

**ANNUAL REPORT OF THE UNION OBSERVATORY,
JOHANNESBURG**

1954

(Director, Dr. W.H. van den Bos, Union Astronomer)

1. *Astronomical Observations and Research.*

The 26½-inch refractor has been used on 153 nights with the interferometer by Dr. Finsen for the measurement of known double stars and the discovery of new pairs. The telescope has also been used on 48 nights with the micrometer by Dr. van den Bos and Mr. Churms for the measurement of known double stars. During the close approach of Mars to the Earth in June and July Dr. Finsen with the assistance of Messrs. Seligmann and Churms, obtained about 24,000 exposures of the planet on colourfilm on 36 nights.

Visual and photographic observations of Mars were also obtained with the 9-inch refractor on 49 nights by members of the Transvaal branch of the Astronomical Society, who also made observations of Saturn, variable stars etc. with the instrument on 61 nights and rendered valuable assistance to the Staff on visiting evenings and in many other ways.

With the 9-inch and 6-inch refractors 151 occultations of stars by the Moon have been observed by Messrs. Bruwer, Churms and amateur astronomers. The results have been communicated to H.M. Nautical Almanac Office.

The Franklin-Adams telescope, with its aperture ratio of 1:4.5, has been handicapped by increasing city lights and smoke. Early in August the telescope was dismantled and, with the assistance of the Public Works Department, transferred to the Observatory Annexe at Hartbeespoort, where it will once more have the benefit of a dark night sky.

The following plates were obtained by Messrs. Bruwer and Churms with this telescope before it was transferred:

Minor Planets	154 plates
Comets	33 "
Miscellaneous	5 "
Total	<hr/> 192 "

In addition, 2 plates for minor planets and 9 plates for comets were obtained by Mr. Bruwer with the Rockefeller telescope of the Leiden Southern Station by kind permission of the Leiden Observer and 5 plates by Mr. Churms with the 6-inch photovisual refractor.

The resulting positions of minor planets and comets have been regularly communicated to the respective Central Bureaus of the International Astronomical Union at Cincinnati and Copenhagen.

The card catalogue of double stars south of -19 degrees declination has been kept up-to-date and information supplied to other astronomers on request. The manuscript for a General Catalogue of Double Stars south of -19 degrees declination, mentioned in previous reports, has been completed, but in such a form that it can be brought up-to-date when the time for publication arrives. It contains 18,680 entries and an index to discoverers' numbers. For comparison, the loose-leaf General Catalogue for the same region of the sky published by Dr. Innes in 1927 contains 6,902 entries.

Counts of sunspots with a 3-inch refractor were obtained on 308 days, the other days of the year being overcast or unsuitable for reliable counts. The results are communicated daily to the Telecommunications Research Laboratory of the South African Council for Scientific and Industrial Research, and monthly to the Magnetic Observatory at Hermanus and the Receiving Station of the South African Broadcasting Corporation at Panorama.

2. *Publications.*

Circular No.114 is at the printer. The Annual Report for 1952 was received and awaits distribution together with the Circular. The following papers by members of the Staff were published during the year:

W.S. Finsen,	New Double Stars	<i>The Observatory</i> , 74, 41.
J. Hers	Relay unit for time signal receiver.	<i>Journal of Scientific Instruments</i> , 31, 146.

3. *Public Service.*

The Time Service is under the general supervision of Dr. Finsen, with Mr. Hers in charge, assisted by Mr Seligmann and, when necessary, by Messrs Bruwer and Churms.

Further improvements have been made to the quartz crystal clock and time signal installation, mainly with a view of making it as independent as possible of power interruptions. The six British Post Office oscillators have each been fitted with a separate vibrator unit to supply high tension, while the oven units, which require 50 cycles alternating current, are switched over to the 50 cycle heavy-duty vibrator units during a mains failure. Two oven units have been replaced by experimental equipment in which small polarized relays take the place of the original thyratrons, thus reducing the A.C.

power requirements from about 30 watts to 1.5 watts per unit. This can readily be obtained from ordinary radio vibrators, while the power for heating the ovens is obtained directly from the 12 volt battery without converters of any kind.

Power failures totalled 19 hours, the greater part occurring before modifications to the equipment had been completed, but at no time was the continuity broken. Oscillator 4C, which was used to control the signalling equipment from March onwards, was kept in continuous operation throughout the year, but all other oscillators were stopped at various times for alterations and maintenance.

At the end of the year the average rates of frequency drift for the various oscillators were as follows:

2A	(Western Electric)	1.7 parts in 10^8 per month
3A	(British Post Office)	8.7
3B	"	3.8
3C	"	1.4
4A	"	0.7
4B	"	2.8
4C	"	1.0

A special measuring console was constructed, which makes it possible to measure time differences and check the operation of most of the important parts of the clock system from a central position.

Since the 5 megacycle transmitter at the Observatory (call sign ZUO) received international recognition as a standard frequency and time signal station -- the only station of its kind in the southern hemisphere -- it became necessary to supply more accurate information regarding the time signals sent out. The original fortnightly bulletin was therefore discontinued in March, and in its place a quarterly bulletin is now published which lists the daily time and frequency deviations. Since there is at present no equipment at the Union Observatory for determining time astronomically, these deviations are quoted with reference to time signals from station WWV (Washington).

Hourly time signals were sent throughout the year to the S.A.B.C. and the Post Office, the latter being interrupted on two occasions as a result of landline faults. In addition, standard frequencies of 1000 cps and 50 cps are sent by landline to the Johannesburg Post Office, where they are used for checking frequencies of carrier telephony and teleprinter equipment.

151 certificates for stopwatches were issued.

The Wiechert horizontal seismograph was in operation throughout the year. The following local earth tremors were recorded:

Light	3048
Medium	710

Strong	251
Very strong	108
Very very strong	51
Total	<hr/> 4168

Monthly returns have been sent to the Inspector of Mines and the Bernard Price Institute of Geophysics.

In addition to these local tremors, 22 distant earthquakes were recorded by the instrument. These records are forwarded to the Bernard Price Institute for inclusion in its monthly Seismological Bulletin. Several have been lent, on request, to overseas geophysical institutes.

Records of rainfall have been sent monthly to the Weather Bureau, Pretoria.

Certificates for legal purposes have been issued and numerous requests for information have been answered. A monthly bulletin giving the astronomical phenomena for the coming month has been sent to the Editor, South African Journal of Science, and to the South African Press Association for distribution to the Press.

There were 35 visiting nights during the year and the total number of visitors received was 1178. When weather permitted, celestial objects were shown with the various telescopes; in addition, a display of astronomical exhibits was arranged in the library.

4. *General.*

Dr. Muller was the Leiden Observer throughout the year. Mr. van Woerden, also from Leiden Observatory, worked at the Observatory from April to October, obtaining a large number of plates of variable star fields with the Franklin-Adams telescope before its transfer to Hartbeespoort.

Dr. Martins and Eng. Paulo from the Lourenco Marques Observatory visited the Union Observatory from September 1 to 10 to study the Time Service installation.

The Union Astronomer visited the Harvard Southern Station at Mazelspoort and the Royal Observatory at the Cape in April.

Astronomers Beggs, Burdecki, Cousins, Evans, Koelbloed, Martins, Paulo, H and E. Smith, Stoy, Thackeray and Velghe visited the Observatory.