The Calibration Equipment of the ESO Schmidt Telescope

Some time ago, two calibrating devices of completely new design were installed in the ESO Schmidt telescope. Invented by ESO astronomer Dr. André Muller, they permit simultaneous exposure of the sky and the calibration marks in the telescope. This greatly increases the accuracy of the calibration of the photographic plate, a problem that has always worried astronomers. Dr. Muller explains how it works:

Some time ago the ESO Schmidt telescope was equipped with a calibrating device specially designed to produce calibration marks in exactly the same way as the stars and galaxies are acquired on the photographic plate. The philosophy behind the design is that the most reliable calibration is obtained if done simultaneously with the sky exposure, i.e. simultaneous and equal exposure time for sky and calibration marks.

Two projectors were constructed and mounted inside the telescope tube, as shown in Figure 1, in such a way that the projectors cause no light obstruction for the entering star and sky light. The calibration marks are projected on the sky background at the east and the west edge of the photographic plate.

The design of the projectors is shown in Figure 2. The light source (107) is chosen as to match as well as possible the required colour characteristic. The light passes through two different quartz windows (106). The size of the front window is matched by means of a diaphragm (25) with the diameter of the projecting lens (102) in order to avoid light scatter inside the projector tube. The lens (105) images the diaphragm (25) on lens (102) which projects an image of a step-wedge (104), placed immediately in front of lens (105), on the photographic plate. The intensity of the light passing through diaphragm (25) is variable and depends on the exposure time of the photographic plate. In order to keep the colour characteristic of the light constant for different intensities, the light source (107) can be shifted along the axis (30) of the projector tube over a range of 1 to 12 cm from the quartz windows (106) covering an interval of nearly 5.5 magnitudes which has proved to be amply sufficient for the used range of exposure times.

The homogeneity of the light spot on the photographic plate was tested by removing the step wedge and measuring the density on the photographic plate of the image of the lens (105). Density variations of 0.01 were measured over the full size of the image which is 9.4 times larger than the actual surface used for the projection of the step-

---

1.52 m Spectrographic Telescope

Oct. 1977:	Breysacher/Azzopardi, Ahlin, Foy, van Paradijs/van den Heuvel, Materne/Tarenghi/Chincarini, Schmidt-Kaler/Kühn/Feitzinger/Reinhardt, Imbert.
Nov. 1977:	Imbert, Wamsteker, van Paradijs/van den Heuvel, Bergvall/Lauberts/Westerlund/Ekman, Dennefeld/D'Odorico, Kohoutek, Surdej/Breysacher, Sterken/Jerzykiewicz, Lacoarret.
Dec. 197	Lacoarret, Melnick, Dennefeld, Dennefeld/D'Odorico, Mauder, Klutz, Pakull.
Jan. 1978:	Pakull, Breysacher/Muller/Schuster/West, Schnur, Kunth, Westerlund/Olander, Seggewiss/Maitzen, Breysacher/Westerlund, Dravins.
Feb. 1978:	Dravins, Ardeberg/Lyngå, Georgelin/Comte, Breysacher/Muller/Schuster/West, Reimers, Gahm, Danks.
March 1978:	Danks, de Loore, Wamsteker, Breysacher/Westerlund, Andersen, Ahlin, Hunger/Kudritzki, Surdej.

1 m Photometric Telescope

Oct.	Thé/Staller, Alcaíno, Wamsteker/Schober, Epchtein/Turon.
Nov. 1977:	Vigneau, Vogt, Bergvall/Lauberts/Westerlund/Ekman, Wamsteker.
Dec. 1977:	Crane/Dennefeld, Lequeux/Mianes/Vigroux, Muller/Surdej/Schuster/West, Wamsteker, Salinari, Mauder.
Jan. 1978:	Mauder, Crane, Wlérick, Schnur, Westerlund/Olander, Pakull, Lub, Schröder.
Feb. 1978:	Schröder, Schnur, Lelièvre, Vogt, Knoechel, Gahm.
March 1978:	Gahm, Möllenhoff, Dennefeld/Materne, Adam, Wamsteker/Schober, Wamsteker, Sherwood/Arnold.

