article with title 'Turning to Stone'
in an English Heritage magazine. (Date not given on my photocopy.)

G.7.3 Autobiographical articles

- Margaret Burbidge, 1994. In *Annual Review of Astronomy and Astrophysics*.
- C. A. Murray, 2005. Astronomical reminiscences of work in RGO, 1950-1986. 37 pp.
- B. E. J. Pagel, 1999. Some reminiscences of early days at the RGO, Herstmonceux. *Observatory* **119**, 186-193.
- John Pope, 2008. The Diary of a Telescope Engineer as recalled in the year 2008. 38 pp
- R. H. Tucker, 1982. Reminiscences of a pre-war astronomer. *Gemini* 2, 10; 3, 11-12; 4, 11.
- G. A. Wilkins, 1990. Parts of the article in appendix A.3 are autobiographical in character, as are many paragraphs in the main text.

Articles by other former members of staff may be found on the website of the RGO Society.

G.8 Miscellaneous aspects of RGO history**G.8.1 References re Neptune**

- A. Chapman, 1988, Private research and public duty: George Biddell Airy and the search for Neptune, *J. History Astronomy* 19, 121-139.
- N. Kollerstrom, 2003, Recovering the Neptune files, *Astronomy and Geophysics* 44, 5.23-5.24.
- D. Rawlins, 1999, British Neptune-disaster file recovered, *DIO* 9, 3-25.
- R. W. Smith, 1989, The Cambridge network in action: the discovery of Neptune, *Isis* 80, 395-422.
- W. Sheehan, N. Kollerstrom and C. B. Waff, 2004, The case of the pilfered planet: Did the British steal Neptune?, *Scientific American*, Dec 2004, 92-99.

G.8.2. References to the Magnetic Department

- S. R. C. Malin, 1995. Article describes the moves of the magnetic observatory from Greenwich to Abinger and then to Hartland. *QJRAS* **36**, 72-73.
- S. R. C. Malin, 1996. Article on history of geomagnetism at RO,G. *QJRAS* **37**, 65-74.

G.9 The Civil Service and conditions of service

I have copies of various reports that are relevant to appendix C on Staff and conditions of service. They include:

Royal Commission on the Civil Service 1953-55. HMSO, 1955.

The Civil Service: Vol.1. Report of the Committee 1966-68. Chairman: Lord Fulton. HMSO, 1968. (Referred to as the Fulton Report)

4 reports of a joint committee of the National Whitley Council on the Fulton Report: Feb. 1969 (Developments on Fulton); March 1970 (*Fulton: a framework for the future*): March 1971 (Fulton: the reshaping of the Civil Service); March 1972 (The shape of the post-Fulton Civil Service).

An account of *Whitley Councils in the United Kingdom Civil Service* by Richard

Hayward is given in an orange booklet that was published by the Civil Service National Whitley Council (Staff Side) in about 1963.

An H.M. Treasury booklet on Staff relations in the Civil Service. HMSO, 1965.

Several other government and IPCS reports relating to conditions of service and organisational arrangements. [I cannot, however, find a copy of any booklet that was given to each new recruit to IPCS, nor of the later IPCS Handbook.]

Other government papers on such topics as research and development, computer policy, etc..

IPCS reports on policy matters, such as superannuation.

Booklets about management techniques, job evaluation, interviewing techniques, etc.

G.10 Move of RGO to Cambridge and its closure

A. Boksenberg, 1988. The future of the Royal Greenwich Observatory. (Based on an interview.) *Astronomy Now*, **2** (11), 22-24.

Patrick Moore, 1993. *Fireside Astronomy*. Wiley. ISBN 0 471 94202 2. See chapter 35 for "an accurate account of the widespread opposition to the removal of the RGO from Herstmonceux". (D. Stickland, 1994. *The Observatory* (Aug.), 180.),

G.11 The Herstmonceux Science Centre

Anthony Wilson, 1998. *Herstmonceux Science Centre: Guide and Souvenir*. London: Science Projects Ltd.

See also the end chapters of Calvert and Martin, 1994, in G.4.1.

G.12 Items about RGO in house magazines of research councils

G.12.1 Quest

Quest was the SRC House Magazine from 1968 to the beginning of 1978. Most issues have some items of relevance to RGO. It includes articles and photographs about Club activities, especially for the SRC Sports Days, as well as about official RGO projects and activities. It is similarly a source of information about the SRC Chairman, Council and Central Office staff, as well as about the staff and projects of other establishments. (Only a few of these items are listed here.) It started with 4 issues per year, but dropped to three in 1973. The following list includes both official and Club items, but omits some short items that do not add to known information. The subject listed is usually not the title of the article.

Most articles have small photographs. FC = photograph on front cover (usually monochrome). P = photograph and short legend only.

