Data Reduction Facilities Available at ESO in Geneva

P. Crane

Nowadays, the astronomer is likely to spend more time at a computer terminal than at the telescope. To assure efficient reduction of the photographic plates from ESO and other telescopes, fast measuring machines have been provided at ESO/Geneva, together with advanced computer programmes for handling the large masses of data that result from these machines and other instruments. Dr. Philip Crane, who is in charge of the system, describes the present configuration and explains how visitors can request time.

The facilities currently available in Geneva fall into two categories: measuring machines and an interactive reduction programme on the Hewlett Packard computers. These facilities are generally available with priority given to observers with data obtained at ESO telescopes in Chile.

Measuring Machines

The measuring machines comprise on Optronics S 3000 scanning microdensitometer, a Perkin Elmer PDS 1010 A scanning microdensitometer, and a one-dimensional Grant machine which can be used either to scan spectra or to measure spectra manually. Each machine is controlled by a small computer which can be used in stand-alone mode or linked to a central Hewlett Packard computer running the RTE IV operating system. Figure 1 shows this configuration.

The Optronics machine is useful for scanning large plates and for making precise astrometric measures on plates. The machine has enough travel in both x and y to be able to scan the large 36 cm square Palomar and SRC Schmidt plates. The electronics can handle densities up to about 3 and the stability is quite good. Scanning speeds of 10 mm/sec are possible. The mechanical stability and linearity of the system are extremely good. The deviations from linearity are less than 1 micron over the entire travel and there is less than 0.5 micron of hysterisis. Several useful computer programmes exist for doing astrometric reductions on this system.

The PDS machine has only recently been installed. It is a complement to the Optronics since it is able to scan higher density plates at higher speeds. However, the mechanical stability and readout resolution are less than that of the Optronics. The PDS has only a 25 cm travel in x and y. The PDS appears considerably easier to use, although experience is still rather limited.

