magnitudes are measured from plates of the ESO-SRC sky survey, J colour): at these magnitudes the mean density of objects over the field matches the total number of fibres and the instrument can then be used at its maximum efficiency. It was a clear conclusion of the feasibility study that it would be possible to carry out the survey to such a depth at a rate of about 1.5 square degrees per night. This means that, for example, to survey a strip of 100 x 1 square degrees would take about 70 nights of 3.6-m telescope time. Here we are not going to enter into details neither on the best way to conceive such a survey, nor about the fundamental importance that its results would have for the study of the topology of the Universe and consequently for the theory of galaxy and large-scale structure formation. For an excellent discussion of these points see the review article by Rood (1989).

Before starting the run, it was planned to use the new prototype head just for a couple of nights for testing, and then shift back to the old version for the rest of the programme. After the first spectra were obtained, the improvement in efficiency was so evident that it was decided to go on with it for the whole run.

The ESO grating no. 15 was used together with the f/8 collimator and f/1.9 blue camera of the B & C spectrograph. This combination gives a dispersion of 170 Å/mm and a resolution (FWHM) around 10 Å. This dispersion is quite appropriate to study the distribution and rms velocities of galaxies, for which it is necessary to keep rms errors on cz to less than 50 km/sec. We plan to measure eventually the redshifts using cross-correlation with template spectra (generally of a bright galaxy or a K-type star): this technique permits to reach rms errors on z between 1/25 and 1/10 of the nominal resolution, depending on the S/N ratio of the spectrum. This corresponds in our case to errors in cz between 25 and 60 km/sec.

The OPTOPUS starplates were prepared in Garching in June 1988. The galaxy magnitude limited samples were extracted from a subset of the Edinburgh-Durham Southern Galaxy Catalogue (EDSGC) under completion in Edinburgh (Heydon-Dumbleton et al., 1989), kindly provided by the authors. We observed three areas of 1, 3 and 0.2 square degrees around the South Galactic Pole, all at the same declination and with right ascensions around 22 h, 00 h and 03 h, respectively. The largest region is centred on the rich cluster Klemola 44. The exposure times were usually of 60 minutes divided into two exposures for optimal cosmic-ray elimination. Three or four fibres were used during each exposure to monitor the sky spectrum, while a shorter sky exposure was observed right after each object exposure, offsetting the telescope 1 minute north. In Figure 2a, b we present two partly reduced spectra of faint galaxies in the field of Klemola 44. The sky has not yet been subtracted but its contribution in these spectra is mainly confined to the emission lines. An estimate of the accuracy with which the sky can be subtracted will have to wait for a complete reduction of our data.

The average S/N ratio in the blue-visual continuum of the spectra is around 25: with such a value the rms error on the redshift cross-correlation measurement is expected to be better than 30 km/sec. Therefore it appears that OPTOPUS with the new prototype head is already a well suited instrument for redshift surveys down to at least bj = 19–19.5.

These magnitudes are integral values for the entire galaxies which extend beyond the finite aperture of the fibres. The real fluxes collected by OPTOPUS depend on the surface brightness distribution of the objects. For point-like sources like QSOs it will certainly be possible to reach fainter limits. If we consider also that a further improvement (of the order of 10%) will come from the introduction of the F/6 collimator, we can foresee that the updated version of the OPTOPUS facility will really be one of the most efficient facilities of this kind.

It is also interesting to relate about the "mechanical" efficiency of the system, i.e. the rate of fields observable per night. We observed with 25 independent starplates during 5 actual nights of observations. This can be considered as an upper limit, as the level of technical support to this test run was particularly qualified.

A normal changeover of the starplate takes around 30 minutes. A complete exposure run of a starplate, including mounting, alignment, calibrations, flats, 30 min sky exposure and 1 h scientific exposure, takes around 130 minutes.

An OPTOPUS run at La Silla is a demanding task because of the many operations the observer is involved in: the checking of the starplates, the mounting of them in the special adaptor, the positioning of the fibres in the holes, the alignment on the field in the sky and the monitoring of the resulting CCD spectra.

All these operations have to be done accurately but quickly if you want to maximize your observing time. At times the work becomes frantic and the observer is usually exhausted at the end of a run. However, the effort is well rewarded, if one considers that we collected some 700 galaxy spectra in 5 nights! A similar number of spectra with single-object spectroscopy would have required around 50 nights!