***Quest* 1968**

1,1	FC	Queen at opening of INT
	3	PSL: Bust of Isaac Newton
	6-8	DHS: 200 years of NA

- 10-11 Inaug of INT
 15 P – Castle floodlit
 19 Alan Powell (RGO correspondent)
 1,2 8-12 History of RSRS
 1,3 6-10 MVP: Quasars; P- 26-inch
 11-16 Atlas Computer Lab
 23 P – Woolley and Saxton toss at cricket match
 1,4 6-9 JBA: Cape Observatory; P – Victoria telescope (McClean)
 10-11 RHT: Enquiries from public
 22-24 Sports Day: Ps- GAW & RJD win men’s doubles

Quest 1969

- 2,1 FC Father Xmas in Staircase Hall
 9-13 Birth of radar; inc. Pevensey site in 1938
 2,2 1 Alec Spurway
 7-8 Radcliffe Observatory
 14-18 Smallest radio sources (but not 3C 273)
 2,3 1 H A Brück
 14-15 Norman Walker – motorcyclist
 BC P- Woolley (at clockmakers’ garden party)
 2,4 8-9 Sports Day; P – DVT & GAW

Quest 1970

- 3,1 10-11 AAT
 12 K2 chronometer and Bligh
 3,2 4-6 GALAXY at ROE
 3,3 FC P – BDY, RJD, AP, ? in HC courtyard
 1-2 Woolley
 3-4 AP: 14th Herstmonceux Conference
 12-13 ROE time gun
 BC P – John Philcox about to bowl
 3,4 4-5 GMH: 150 years at Cape
 26 P – RGO supporters at Sports Day

Quest 1971

- 4,1 14-15 Time synchronization by plane over WB
 4,2 20 P – Cape staff; GAH as OinC
 21 P – Replica of original INT
 4,3 FC P – 48-in at Mount Palomar
 1 Jack Howlett
 14-16 LVM: Occultations
 4,4 1 Margaret Burbidge +P

- 2-3 Woolley +P
- 11 P- DEH & GAW receive MxD cup
- 15 P- BEJP (Special Merit)

Quest 1972

- 5,1 7-19 Astronomy from space
- 5,2 21-22 GAH: time gun at Cape
- 5,3 11-15 Site testing
- 21 Henry Rishbeth
- 5,4 5-8 200 years of Radcliffe Observatory
- 10-11 Sports day: Ps – GET, table tennis; MVP, Chess

Quest 1973

- 6,1 FC P – Tycho Brahe
- 1-3 150 years of ROE; P- Hewitt camera; Crawford Collection
- 21 P – 48-inch Schmidt at factory (for Siding Spring)
- 6,2 16-17 Opening of SAAO at Sutherland; P- Thatcher and Woolley
- 28 P – Mr Jeffries (tel op) receives MBE from Thatcher (in hat!)
- 6,3 19 Telex weather forecast for Herst (spelling errors)
- 20 P – OBE for H M Smith

Quest 1974

- 7,1 FC Daffodils at HC
- 1-2 CJAP: 50 years of GMT
- 5-6 JBA and CML: Comet Kohoutek
- 13 MB leaves; AH as Director
- 7,2 6 P – Barry Martin
- 8-10 NPJO: PZT
- 12 P – GAW & IM with cup at Sports Day
- 17 Centenary of Solar Department
- 7,3 3 FGS and V Reddish
- 10-11 Opening of AAT by Charles
- 15 Programme of events for RGO Tercentenary

Quest 1975

- 8,1 FC P – Eta Carinae by AAT
- 8,2 FC P – Queen and AH at 28-inch at Greenwich
- 14-15 RGO Tercentenary
- 16-17 ‘Herstmonceux’ addresses
- 8,3 8-10 Site testing
- 20 P – Anne and AH by Flamsteed bust

Quest 1976

- 9,1 9-11 Dave Allen to Coonabarabran
 13 Board of Visitors dinner menu for 1889
 14-16 Brück, Howlett and Hunter retire
- 9,2 11 P – includes Maurice Message (Swindon) (relative of Jim Message)
 12 P – swimming pool at HC
- 9,3 13 P – IM and GAW playing tennis
 14 Menu for 20th Herstmonceux Conference; Folk Dance Group

Quest 1977

- 10,1 FC FGS, PM & Sam Edwards in RGO Exhibition
 13 CJAP retires; (J L Gowans, Sec to MRC)
- 10,2 11-12 Horner, Rishbeth, Saxton (App. Lab)
 13 HMS and PSL retire
- 10,3 ??? no copy

Quest 1978

- 11,1 FC P – Swindon Office group including Peter Davies
 9 Prof Allen (Ch) visits RGO (KFH, FGS, DJK)

No further issues were produced owing to difficulties in the Swindon Office of SRC!

G.12.2 SRC/SERC Bulletin

The *SRC Bulletin* eventually replaced *Quest* in October 1980 and became the *SERC Bulletin* when SRC became SERC on 1 April 1981.

[I do not have access to copies at present.]

G.12.3 Frontiers

Frontiers was published by PPARC (which took over the funding of RGO from SERC) from 1993? This contained illustrated articles about the many projects that were funded by PPARC, including articles about the Isaac Newton Group on La Palma after the closure of the RGO.

G.12.4 Open Space

Open Space was a bi-monthly newsletter by and for PPARC staff from late 1994 onwards. It included, for example, articles about long-service, retiring and deceased members of the RGO staff. The following list, which gives the issue number and the year, is not complete.

- | | |
|--------------------------|----------------------------|
| Peter Andrews, 9, 1996 | Graham Appleby, 4, 1995 |
| Alec Boksenberg, 8, 1996 | Michael Buontempo, 7, 1995 |
| Michael Candy, 2, 1994 | Alan Hunter, 8, 1996 |
| Keith Tritton, 4, 1995 | Bernard Yallop, 9, 1996 |