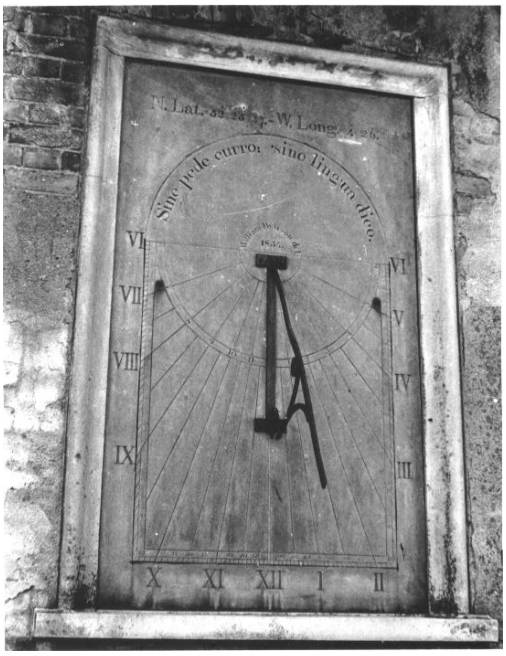
MIRA

The Journal of the
Coventry and Warwickshire Astronomical Society

Spring 2005
Number 71
Price 50p

www.cawas.freeserve.co.uk

The Rector of South Kilworth



Mike Frost's latest story is this issues main work and tells an interesting tale of a Mr William Pearson. His house he had built was at South Kilworth, near Coventry and called The Observatory. This photograph shows the house in the 1960's with a close up view of the large wall mounted sundial. Like many of his contemporaries, he accomplished many things in his long life as this story makes clear. How did they find the time to do so much?

How many more local folk will Mike discover who have made significant contributions to astronomy in the past?

CONTENTS

Is it me or are the so-call science programs on the TV getting simpler and dimmer?? I used to love watching Horizon on BBC2, it was full of interesting people with interesting ideas. Sometime I knew a little of the subject and what everyone was on about, but sometimes the ideas where outside mine and most folks fields and took a while to understand. But if the augments where good and the theories sound you learned something new about the subject. Horizon was the premier showcase for science on TV, it rarely failed to inform and some of the programs won major awards. So from such lofty ideals in the old days of TV, we seem to have sunk a lot lower today. To simple to understand TV, or people will turn over or switch off if they have (God forbid), have to think.

But now television has, I think, been taken over by a bunch of producers who know next to nothing about science and don't seem to care either; "Because you have to entertain the public and not give them to much to think about at once or their brains will explode and then the ratings will go down". . . and they will be out of a job. Oh dear. "People want to be entertained" Do they? Doesn't sometimes education stimulate and thrill to learn new facts about the universe we all live in? Why DO we need entertaining so much?

Most producers of programs nowadays knock up roughly the basic bear bones of the program on what's called a non-linear computer edit suits (I use a non-linear edit suit for the videos I make for the company I work for). These can speed up video editing hugely and numerous effects can be added at a click of the mouse. The BBC has over 300 of these machines and they are used for everything from the news bulletins to serials to soaps to documentaries.

This is the problem with the programs made now. The producers have to show their professional colleges how clever they are, with all the added effects and computer graphics. Lots of speeded up bits, lots of slow-mow bits. Lots of Sound EFFECTS!! And everytime something wizzes past the camera, even if it's a comet or asteroid or lump of rock in space, it HAS to make a rushing past the camera noise!!! ***WHY???***

Other effects annoy, chromakeyed backgrounds dropped in behind the talking heads with nothing to do with the subject are quite common. Sometimes it is difficult to tell what the person is saying because of over-loud pop sounding background music and sound effects. Are the producers frightened we may learn something if its all too clear?

And this brings me on to the computer graphics. . . There are a lot of very talented graphic and computer artists out there who can show anything on our screens given enough time and money. Weather you enjoyed watching Walking with Dinosaurs or not, you had to admit the dinosaurs looked pretty real on the box. It was well done with the use of many palaeontologists helping with the making of the series so the content was as near correct as is currently known and understood.

