Film:	Kodak
Weight:	17 kg

Gondola:

The Observatory of Geneva system constructed in cooperation with the Space Astronomy Laboratory of Marseille.

Guiding:	single axis by servo-guided siderostat of 300 × 300 mm
	RMS precision of 20 arc seconds magnitude range $m_B = -2$ to $+6.4$
Total weight:	337 kg
Flight altitude:	40 km, balloon of 350,000 m^3

Construction of the ESO Headquarters Building

The Max-Planck Society informed ESO that the construction company in charge of the ESO project has unexpectedly run into financial difficulties and that a new construction firm has now taken over the project.

There will be some delay but the termination of the building is still expected for summer next year. The exact date is 31 July 1980.

Cassegrain Echelle Spectrograph (CASPEC)

M. le Luyer, J. Melnick, W. Richter

The CASPEC figures prominently among the future, highly advanced auxiliary instruments for the ESO 3.6 m telescope. It will allow high-dispersion, spectroscopic observations of comparatively faint objects to be made in a reasonable amount of observing time. When it enters into operation in late 1980, it will become possible to analyse distant stars and nebulae in great detail. The CASPEC project is directed by Maurice le Luyer, Jorge Melnick and Wolfgang Richter from ESO Geneva.

CASPEC is the first major instrument for observation at the Cassegrain focus of the 3.6 m telescope which has been designed by ESO and which is now going into manufacture. This seems to be the appropriate moment to describe the main features of the instrument and to hope for eventual comments from the future users, comments which are useful for the finalization of the instrument.

1. Astronomical Purpose

Placed at the Cassegrain focus of the 3.6 m telescope, the CASPEC will provide astronomers with spectrograms of resolutions previously obtained only with large coudé instruments, where a significant fraction of the light is lost in additional reflections required to bring the beam to the remote coudé focus. The considerably higher dispersion of echelle gratings as compared to conventional grating spectrographs makes high-resolution work possible at the Cassegrain focus. The CASPEC will allow observers to obtain high-resolution spectra of objects much fainter than what would normally be possible with a coudé spectrograph.

The possibility of obtaining high-resolution spectroscopic observations of stars as faint as 15 magnitude will open a vast field of research to European astronomers, in particular since very high resolution studies of the properties of galactic and nearby extragalactic stellar and interstellar systems only observable from the southern hemisphere will become possible for the first time.

2. Optical Concept

The concept is based on a 15 cm echelle grating and a plane cross-dispersion grating which provide two-dimensional spectra.

The instrument has been designed to be used in three different modes (resolving powers 17500, 30300 and 60600) as shown in table 1. Shown also is the required combination of echelle grating, cross-disperser grating and camera for each of these modes.

The principal detector will be a SEC vidicon tube, which is described on page 34. This tube has a target area of 25 × 25 mm and a pixel size of 25 μm. The last lines of table 1 give slit width and length (and the corresponding angular resolution on the sky) per pixel. The optical scheme uses the minimum number of elements to get a very efficient white instrument. It comprises 3 mirrors, 2 lenses and

Table 1. Optical Parameters

Resolving power	17500	30300	60600
Dispersion at = 5000 Å	9.5 Å/mm	5.5 Å/mm	2.8 Å/mm
Echelle grating	Jobin Yvon	Bausch and Lomb	
blaze angle	46°30′	63°26′	
line pairs	95 mm⁻¹	79 mm⁻¹	31.6 mm⁻¹
Cross disperser			
blaze angle		4°18′	
line pairs		300 mm⁻¹	
White camera			
focus	F = 279 mm		560 mm
aperture	f/1.66		f/3.3
Resolution/pixel			
slit width	144 μ	173 μ	86 μ
sky angle	1″	1″2	0″6–
slit length	192 μ	277 μ	138 μ
sky angle	1″3	1″9	1″