50 cm ESO Photometric Telescope

Oct. 1977:	Bouchet, Vogt, Bouchet, Wamsteker/Schober, Duerbeck.
Nov. 1977:	Duerbeck, Vogt, Duerbeck, Kohoutek.
Dec. 1977:	Kohoutek, Surdej, Vogt, Surdej.
Jan. 1978:	Surdej, Vogt, Pakull, Seggewiss/Maitzen, Haug.
Feb. 1978:	Haug, Knoechel, de Loore.
March 1978:	de Loore, Vogt, Bastiaansen.

GPO — 40 cm Astrograph

Oct. 1977:	Azzopardi/Bijaoui, Blaauw/West, Azzopardi/Bijaoui.
Nov. 1977:	Blaauw/West, West/Muller/Schuster/Surdej, Martin.
Dec. 1977:	Martin, West/Muller/Schuster/Surdej, Martin.
Jan. 1978:	West/Muller/Schuster/Surdej, Blaauw/West, Gieseking.
Feb. 1978:	Zeuge, Blaauw/West, Gieseking, Azzopardi.
March 1978:	Azzopardi, Blaauw/West, Gieseking, Azzopardi.

50 cm Danish Telescope

Nov. 1977:	Renson, Sterken/Jerzykiewicz.
Dec. 1977:	Sterken/Jerzykiewicz, Heck, Klutz, Heck.
Jan. 1978:	Heck.

Do not forget ...

... that applications for observing time during period 21 (April 1, 1978 to October 1, 1978) must be sent to ESO-Munich **before October 15, 1977.** It has been decided that late applications will **not** be considered this time.

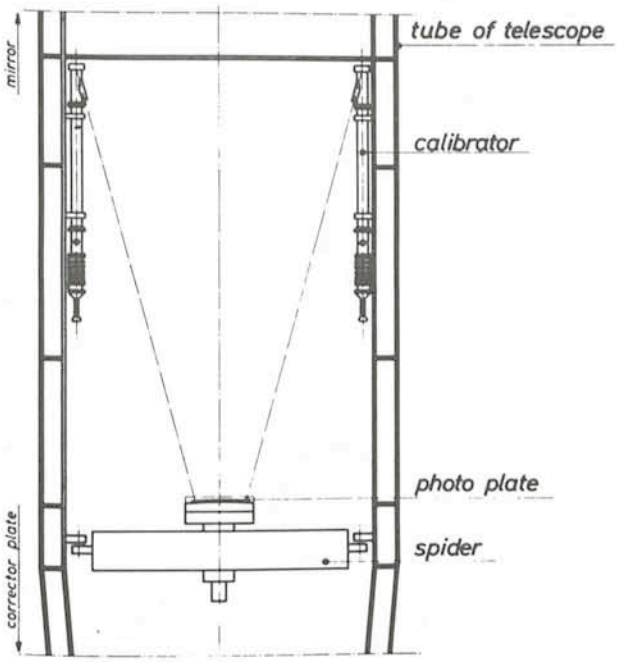

Fig. 1. — *The two calibrators are mounted inside the tube of the Schmidt telescope and projects calibration marks on the photographic plate.*

wedge. This is fully acceptable for photometry on Schmidt plates. The same exposures were used to measure the existence of scattered light. Density variations in the wide surrounding of the calibration marks were of the order of 0.01 and no systematic density pattern could be found, proving that no disturbing light scatter occurs.

As the projector is mounted just outside the actual limiting light beam of the telescope, the projection angle is slightly larger than the angle of incidence of the star light at the edge of the plate. This causes an image distortion resulting in a magnitude difference over the height of one calibration mark of the order of 0.003 which is negligible. The projectors are dust-proof protected at the front side by a quartz window (103) which is mounted rimless, allowing effective and easy regular cleaning. The mounting of the mirror (101) which reflects the image to the plate is very delicate because the slightest stress on this mirror causes unacceptable image distortion. The mirror position can be adjusted to enable the positioning of the calibration marks at the plate edges. Figure 3 shows one of the two calibration marks copied from an original plate. The details in the dense parts do not show up well in the reproduction.

ESO Fellowships 1978–1979

The European Southern Observatory (ESO) intends to award up to six fellowships tenable in the ESO Scientific-Technical Centre which is presently located on the grounds of CERN in Geneva.