So how come so many astronomical scenes look wrong on TV? OK, I know most of the time they show things no-one has seen, or could ever see, like the Big Bang, a supernova exploding, black holes, twin stars in close orbits, swishing through the arms of our galaxy at thousands of times light speed! Phew! So why are so many of the effects and visuals incorrect, out of scale and badly executed? Not all the blame can be laid at the door of the graphic department. You can't expect the poor old artist to be an astro whizz who understands physics and relativity theory as well as a computer graphic designer. It takes years to learn some of the 3-D graphic design programs (just when you think you've got to grips with it, an upgrade comes along!). All this plus additions from the audio/visual effects which can be added at the editing stage in the program making and make some programs almost unwatchable.

The story, layout and content of the program is made by the producer who must commission the graphics and visuals as well as organise the shooting schedule. Of cause he/she has lots of help, look at how long some of the tails are on films with everybody from the tea boy mentioned, and advice is given by "experts" in their fields to get the right kind feel to the effects. But how much does the producer take in, how much does he change to get the right look?

You only have to look at the artwork being done by artists like David Hardy, William Hartmann, Adolf Schaller, Kim Poor and others to see how much the visuals are lacking in imagination and scientific accuracy. Why can't we get more realistic impressions of far-a-way places on television? If the artists working for the astronomy magazines can paint realistic scenes, why can't we have them on the telly?

Ivor Clarke

A Tale of Two Lenses

or how I discovered a new lens aberration

By Mark Edwards

When I was a physics student we were taught about how imperfect single lenses were. These lenses suffered from defects, or aberrations, that could produce an image of a star that looked nothing like the point of light it should be. It could be spread out and made impossible to focus by spherical aberration; coloured by chromatic aberration; turned into a line by astigmatism; or made to appear like a comet by coma. Not to mention its shape being changed by barrel or pincushion distortion. Useless as it might have seemed at the time, this knowledge helped me years later when I applied for my first job. Unbelievably, the interviewer asked me to list the aberrations of a lens, which I did and I got the job.

Lenses since their invention had always had these aberrations, so imagine my surprise when I discovered recently that large numbers of modern lenses had started to exhibit a previously unknown aberration. This aberration is far worse than the ones listed above and makes many of the lenses totally unusable.

This is how I discovered it . . .

Whether it is in my genes or as a result of all those books I read as a child in bed I do not know, but since the age of about ten I have been short-sighted and have needed glasses to see anything at all of the night sky. In those days school eye tests were not very sophisticated, you were asked to cover one eye with a piece of card and read as much as you could from a chart on the wall. Then you moved the card to cover the other eye and read the same chart again. If you were unfortunate you were given a piece of paper that singled you out as someone who needed to visit an optician.

The equipment used by the optician was just as crude. You were made to peer through a frame at the same letter chart on the wall and the optician would insert more and more lenses into the frame until you were able to read the bottom line on the chart. Of course the more lenses he inserted the worse the distortions became so it was always a hit and miss affair. A couple of weeks later you were given a pair of NHS glasses that looked hideous and contained very heavy glass lenses, but they did work.

Over the years my eyes gradually became slightly worse, but the optician's measuring equipment became better and more sophisticated. The glasses he prescribed became better-looking and the heavy glass lenses were replaced by light weight plastic ones that worked just as well. That was, until the new aberration started to appear.

On my most recent visit to the opticians I found that they had gone high-tech. I was asked to look into machine after machine as the defects in my eyes were measured. Finally, I was handed my prescription detailing precisely how my short-sight should be corrected. Two weeks later I collected my shiny new glasses and looked through them at the night sky. This was when I made the amazing discovery that they suffered terribly from the new aberration of . . .

F A S H I O N

This then is the terrible truth. The manufacture of modern lenses is not determined by physics, but by fashion.

If like me you are short-sighted, the lens in your eye brings the light from stars to a focus in front of your retina rather than on it, so the stars appear blurred. However, if you put a negative lens, eg. a bi-concave one, in front of your eye of just the right strength you can again bring the light to a sharp focus. The problem though comes with the shape of the resulting lens. A negative lens is thin in the middle and thick around the edge. This is where fashion comes into play because people do not like to have thick looking glasses.

So the solution generally adopted by opticians is to only make the lens the correct shape just below its centre and to artificially thin it towards its edge. This gives the lens a more pleasing appearance and makes it fit into any frame more easily, but of course the lens no longer does its job. When you look through these lenses you find that you can only see objects just below eye level in focus (try looking down and at the sky at the same time!), everything else has a high degree of astigmatism. Looking at the sky is just impossible as most stars that you can can see appear as lines rather than points of light.