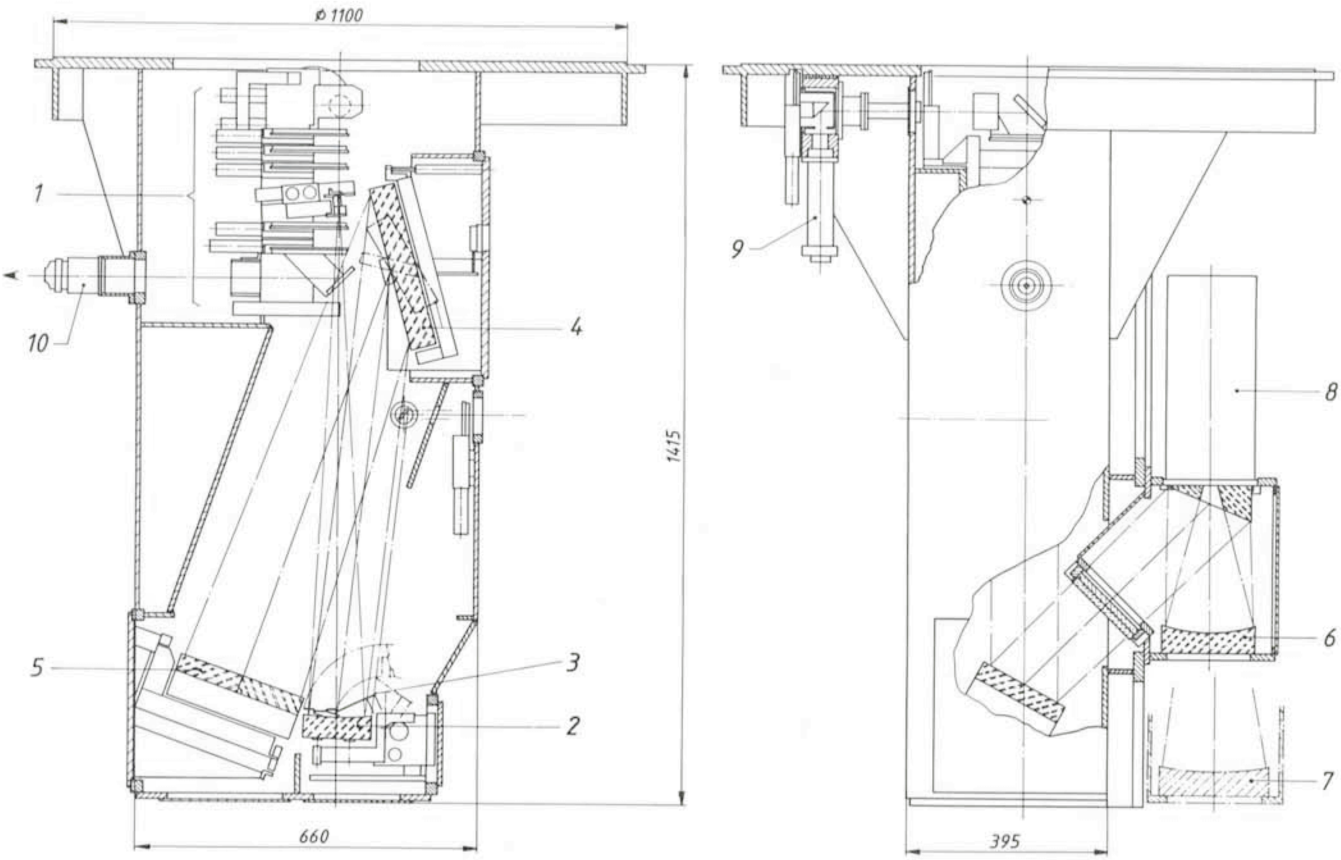

Fig. 1: *CASPEC Assembly: (1) slit area Fig. 2, (2) collimator, (3) Hartmann mask, (4) echelle gratings, (5) cross disperser grating, (6) short camera, (7) long camera, (8) detector, (9) comparison lights, (10) slit rear viewer.*

2 gratings. The wavelength range is limited by the efficiency of the detector, 0.38–0.65 μ for the chosen photocathode of the vidicon.

3. Mechanical Concept

The basic concept is a straight (not folded) very compact layout, leading to a fairly small and strong housing with modules for the different functions as shown in figure 1.

To change from one mode of observation to another requires the exchange of modules. Such a module is a grating with cell, adjustment mechanism and base-flange. Another module is a camera with detector and base-flange.

The echelle grating has a manually operated adjustment screw to centre the spectra on the detector. The tilt of the cross-disperser grating which is used to centre the desired wavelength band on the detector has remote control.

The slit area is one unit which is composed of several modules as shown in figure 2. This gives the possibility for a later exchange of some modules by others. All modules are equipped with remote control (motor and digital read-out). The adjustment ranges are given in table 2.

Table 2. Adjustment Range

Function	Range
Slit opening	0.07 . . . 2 mm
Dekker opening	0.1 . . . 20 mm
Collimator focus	± 3.5 mm
Cross disperser	± 5°

4. User Interface

The status of the instrument is completely controlled through the Instrument Computer and the standard Cassegrain area peripherals. The philosophy is very similar to what is being made for the Coudé Echelle Spectrometer.

A touch panel in front of a display plays the role of a "software" buttons set—the function of each button is given on the display.

A second display shows the status of the instrument. The form-filling technique simplifies strongly the introduction of new parameters.

A third display, which is a graphics one, permits the user to "play" with the data.

5. Data Reduction

The advantage of using a square format has to be paid for by a rather complex data reduction programme. A meeting was organized on this subject last March. J. Melnick, the chairman, reports an page 13 on the discussions of this meeting.

6. Assistance from the Review Team

The Review Team members (J. Andersen, L. Delbouille, E. Maurice, P.E. Nissen) received a very detailed information manual and a complete set of sub-assembly drawings. This gave rise to most fruitful comments and discussions, especially in the following aspects: flexure analysis, controls and electronic interface, data processing (one RT member initialed a small ESO workshop on this subject), image slicer exchange, Hartmann mask design. We feel we have been very much guided by this excellent cooperation of the RT members to whom we extend our grateful thanks.

