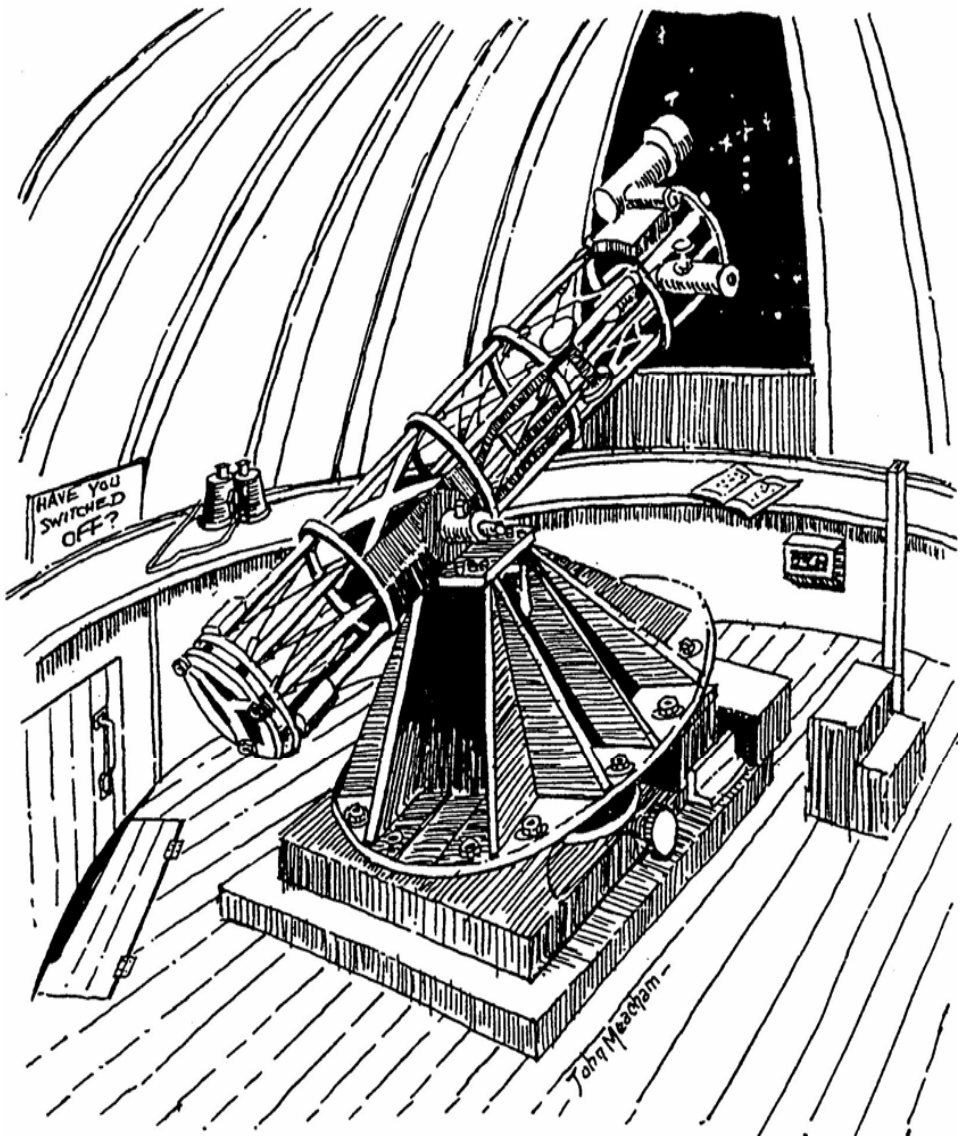

The Cyril Swindin TELESCOPE

AN ACCOUNT OF THE HISTORY

OF THE

CYRIL SWINDIN TELESCOPE

WHICH IS NOW IN THE

FAILAND OBSERVATORY

OF THE

BRISTOL ASTRONOMICAL SOCIETY

BY

C.A.SWINDIN C.B.E

which we were proud was a 20 minute exposure of the faint Comet Burnham 1959. But perhaps our favourite photograph was of the bright Comet Arend-Roland 1955 with the constellation Cygnus shining through its fan-shaped tail. Another interesting one was of the peculiar Comet Mrkos 1956 with its fuzzy head.