The main goals of the Centre are as follows:

- to carry out a programme of development of auxiliary instrumentation for the large telescope;
- to make studies in observational and theoretical astrophysics so that the observing facilities can be used in an optimal way;
- to foster cooperation in astronomy and astrophysics in Europe.

Most of the scientists in the Centre come from the Member States of ESO, but some are from other countries. At present, the Member States of ESO are: Belgium, Denmark, the Federal Republic of Germany, France, the Netherlands and Sweden. In addition to regular staff members, the Centre comprises research associates and post-doctoral fellows.

ESO facilities include the La Silla Observatory in Chile where telescopes with apertures of 1 m and 1.5 m as well as a 1 m Schmidt telescope have been in operation for some time, while a 3.6 m telescope is becoming operational in 1977. The ESO Sky Atlas Laboratory is located in Geneva. A CDC 7600 computer system is available at CERN.

Applicants should have a university degree, preferably a doctorate. The basic monthly salary will be not less than SFr 3076. The fellowships are granted for one year, beginning about September 1978, with reasonable possibilities for renewal for a second year. Applications should be submitted to ESO not later than 31 December 1977. Applicants will be notified by the end of February 1978. The ESO Fellowship Application form should be used and be accompanied by a list of publications. In addition, three letters of recommendation should be obtained from persons familiar with the scientific work of the applicant. These letters should reach ESO not later than 31 December 1977. Late applications may be considered in exceptional circumstances.

Enquiries, requests for application forms and applications should be addressed to

European Southern Observatory
Fellowship Programme
Schleissheimer Str. 17
D-8046 GARCHING b. München
Federal Republic of Germany

Telephone (089) 3204041

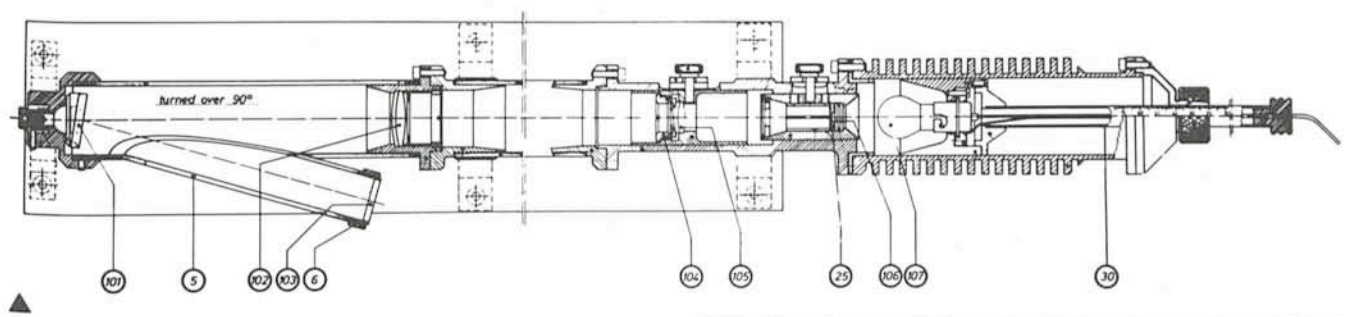

Fig. 2. — *The design of the calibration device. Details are explained in the text.*

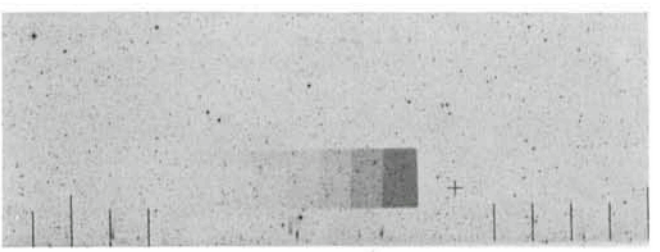

Fig. 3. — *Example of calibration marks on an ESO Schmidt plate. Exposure 90 minutes, IIIa-F (127-04) + RG 630. Two such marks are imprinted on each plate. The present wedge has only seven steps and will be replaced by another with fourteen steps, in order to improve the calibration accuracy. The weakest step is less than 0.01 density above sky background.* ▶