7. Present Status (2.5.79)

The design is near completion and the bids for optical and mechanical parts have been received. The contracts for manufacture are in the process of being signed.

8. Future Plans

After the definition of the test procedures we have now started with the design of the test facilities. One part comprises the tests in Geneva (stability of spectrograph, functional test of the detector and of the instrument), the other for tests on La Silla. Also in the near future the control and handling aspects will be finalized.

The present planning of the main activities for the subsequent development is shown in table 3.

Table 3. Present Schedule

Activity	Dates	
Manufacture mechanics	May–Sept.	1979
Assembly mechanics	Oct.	1979
Assembly controls	Nov.–Dec.	1979
Manufacture optics	May–Dec.	1979
Optics test Geneva	Jan.–Feb.	1980
Improvements	March–May	1980
Integral test	June–July	1980
Shipment	Aug.–Oct.	1980
Installation La Silla	Nov.–Dec.	1980

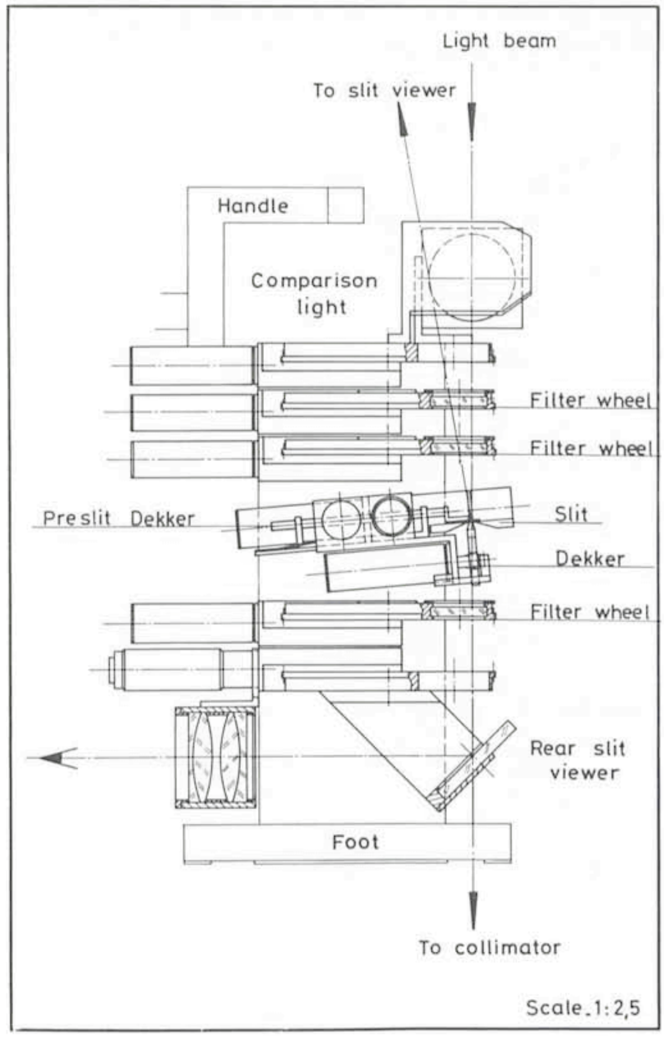

Fig. 2: *Slit area.* ▶

Relative Radial Velocities of Stars Determined from GPO Spectrograms

F. Gieseking

One of the first telescopes to be installed on La Silla was the GPO 40 cm astrograph. Although it is one of the "smallest" instruments at the ESO observatory, it is by no means less productive than the larger ones! On the contrary, the impressive results that have recently been obtained by Dr. Frank Gieseking of the Hoher List Observatory, near Bonn, proves the tremendous potential of this instrument. Thanks to the good accuracy of the measured radial velocities, large-scale investigations of stellar motions can now be carried out.

The General Problem

The *radial velocities* and the *proper motions* of stars (and their possible temporal variations) are fundamental parameters for the investigation of the kinematics and dynamics of stars and stellar systems like binary and multiple systems of stars, stellar associations, star clusters, the galaxy as a whole and clusters of galaxies. Proper motions, however, defined as the angular velocity of the tangential component of the space velocities, are important only in the solar neighbourhood. For example, a binary system, even with the large orbital period of 100 years, consisting of two solar-type stars, has a separation of less than 0.1 arcsecond if at a distance larger than 270 parsecs. With terrestrial telescopes such a system can only be resolved by application of laborious interferometric techniques like speckle interferometry. On the other hand, the error of the tangential motion of single stars as derived from proper motions is proportional to their distances. Typical values for the errors of average accurate proper motions indicate that already at distances larger than 800 parsecs the error of the tangential velocity is larger than ± 6 km s^{-1}.

Contrary to this, the error of radial-velocity measurements is in principle, *independent,* of the distance of the