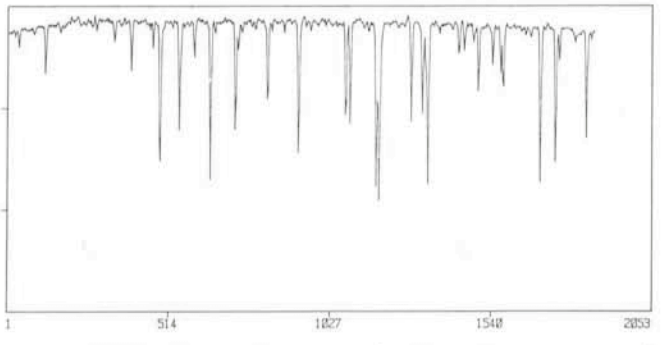

Fig. 4: *Spectrum of Nu Indus at 5135 Å. The spectrum covers 42 Å (5114–5156 Å) and a signal-to-noise ratio of 120 is obtained on this 5.2 magnitude star after 30 minutes at a resolution of 60 mÅ.*

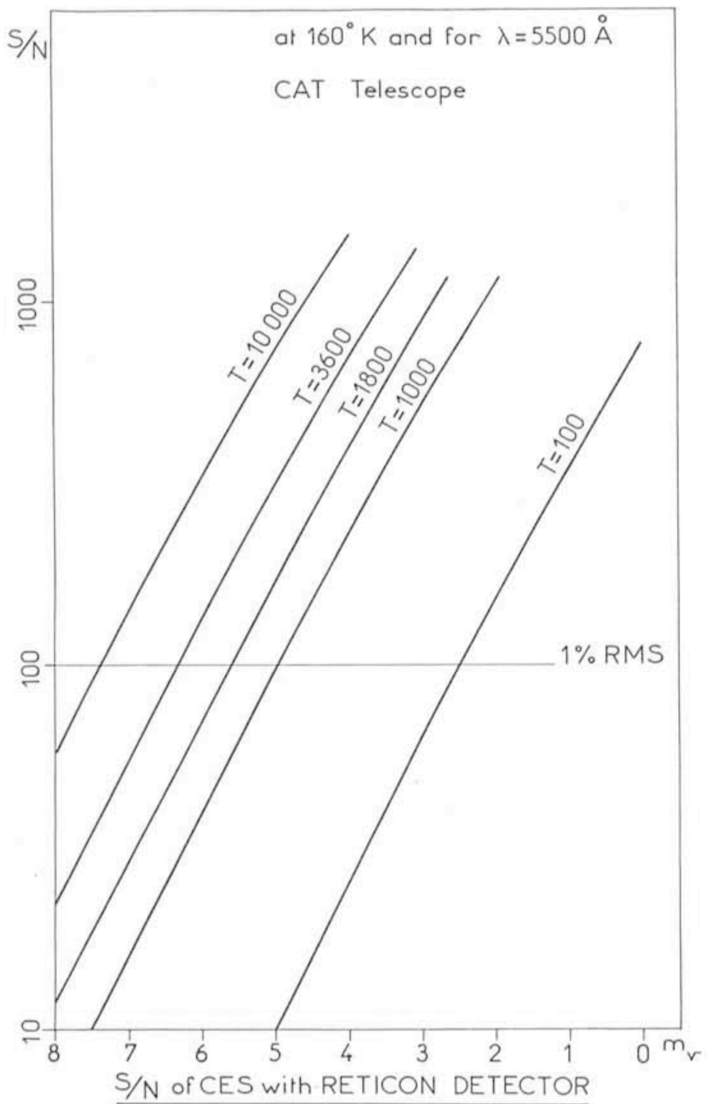

Fig. 5: *Efficiency curves of the CES with a Reticon. They give the signal-to-noise ratio one can expect for a given integration time and under reasonably good seeing conditions at 5500 Å. For lower wavelength the Reticon sensitivity decreases fastly and corrections must be applied.*

First Results

(a) *Resolution.* Results obtained in the laboratory have been confirmed. Effective resolution (FWHM of instrumental profile) versus slit width is shown by Figure 1 for the red path. Resolution in the blue is slightly worse because of the poor quality of the pre-disperser prism. It is foreseen to replace that prism in the near future. Figure 2 illustrates the extremely low level of stray light, a result of the high quality of the échelle grating and of the pre-disperser which introduces into the spectrometer a minimum of light.