When some impairment of my sight interfered with my observing I did not like to think of so good a telescope standing unused so I was very happy to find a suitable home for it and its dome, with the Bristol Astronomical Society.

I would like to end this account with a personal reminiscence. I remember that in 1910, when I was eight years old, my father took me into our garden to point out Halley's Comet, then a naked eye object. He said you must see this because it is a rare sight and you are unlikely to see it again as it will not return for 76 years. However, I did see it again, on the 11th January 1986, and through my old telescope now in the Society's observatory at Failand.

I count myself lucky to be one of the relatively few people to have seen Halley's Comet on two of its approaches to the sun.

One other point of interest I might mention is, that when I ordered the 14" worm wheel and worm from a firm in Cambridge I specified phosphor bronze, but they said it would cost me less if instead of phosphor bronze they used a steel disc with welding metal welded on to its rim. They guaranteed an equally accurate and hardwearing job. I accepted their advice and have not had cause to regret it.

The construction of the telescope took me many months, but eventually came its finish and its first trial - and disaster.

The telescope tube when it was mounted by its trunnions on the fork arms, bent like a banana, due no doubt to the heavy lead J weights which had had to be added at the mirror end to counter- balance the greater length of tube at the other side of the trunnions. Discussing the problem with an expert at Cambridge University, I learned of what is called the Z factor which, I gathered, indicates the degree of rigidity in a standard bar or tube. He calculated that if I replaced the 3/4" dural tubes with 7/8" tubes made of steel containing 4% molybdenum, the Z factor would be increased about 5 times and he could get the steel tubes for me.

It was a long, dispiriting job dismounting the tube, dismantling it, enlarging the 36 holes involved, from 3/4" to 7/8", reconstructing the tube and remounting it. Even then I suspected a very slight flexure so I decided to cross-brace every section of the tube except for one for access to the mirror and one for the eyepiece mount. I used bicycle spokes for this -the longest - most difficult and tedious job of the whole operation. It was, however, successful. I think that from germination of the idea of designing the telescope, to the end of its construction was more like three years than two. Until my final removal to Bristol in 1955 the telescope lived under various protective coverings but here in Bristol I provided it with a 14ft diameter dome, where for many years it gave me and many friends much pleasure.

While my interest in astronomy was pretty general, I got particular pleasure from celestial photography especially of comets, an interest which my son and a long-standing friend, John Cheyne shared. Before reflex cameras appeared on the scene I had built a 1/4 plate camera - a wooden box carrying a 20" focus, f5.6 Aero Ektar lens, which was mounted on the telescope. Some faint comets require longish exposures and it is tiring for the eye to keep such faint objects on the crosswires of an eyepiece for long, but we.avoided this by a routine of alternating 5-minute stints at the eyepiece. One photograph of

When some years ago, I was posted to Paris, I was provided with furnished accommodation, so my furniture stayed at home and with it my home-made 10 1/2" reflector which had enabled me to pursue my all-absorbing hobby - astronomy.

For quite a long time the excitements and problems of my new post occupied my interest and much of my spare time. However, after a while I began to miss my hobby, and though I joined the French amateur astronomical association - l'Association Astronomique de France -where I met some interesting fellow enthusiasts, I somehow felt isolated from astronomy, probably because I was doing no observation. I bought a 3" refractor, but this didn't help much, as the garden of our villa, although fairly large was not a good observing site, having so many large old trees in it—49 of them in fact.

I thought a good deal about my telescope at home and sometimes sketched out improvements I could make to it when I returned to England. It was a simple step from here to decide, purely as an intellectual exercise, to design the perfect amateur telescope which would incorporate the best features I had noticed in the scores of telescopes, amateur and professional, I had seen over the years.

I started with some basic ideas. The mount should be massive, not for strength, but to limit vibration. It should be a fork mount with arms sufficiently long to allow the tube to swing through them. The tube should be an open one. The mirror should be of 12" diameter, made of glass having a negligible coefficient of expansion.