This problem is compounded by the use of

plastic materials instead of glass. The plastic used for the lenses has a lower refractive index than glass, so to obtain a lens of the same power it has to be thicker. As fashion dictates that the lenses should be thin, there has been a move in recent years to plastics that possess high refractive indices regardless of their other optical defects.

The latest material used is polycarbonate. This has a high refractive index that gives nice looking thin lenses, however it suffers from very high chromatic aberration, about twice as high as the older plastics. It is also prone to giving multiple images (it is mildly birefringent) especially around any holes drilled in it for frameless glasses.

The combined effects then of using polycarbonate and grinding it to the wrong shape produce a lens that looks fashionable but is useless for its intended job of correcting sight defects.

The day after I made this ground-breaking discovery, I took my glasses back to the opticians so that they too could see the effects of the fashion aberration. Unfortunately, they had some bad news for me. It was not the lenses that were at fault, instead I was suffering from a disease previously unknown to medical science...

"I had flattened curve sensitivity syndrome!"

ASTRONOMICAL MUSIC QUIZ 4
Answers

The answers to the latest AMQ4 quiz from the last MIRA, a selection of obscure song titles and weird lyrics with astronomical themes.

By Mike Frost (with (lots of) help from Vaughan Cooper)

Round 1:
The Heavy Metal Round

In astrophysics, any element heavier than helium is regarded as a metal. Who recorded the following song titles?

1. Led Zeppelin
2. Rainbow
3. Rainbow
4. Rolling Stones
5. Ozzy Osbourne
6. Def Leppard
7. Black Sabbath
8. Black Sabbath
9. Black Sabbath
10. Black Sabbath
11. Black Sabbath
12. Deep Purple
13. Deep Purple
14. Deep Purple
15. Deep Purple
16. Deep Purple
17. Yes
18. Pink Floyd

Round 2:
Lyrics

Who wrote the following? One of them isn't actually a pop lyric. . . but which?

1. Europe - *"The Final Countdown"*
2. Elton John - *"Daniel"*
3. Erasure - *"Star"*
4. The Pretenders - *"Don't Get Me Wrong"*
5. William Wordsworth - *"Daffodils"* ("I wondered lonely as a cloud. . .")
6. Coldplay - *"Yellow"*
7. Outkast - *"Roses"*
8. George Michael and Mary J. Blige - *"As"*

Round 3:
Courtesy of the Sky at Night

1. Gustav Holst
2. Patrick Moore
3. Patrick Moore again
4. John Philip Sousa
5. William Herschel
6. Caroline Herschel

How many answers did you get right?

The Rector of South Kilworth

By Mike Frost

The Royal Astronomical Society in London is housed in Burlington House, off Piccadilly, close to the Royal Academy. On the wall of the Council Room stands a portrait of one of the Society's founders, the Reverend William Pearson. Reverend Pearson is shown with his family (his first wife Frances and daughter, also Frances). Beside the happy family sits one of the astronomical instruments that Pearson designed, an orrery, or clockwork model of the solar system.

William Pearson is not well known nowadays, but in his day he was a leading member of the astronomical community. As well as being an innovative designer of astronomical equipment, and the writer of one of the most important astronomical textbooks of the nineteenth century, he carried out a decades-long program of positional astronomy.

The observatory from which he carried out these observations was less than twenty miles from Coventry, in the village where Pearson was the incumbent minister, and the building that housed his observatory stands to this day and is now a private house. This is the story of the Rector of South Kilworth.

William Pearson was born in Whitbeck, Cumberland, on April 23rd 1767, into a family of yeomen farmers. He went to school at the grammar school in Hawkshead, Cumberland, where one of his schoolmates was William Wordsworth, who was three years younger than Pearson. Wordsworth later wrote *"His manners when he came to Hawkshead were uncouth as well could be, but he good abilities, with skill to turn them to account. . . I often used to smile at the tales which reached me of the success of this quondam clown, for such he was in manner and appearance before he was polished a little by*

The William Pearson's family

William Pearson's house *The Observatory* at South Kilworth today

attrition with gentlemen's sons trained at Hawkshead, rough and rude as many of our Juveniles were".