(b) *Observations of Arcturus.* This very bright star has been observed in several wavelengths and provides an easy comparison with other observations. Figure 3 shows the spectrum obtained around 6110 Å with the Reticon, and an expansion of the same spectrum showing the Ca lines around 6102 Å. Results obtained with the scanner are very similar in quality to those obtained with the Reticon. Difference in depth of absorption lines was found to be less than 1%. Efficiency of the Reticon is however much higher because of simultaneous multichannel integration and high quantum efficiency.

(c) *Observation of Fainter Objects.* In order to determine the limit of the instrument, a number of objects up to magnitude 6.5 have been observed. As an example, Figure 4 shows a spectrum of NU INDUS (V = 5.22) obtained in the 6102 Å region with an integration time of 30 minutes.

The efficiency curves of Figure 5 have been calculated taking into account the average good seeing obtained with the CAT and the real noise level of the Reticon. These curves are in good agreement with practical observations so that they can be used as a guide for determination of observing time. However, many parameters have also to be considered such as:

- Relative quantum efficiency of the Reticon. (For example, the loss of sensitivity for H and K lines is nearly one magnitude.)
- Relative distance from the blazed wavelength of one order. The corresponding loss of efficiency can be as high as 50% and is calculated by the programme for the central wavelength.
- Actual seeing and slit width.

Present Status and Availability

The instrument is now operational at La Silla. However a few functions like the setting of the slit widths and the selection of neutral densities for the calibration are still manual. Full control from the main console is expected to be installed during the first half of 1982. The CES will be offered to visitors from January 1st, 1982.

Further improvement of the instrument will be considered in the near future. A very promising development would be the installation of a CCD detector possibly coupled to an F/3 camera. The resolution would be reduced to 60,000 but a gain of 3 to 4 magnitudes is to be expected.

New Large Interference Filters for the 3.6-m Triplet

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The triplet adaptor (see *The Messenger* No. 16, page 26 for a description by M. Ziebell) was put into operation in November 1979 and since then it has been used regularly both with large 240 × 240-mm plates and with the 40-mm McMullan electronographic camera (*The Messenger* No. 19, p. 33).

In the meantime new photographic possibilities at the prime focus of the 3.6-m telescope have been implemented. Thanks

Table 1. – Characteristics of the new interference filters now available with the triplet corrector

Nominal mean wavelength (Å)	6748	6577	6500	5024	4880
Mean effective wavelength at the 3.6-m Prime Focus (Å)	6735	6565	6488	5014	4871
Bandpass (Å)	110	58	100	100	110
Variation of central wavelength over ∅ 220 mm (Å)	14	10	18	10	8
Variation of BW over ∅ 220 mm (Å)	1	0.5	2	4	2
Peak transmission (%)	91	90	96	92	76.5
Blocking T < 0.1 %	0.3–1 μm	0.3–1 μm	0.3–1 μm	0.3–0.88 μm	0.3–1 μm

to improvements of the dark-room it is possible not only to obtain a better development of the large-format plate but also to make use of IV N plates sensitized with the silver nitrate technique.