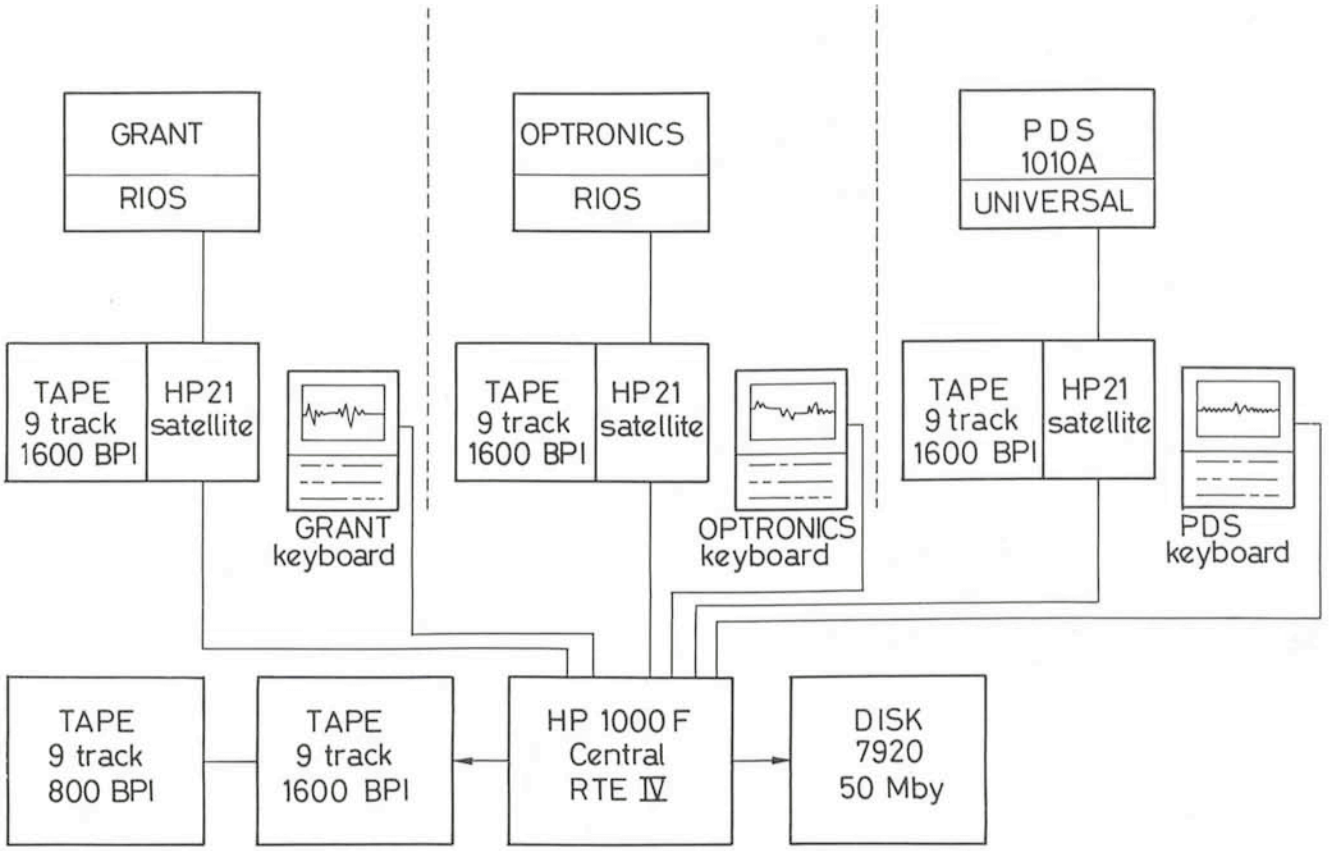


Fig. 1: *ESO measuring machines general organization.*

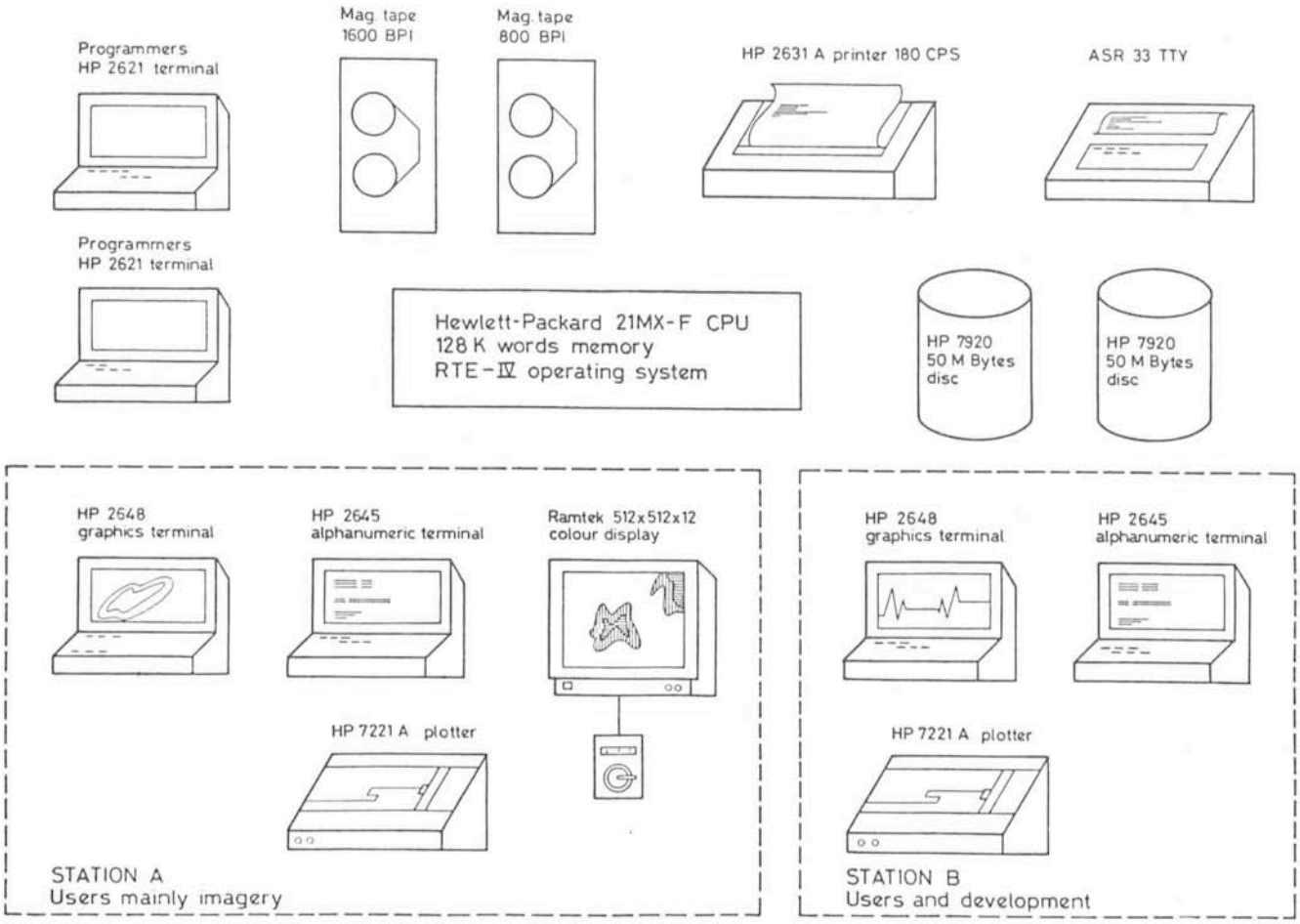


Fig. 2: *ESO main image processing facilities.*

The Grant machine is the one that used to be at ESO in Chile and was shipped to Geneva. For manual measurements of the line positions, good facilities exist to increase the speed and efficiency of the measuring. In particular, a list of the positions of comparison lines and object lines can be entred so that the machine will move automatically to the approximate position of the lines of interest.

When using these machines in the linked mode (i.e. linked to the RTE system), the user can review the data obtained in an on-line way. A small portion of the data is transferred to the central RTE system disk and then the interactive reduction programmes can be used to review the results before setting off on a long series of scans.

In addition to the above devices, there is also a blink comparator which can be used for plates as large as Schmidt plates. There are several smaller manual measuring engines as well as light tables with a travelling microscope.

The output from the scanning machines is in the form of a magnetic tape written on 9 track 1600 bpi form. The data format is an ESO internal one which is well documented. In addition, programmes are available to transform the data into the new FITS (Flexible Image Transport System) format tapes.

Documentation on the measuring machines and programmes available is being written and will be ready by January 1980.

Image Processing