In 1790 Pearson began his adult career as an assistant schoolmaster at Hawkshead grammar. He did not initially attend university (he was later awarded an honorary doctorate by Glasgow University), probably because he would not have been able to support himself as a student. By 1793 he was working in Lincoln, working as an under-master at Lincoln Grammar, and shortly after as a curate of St Martin's, Lincoln. Around this time he married Frances Low and their only child, also called Frances, was born in 1797.

In 1796 he designed the first of the astronomical instruments that were to make his reputation in the subject - an orrery, named for the fourth Earl of Orrery, who commissioned the first such instrument from George Graham in 1708. Almost certainly Pearson's orrery was built for the purposes of giving public lectures on astronomy, a frequent and profitable employment for men of science at the time. We know that Pearson gave such lectures in Lincoln.

Over the succeeding years Pearson constructed a series of superbly accurate models of planetary, lunar and satellite motion. He paid particular attention to the mechanisms required to produce accurate motion. Ironically, given the long struggle to discredit epicyclic descriptions of planetary motion, Pearson's orreries employed epicyclic mechanisms. Pearson published a series of articles on how to construct orreries, telluriums and satellitiums. One orrery (or copy) still exists in the Science museum, London, a copy of another instrument is in the museum if the History of Science in Oxford.

In addition to his successes as a public lecturer and instrument maker, Pearson's career as a schoolmaster continued to flourish. In 1800 he became a partner in a boys' preparatory school, Elm House in Parsons' Green, near Fulham. Running a successful school proved to be a profitable enterprise. By 1809 he had founded a larger establishment, Temple Grove School, at Sheen Grove in East Sheen. Temple Grove was fashionable with the aristocracy - Wellington's sons and Disraeli's brother were educated there. Temple Grove School continues to exist, although it has now moved to Uckfield, and claims to be the oldest preparatory school in the country.

Nor should we forget Pearson's career within the church. From 1810 to 1812 he was Rector of Perivale, near Fulham. In 1817 he was appointed to Rector of South Kilworth, Leicestershire, although he continued to live in East Sheen until 1821. Absentee rectors were

William Pearson's grave, he died in South Kilworth, on September 6th 1847

common at this time!

It was around this time that William Pearson became involved in the most momentous of his many endeavours - the founding of an astronomical society. He first mooted the idea in 1812, and then again in 1816. Both times there was interest, but nothing came of the idea. The idea of an astronomical society was independently proposed by Francis Baily (after whom Baily's Beads are named) in April 1819, and then in December 1819 Pearson tried a third time, writing to astronomers around the country.

At a meeting in the Freemason's Tavern, London, on January 12th 1820, the Astronomical Society of London was founded. The first full meeting was on February 29th 1820, and Pearson was elected Treasurer, a post he was to hold for seven years. The Society received a royal charter from William IV on March 7th 1831 and from then on became the Royal Astronomical Society.

In addition to the R.A.S., Pearson became a Fellow of the Royal Society, was a visitor to the Royal Greenwich Observatory for twenty years and was involved with the foundation of the British Association for the Advancement of Science (see Martin Lunn's note in the Appendix below).

It's perhaps surprising, therefore, that in 1821 William Pearson should make his home in a quiet Leicestershire village. He attended almost all the monthly meetings of the R.A.S., traveling by stagecoach from Rugby. Selling Temple Grove School, at a handsome profit, enabled him to retire to the countryside and pursue his many interests. He also purchased substantial holdings of land around the country, including land around Grasmere and Rydal in the Lake District. There is still a boathouse on Grasmere with a stone bearing the initials W.P. William Wordsworth was not keen on the boathouse - *"a tasteless thing in itself. . . utterly out of place and perfectly fitted. . . to mar the beauty and destroy the pastoral simplicity of the vale"*.