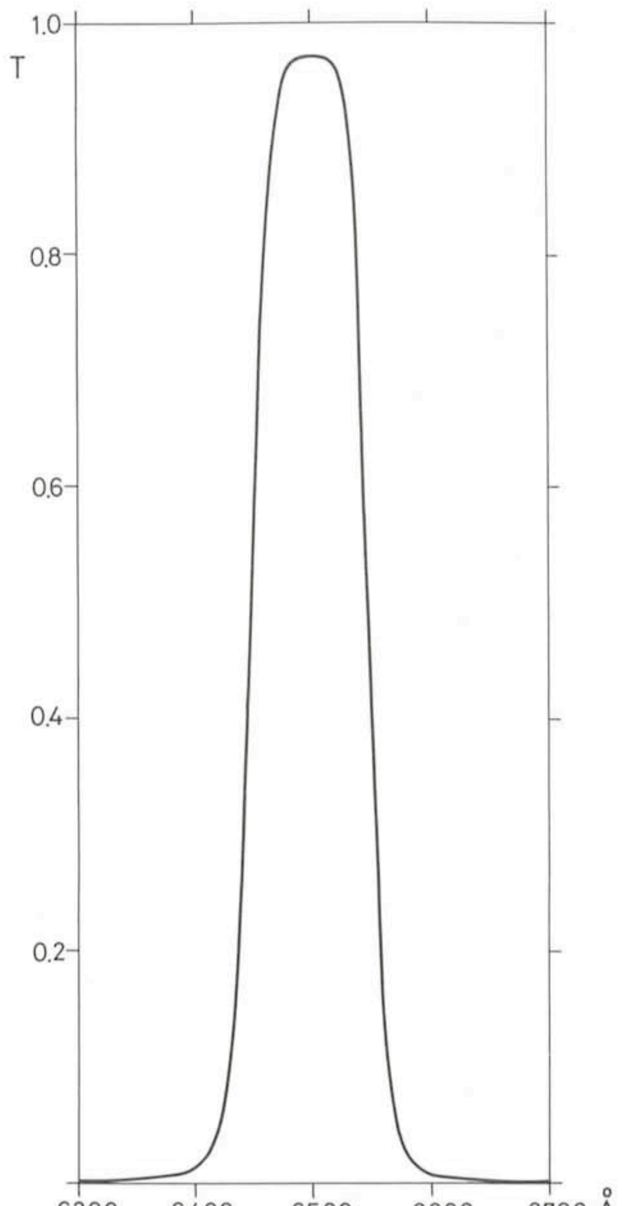

Fig. 1: *Transmission curve of the H_α "continuum" filter for the triplet corrector.*

Two of the four available large-field (~ 1°) transmission gratings have been used with complete satisfaction by the visiting astronomers.

The 80-mm McMullan electronographic camera has been tested, showing good mechanical and electronic performances but an unacceptable quality of the tube. A new tube will arrive soon. Finally a Racine wedge is in the process of being ordered.

A set of large interference filters have recently been developed for use at the 3.6-m telescope and the triplet corrector. These filters are 230 × 230 mm large, the useful area being however limited to a circle of 220 mm in diameter.

They are multilayer filters and they exhibit the typical band shape of this type of filters with steep side slopes, an example of which is given in Figure 1. Despite their very large size, the central wavelength varies by less than 20 % of the bandpass over the surface, and the bandpass is practically constant.

For anyone aware of the difficulties of making large interference filters there is no doubt that this represents a great achievement and the present ultimate state of the art, thanks to the talent of Dick Bennett from Andover Corp. Moreover, the optical quality is kept excellent—no detectable degradation of image quality being noticed—and the two external faces are coated with a hard and cleanable anti-reflexion coating. Transparency is therefore improved and intensity of ghost images reduced.

Table 1 gives the main characteristics of the filters which are now available at La Silla.

Because of their size it was not possible to measure the performances of these filters on a classical double-beam spectrophotometer. A new type of instrument has been used.

This instrument has been developed to measure the absolute transmission or reflexion of optical elements whatever their size and optical power. It is therefore possible to measure absolute efficiency of mirrors, lenses and even gratings up to 60 cm wide. A new set of interference filters has also been developed for use with the 40-mm and 80-mm MacMullan cameras. They correspond to the u, v, b, y' bands of the Strömgren photometric system and come in addition to the present glass filters (Table 2). Their main advantage is that red leak beyond 6500 Å inherent to glass filters is totally suppressed.

Their useful diameter is 110 mm and variations over the surface are negligible with respect to the bandwidth.

The first picture obtained in a test night is shown in Figure 2; it shows the Orion nebula. The print presented here has been obtained by making use of the masking technique by C. Madsen (*The Messenger* No. 26, p. 16). The filamentary structure is well visible both in the central region and in the external envelope.

Table 2. – Characteristics of the u, v, b, y' interference filters now available with the McMullan camera and the 3.6 m telescope

Nominal mean wavelength (Å)	3457	4090	4708	5771
Mean wavelength corrected for 3.6-m Prime Focus (Å)	3443	4078	4700	5760
Bandpass (Å)	365	156	180	186
Peak transmission (%)	57	63	82	94.5
Blocking T < 0.1%	0.3–1 μm	0.3–1 μm	0.3–1 μm	0.3–0.84 μm

The second example of use of the interference filter is showing NGC 300 (Fig. 3). The heliocentric radio velocity of NGC 300 being only 145 km/s, the H_α filter is almost centered on the H_α emission of the galaxy. A comparison between the blue and the H_α images gives a clear picture of the location and structure of the numerous H II regions.