The interactive reduction programmes have been developed to reduce various types of data. The most extensive programmes available are for reducing spectra of various types, but some facilities for two-dimensional photometry do exist and others are under development. Programmes are available to reformat tapes into the ESO internal format for tapes from several different sources. Of course, data obtained on La Silla are already in the proper format. However, IUE data tapes, IPCS tapes, and various tapes from Kitt Peak can be processed. In the future, tapes written in FITS format and ESO internal format will be supported.

Figure 2 shows the hardware configuration of the main system. There are currently three work stations available. Users enter commands from the terminal or use the preprogrammed soft-keys to enter commands. It is also possible to make macro-like commands by stringing together a series of commands into what is called a "Batch" file. All commands operate sequentially, and it is not possible to start up background image processing jobs to run in parallel with the interactive programme.

The repertoire of commands available is growing as well as the demand on the system. Many people are successfully reducing their data with the system. Nevertheless the limitations of the current facilities are becoming clear and it is hoped that soon after the move to Garching, it will be

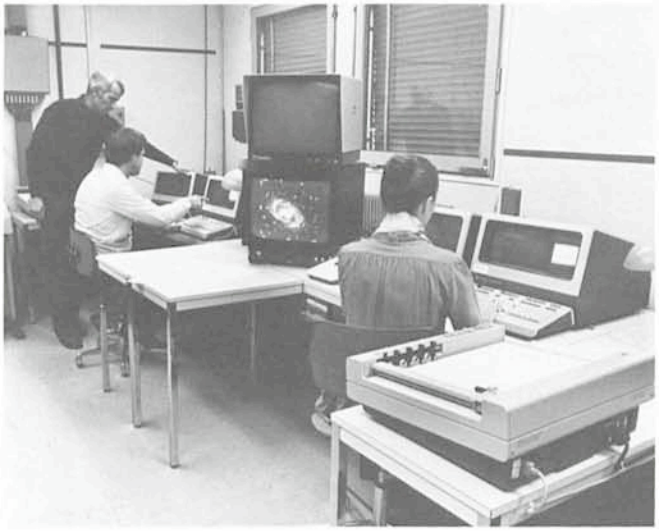


Fig. 3: *The ESO-Geneva image processing room (detail).*

possible to offer more extensive and better services. In the meantime, the development of the applications programmes will continue.