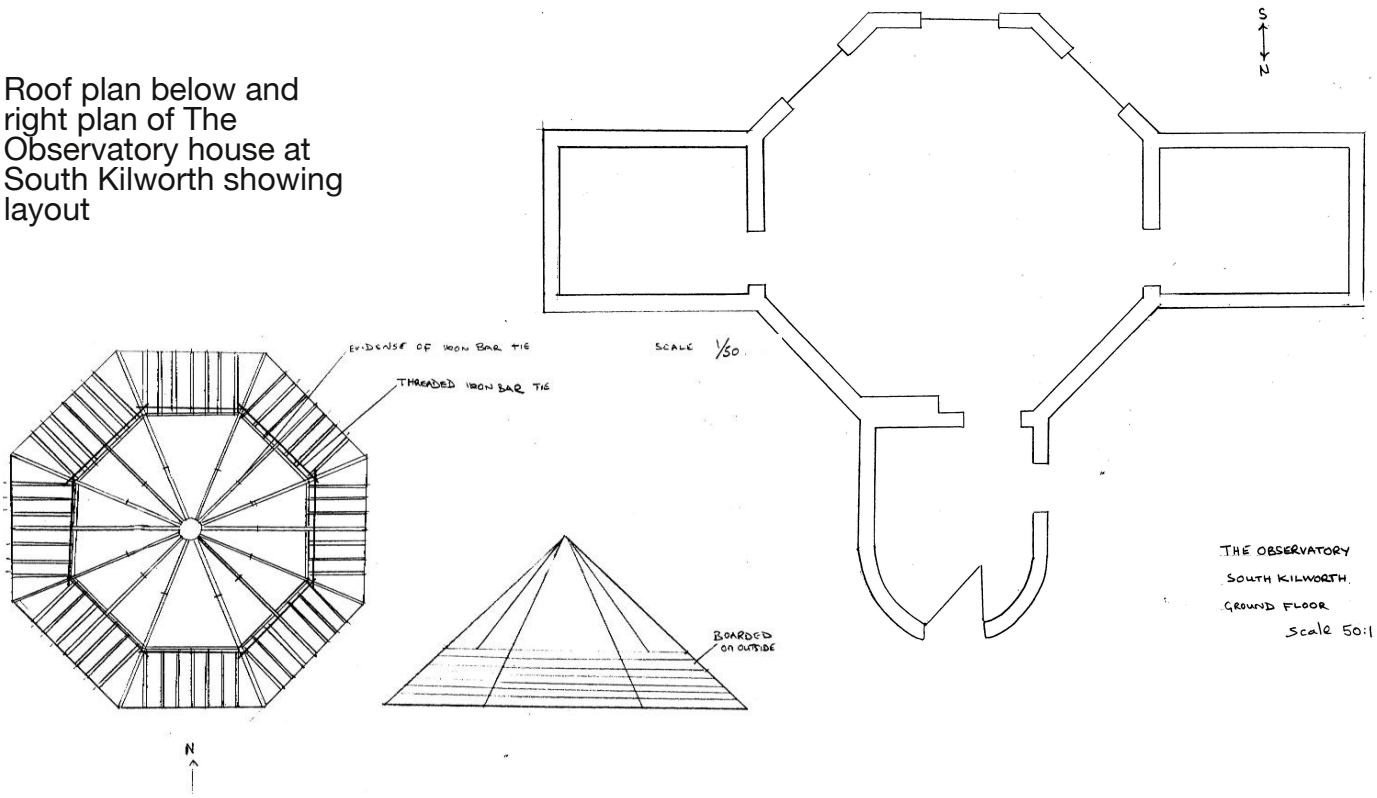
Pearson had been interested in astronomy since at least his Lincoln days - in 1794 he had presented a copy of James Ferguson's influential *"Astronomy"* to his old school in Hawkshead. His first observatory was in East Sheen in 1812 (he wrote to Wordsworth about it in 1813), but his work here seems to have been more concerned with building optical instruments rather than using them, as very few observations are recorded from here.

William Pearson's first task on arrival at South Kilworth was to build a new wing for the Rectory, incorporating two instrument stands. These were used to house a transit

Plaques in South Kilworth Church, the right hand one has the inscription

TO THE MEMORY OF THE
REVD WM PEARSON L.L.D. F.R.S.
RECTOR OF SOUTH KILWORTH
WHO DEPARTED THIS LIFE
ON THE 6TH SEPTEMBER 1847
IN THE 81ST YEAR OF HIS AGE
UNIVERSALLY BELOVED AND REGRETTED

Roof plan below and right plan of The Observatory house at South Kilworth showing layout



telescope, and an altitude and azimuth circle. The altitude and azimuth circle had originally been built by Edward Troughton (at a cost of 500 guineas, 10 years salary for a country curate) for the Imperial Observatory in St. Petersburg, Russia, but Napoleon's invasion of Russia had meant a cancellation of the order. The transit circle was built for Pearson by Jones in 1815. Both instruments were used to observe due south, through shutters in the walls. Due south was marked by a meridian mark on a wall, 400 yards away. Pearson determined the latitude of his observatory and duly informed the Astronomer Royal that the published latitude for South Kilworth was 4" in error, an error that was corrected in the next Ordnance Survey.