Fig. 2: *The Orion nebula. One hour exposure on a 098–04 emulsion behind the H_α interference filter at the prime focus of the ESO 3.6-m telescope.*

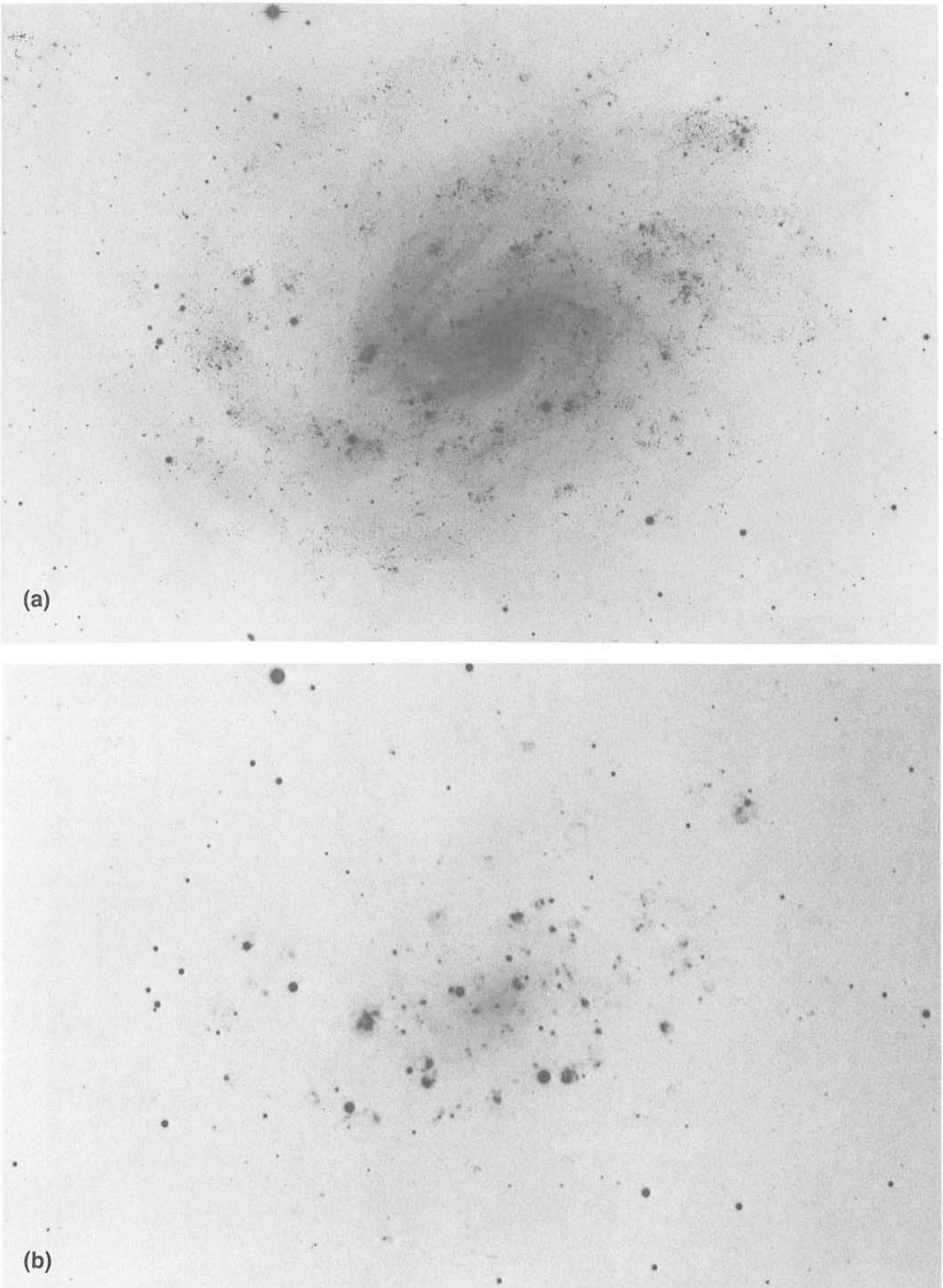

Fig. 3: *The Sc galaxy NGC 300: (a) A 10-min exposure, with the blue corrector, on a IIa–O baked plate, without filter; (b) a* 1^h30^m *exposure, with the red corrector, on a 098–04 emulsion behind the* H_α *interference filter.*