From these basics I turned to the detailed design. The tube, of open construction, should be made of say 6 longitudinal tubes made of dural about 3/4" diameter held in 6 cast dural rings. As the mirror was to be 12" in diameter, these rings would need to be about 14" in diameter. At the tube's centre of gravity should be a strong box section to carry its trunnions. Its length would depend on the focal ratio of the mirror. To keep to a tube length of about 6' would require the 12" mirror to be of f6 focal ratio.

The drive should be electric, operating a worm shaft and geared down to give a large worm-wheel on the polar axis 1 revolution in 24 hours minus 4 minutes, with provision for slow motions forward and reverse.

The fork mount should consist of a large circular steel plate about 3' in

diameter which would rotate on ball-bearing rollers at its rim. I had in mind for this, the external fly- wheel from a dis-used steam roller. The stubby polar axis to be welded to its centre would run in a normal ball-bearing and be supported by a thrust bearing.

The arms should be thick steel plate with external buttresses, welded to a broad footing which could be bolted to the circular base plate. A bearing on the top of each arm would carry the tube's trunnions.

To get this design on to paper, I spent a lot of my spare time over the next few months making drawings of each part, frequently changed as fresh ideas occurred to me. Eventually I made a sketch of the completed instrument as I imagined it.

At this stage I felt a bit flat, having come to the end of what had been an interesting pastime in my leisure hours for several months. I never had any intention of building such an instrument, knowing that it would entail an enormous amount of work well beyond my capacity. When, however, I showed my wife the final sketch, she was very interested but remarked that I would have to wait until we returned home before I could start making it. My wife has always been sympathetic towards my various hobbies over the years and apparently she had assumed all along I was designing a telescope for myself. This decided me.

Realising that I should have to get most of the parts professionally made, I sent my sketches to a friend in England - an engineering draughtsman. My own drawings were only very approximately to scale, but supplied most of the essential dimensions. From these my friend was able to produce engineering blue prints of the design of a 12" reflector, which with some changes to correct my errors and omissions, was exactly what I had in mind.

Some of the parts I was able to order in advance from firms in England and a friend stored these in his garage pending my return. At this stage having finished my three year tour of duty in Paris, I returned to England and was posted to Cambridge. After settling in there I was able to take up the telescope project again.

I had a piece of luck over the mirror. I had been advised to obtain this, if possible from a Mr. F.J. Harqreaves, a world-famous mirror maker, so I had written to him at his workshop in Coulsdon, Surrey saying I was in no hurry and would collect the mirror on my return to England in a year or so. He had replied that he was making the lenses for the television cameras used at the coronation of our present Queen Elizabeth and to test them he was using a 12 1/4" disc of Hysil glass 1 1/4" thick with its surface figured to a spherical curve. When finished he would parabolize it for me. When eventually I went to collect it I was most interested to find his workshops were in some underground caves of very even temperature, with a number of refrigeration units to control the humidity.

My greatest difficulty was over the circular base plate for the fork mount. Advertisement failed to produce a large enough second hand fly-wheel, but on returning to England I was able to locate a firm in Letchworth having two spare circular steel castings 34" in diameter and double-dished. One of these would do admirably, provided I could get the outside of one of the dished sections turned smooth to rotate on rollers. Not many firms have lathes which can swing a 34" disc between centres, and I was stumped until I found a sympathetic firm which dismantled the headstock and tailstock of their largest lathe, raised these on blocks to the necessary height and so managed to do the job .

The drive was made to my specification by a firm in Ipswich, specialising in making cams and gears for the Admiralty. I had specified that to avoid vibration I wanted no metallic contact between the motors and the base of the telescope and that the motion was to be conveyed to the worm shaft by a chain drive. They met these requirements in a most ingenious and successful manner.

My own main contribution to the construction of the telescope was building the telescope tube. First I got a toolmaker to make a wooden pattern for the six rings which would hold the six dural tubes. Then I had these rings cast at a non-ferrous foundry. The holes in these rings were reamed out for the 3/4" tubes. I should here mention that having seen in one amateur telescope tube the disastrous effects on rigidity, of boring holes in such tubes, my design precluded any hole being bored anywhere in any tube, and provided for the tubes to be held in the rings by set-screws. My reason for emphasising this will become evident shortly.

One major part of the construction which I had to have done professionally was the cutting and welding of the heavy steel sheet used for the arms and some other parts. This was done by local firm.