Pearson built a second observatory in the summer house in the Rectory garden. This contained a more flexible instrument, a 6.8", "the most powerful refractor then in England", crafted by Tulley from a piece of flint glass donated by Guinard to the Royal Astronomical Society. The other notable feature of the summer house observatory was its roof, which rotated on rollers. This is now a common feature of observatories but was a novelty in its time. The roof was designed by John Smeaton, an engineer who is more famous for his lighthouse designs, including the lighthouse on the Eddystone rock. Pearson eventually offered the roof to the York Observatory, although Martin Lunn doesn't think that it was used *[see Appendix 1]*.

Two observatories might have been enough for most people, but not for William Pearson, who decided that smoke from the village was degrading his observations. In 1834 he built a new Rectory, on land owned by the Church to the south of the village. To mark the meridian he also built a farmhouse due south of the new Rectory! For that matter, he also built a new aisle for the church, in 1840, although this was not a complete success and was rebuilt in 1868 by his nephew's son, Col. William Pearson.

From South Kilworth, William Pearson carried out an impressive programme of observations over two decades. He specialised in positional astronomy - the precise and painstaking determination of the positions of astronomical objects. The transit telescope was used to make 1700 observations of the Sun's altitude at noon, from which Pearson determined the obliquity of the ecliptic (the angle at which the Earth's axis is inclined to the plane in which the planets orbit). Pearson also published a catalogue of the positions of 520 stars that could potentially be occulted by the Moon. For this catalogue Pearson and an assistant from the village, Ambrose Clarke, observed each of the 520 stars between 5 and 20 times. The 6.8" refractor was used to observe occultations, the satellites of Jupiter, Mars, and Halley's comet during its 1835 apparition. Pearson published many of his observations in the Notices of the Royal Astronomical Society.

Additionally he published an instructional book, *Practical Astronomy,* quite early in his South Kilworth days and this was probably his most influential publication. The first volume, published in 1824, contained tables of astronomical observations, along with detailed instructions on how to reduce the observations to derive useful data. The second volume, published in 1829, is a description of astronomical instruments, many owned by Pearson, with detailed instructions on how to use them. These two volumes won the Reverend Pearson the RAS's gold medal for 1829. *Practical Astronomy* was still being recommended as a reference work at the end of the nineteenth century.

By now, you will probably not be surprised to hear that William Pearson contributed fully to his community. He was a Justice of the Peace, sitting in Lutterworth, and a Freemason of the borough of Leicester. He built a new village school and endowed it with seven hundred pounds, giving an additional two hundred pounds for the "education of ten poor girls annually". He also bought a set of communion plate (4 pieces of silver) and a new organ for the church. After his first wife died, he remarried, in 1831, to Eliza Sarah, a woman the same age as his daughter.

Pearson continued to live a full life until 1844 when, at the age of 77, he had an accident. As he explained in a letter to George Airy, *"In consequence of a fall from my horse onto hard ground the other day, I have been confined to my room and notwithstanding the aid of 30 leeches, I am unable to move from my bedroom"*. Finally he began to slow down, putting his affairs into order. William Pearson died, in South Kilworth, on September 6th 1847, and was buried in the churchyard.

After Pearson's death, Pearson's instruments were dispersed. His observatory was converted to a granary and then to a cowshed, and then in 1960 to a private house. A sundial that used to be on the outside wall of the house was removed in 1959 to a Leicester museum (Snibston Discovery Park), where it is now in storage. The current owners of house are in the process of restoring the building and I was invited by them to come and take a look at The Observatory, South Kilworth.

The ground floor of the cottage is a living room. There is a staircase (not part of Pearson's original design) up to the upper floor, which used to house the telescopes. The design of the house is octagonal, with side rooms on three sides (to which the current owners are adding an extension). The upstairs windows are full to the floor, and it is likely that these were used for the telescopes (the Troughton and Jones telescopes) to peer out of. Although Pearson used a roof on rollers in his summer house, the observatory was used for transit observations and so the roof had north and south facing shutters.