Scheduling and Availability

The measuring machines can be reserved up to 6 hours per day Mon-Fri between 08.00 and 24.00 and up to 30 hours per week. Weekends and the "graveyard" shift (00 to 08.00 hours) do not fall in these restrictions. Normally Thursday mornings are used for maintenance if needed. Visitors should request time at least two weeks in advance. The interactive computer reduction system is scheduled in a similar way except that only 4 contiguous hours per day can be scheduled and up to 24 hours per week. Tuesday afternoons are used for computer maintenance. These are the general guidelines but there is some flexibility if justified.

The procedure for requesting the use of these facilities is to write to the Scientific Group Secretary, Mrs. Renate van Doesburg, ESO c/o CERN, CH-1211 Geneva 23, Switzerland, and to specify the following: (1) Name (should be both the individual who did the observing and the one who will actually use the machines) and address. (2) Nature of the reductions (radial velocities of coudé plates, IDS reductions, astrometry on Schmidt plates, etc.). (3) Machines requested and time required. (4) Accommodations needed (CERN hostel (if available) 16 SFr./night or Hotel about 60 SFr./night or other). Visitors who come to reduce data obtained at La Silla may have their travel and subsistence paid by ESO. This support is normally limited to a maximum of the return travel cost and 5 days subsistence at 105 SFr./day. Observers reducing data obtained at la Silla and requesting ESO support should specify during which observing period their data were obtained. Other visitors should make a more detailed discussion of their project similar to an observing request.

It is the ambition of the ESO staff to provide excellent data-reduction facilities to the user community. This is not a one-way effort. Comments, complaints and, above all, constructive suggestions will be most welcome.

The 4 cm McMullan Camera for the 3.6 m Telescope

Klaus Klim, ESO-Geneva

The testing in Geneva of the 4 cm McMullan Camera for the 3.6 m telescope was completed by the end of September 1979 and it is planned to ship the camera to Chile in November where tests on the telescope will be performed.

The McMullan Camera for the 3.6 m telescope is similar to the camera used on the Danish 1.5 m telescope. A detailed description of the tube and its specification can be found in *Messenger* No. 17: Collaboration on the use of the 4 cm and 9 cm McMullan Electronographic Cameras at the Danish 1.5 m telescope.

The system for the 3.6 m telescope is composed of 3 parts:

— Control Cubicle,
— Camera Unit,
— Cable, vacuum-line and N_2 supply tube.

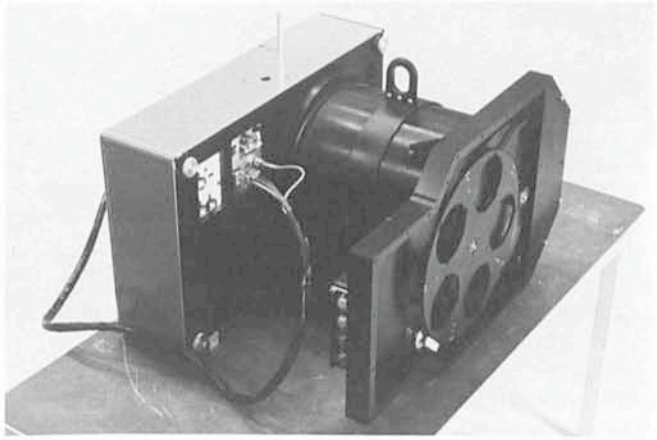
In order to facilitate operation and to increase reliability, it has been decided to install the Control Cubicle in the Cassegrain Cage and to leave the cable permanently on the telescope structure.

This will avoid damage to the vacuum-line which can have a disastrous effect on the tube. The Camera Unit is normally stored on the platform and mounted on the Triplet Adapter for operation (see *Messenger* No. 16).

The Camera is equipped with a filter-wheel and a shutter. The filter-wheel has 5 positions.

Available filters are:

Filter	Composition
U	1 mm UG2 + 5 mm $CuSO_4$ (100 %)
U'	1 mm UG11 + 2 mm BG38
B	1 mm BG12 + 1 mm BG18 + 2 mm GG385
V	2 mm GG495 + 1 mm BG18
R	2 mm OG570 + 2 mm KG3
I	2 mm RG9
Clear	UK50 or UBK7



The 4 cm McMullan Camera for the ESO 3.6 m telescope.