I am not the only astronomer to visit The Observatory. In 1999, unannounced, Dr. Allan Chapman, Peter Hingley, the RAS librarian, and Francoise Launay of the Observatoire de Paris, came to visit. They were in the area and felt that the Revd. Pearson deserved a visit! Like my eminent predecessors, I took the opportunity to visit South Kilworth Church. Pearson's grave is not in good repair, and it is difficult to make out the inscription. Inside the church is a plaque commemorating their illustrious Rector. See illustration on page 7.

There are several unanswered questions about Reverend Pearson, which I would dearly like to answer. I would very much like to track down Pearson's telescopes. Martin Lunn (see below) confirms that one of his telescopes was donated to the York Philosophical Society. We had suspicions that another of his telescopes was eventually donated to the museum of science in Cambridge, however correspondence (see below) does not bear this out. I will certainly make the effort to visit the Pearson orreries in the science museums of Oxford and London.

Most intriguing of all is a comment in the South Kilworth parish magazine that a working orrery has been constructed, to Pearson's design, by a Rugby watchmaker. Perhaps one day we will be able to see one the Rector of South Kilworth's famous instruments at one of our society's meetings!

Acknowledgements

I am very grateful to David and Sue Dilks for showing me round The Observatory and South Kilworth Church, one sunny summer afternoon, and for lending me copious information about Reverend William Pearson. I am also grateful to Martin Lunn who provided information about Pearsonës donations to the Yorkshire Museum, and to James Hyslop who answered my enquiries to the Whipple Museum of the History of Science in Cambridge. (See below)

Sources/ Further Reading

"Revd Dr William Pearson (1767-1847): a Founder of the Royal Astronomical Society" – S.J. Garman and S.R. Harratt (Q.J.R astr. Soc. (1994) 35, 271–292)

"Revd William Pearson" from the Report to the Twenty-eighth Annual General Meeting of the R.A.S. (M.N.R.A.S. 8)

"The Life and Times of a former Rector" (in 3 parts), D.A.L. Harrison (Parish Magazine)

Histories of Kilworth School and South Kilworth Church.

The Royal Astronomical Society website is www.ras.org.uk

Appendix 1

Email from Martin Lunn, Yorkshire Museum

Mike,
Good to hear from you.
The Rev William Pearson was very instrumental in the creation of the York Observatory. As you probably know the York Philosophical Society built the Yorkshire Museum in 1829. In 1831 they hosted the very first meeting of the British Association for the Advancement of Science at the Yorkshire Museum.
At that meeting the BA suggested that if the YPS would construct an observatory, members of the BA including Pearson would donate equipment.
Pearson donated a telescope, clock, plus books and charts.
Unfortunately the telescope disappeared in the 1950s. We still have the original clock, which is a Barraud of 1811, which is still in perfect working order. There are some star charts, which we have recently discovered buried deep in our library, they had been lost for at least 50 years. These quite possibly were the ones donated by Pearson.
We have in the observatory a picture of the summer house roof that Pearson was offering to the YPS. However it was never used. A conical roof instead was used. It is unclear whether that was given by Pearson or was built here in York.
I hope the above is of some use to you in your research.
Kind regards,
Martin Lunn

Appendix 2

Email from James Hyslop, History of Science Museum, Cambridge

Dear Mr. Frost,
Thank you for your inquiry. I have gone through our catalogue's database trying to hunt down a telescope matching on of the three descriptions you sent, but I'm afraid I'm not having much luck. None of our transit theodolites by Jones date specifically to 1815. Our telescopes by Tulley have provenances that do not match your instrument. It is possible that it is the azimuth instrument by Edward Troughton (Troughton & Simms) but our records do not state that any of them came from St. Petersburg.
Also searching our database for Revd William Pearson, South Kilworth and Mr. Edwards of Leicester [probable recipient of telescope] isn't providing me with any promising leads. This sort of information is normally recorded on the database, but it is possible that this information has been lost over the years. If you know when it was given to the museum in Cambridge I might have more luck in tracking it down, but as things stand I don't think we are the museum that you are looking for.
Yours sincerely,
James Hyslop

The Whipple Museum of the History of Science
Free School Lane
Cambridge