In conclusion, it can be said that the test run with the new OPTOPUS prototype head has been very successful. First, it has shown that the partial modifications introduced in the instrument so far have already improved its efficiency. On the other hand, it has also clearly demonstrated that a large-scale survey of galaxy redshifts down to magnitudes as faint as 19 is possible, not only in the dreams of cosmologists, but is really feasible now, with the instruments we already have.

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Optics and Grisms of EFOSC2

In the *Messenger* No. 52 the construction of a second EFOSC for the 2.2-m telescope was announced. Mechanically, EFOSC2 is virtually a copy of EFOSC but comparison of the optical data (see Table 1) shows considerable differences which for some programmes will make EFOSC2 the preferred instrument, even if it is mounted on a smaller telescope.

The optics were completed by the end of 1988 and measured in the ESO optical laboratory. The transmission of the optics is shown in Figure 1. Compared with EFOSC, the transmission has been improved by a reduction in the

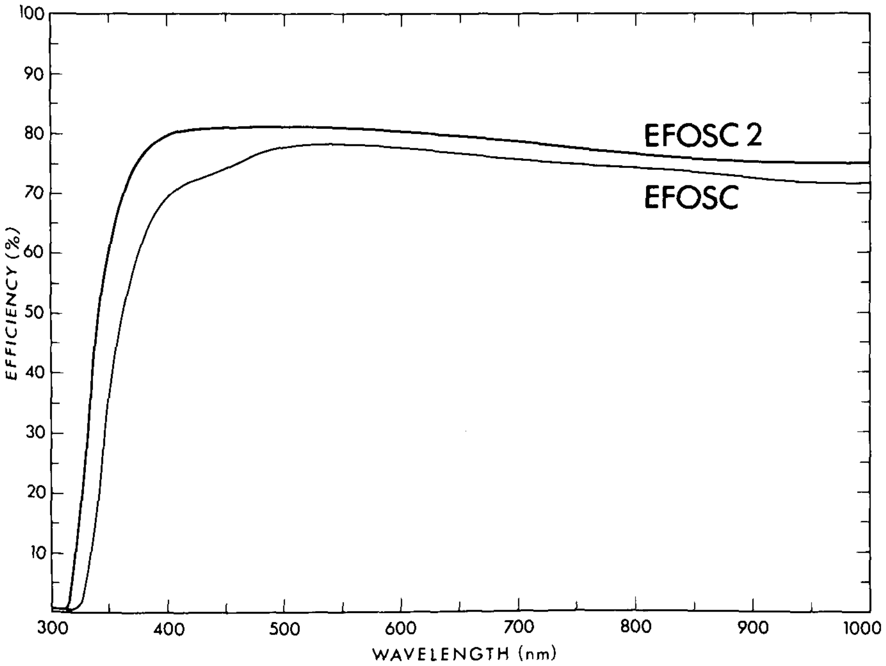

Figure 1: *Measured transmission of the optics of EFOSC and EFOSC2.*

TABLE 1: *Comparison of EFOSC and EFOSC2 optical data.*

		EFOSC/3.6-m	EFOSC2/2.2-m
Camera field (mm)		10 × 15	25 × 25 max.
Field size (arcmin.)		3.6 × 5.8	8 × 8 max.
Wavelength range (Å)		3600–10000	3300 × 10000
Camera focal length (mm)		103	195
Plate scale at CCD (μm/arcsec)		45	52
Dispersion (Å/mm)	grism	up to 120	up to 70
	echelle	55	28
Resolution with 1″ slit		up to 2200	up to 3500

TABLE 2: *Current EFOSC2 grisms.*

Grism #	Dispersion (Å/mm)	Central wavelength (Å)	Wavelength range with TH 1024 × 1024 (Å)	Blaze wavelength (Å)	Blaze abs. efficiency (%)
1	450	4800	3300– 7000	4500	82
2	490	7000	5500–10000	6700	83
3	114	4390	3300– 5800	4000	71
4	124	5620	4100– 7200	4700	76
5	149	7090	5200– 9000	6800	73
6	153	5760	3800– 7700	5100	77

number of lens groups from 6 to 5, a careful selection of glass melts and optical cements used for the production of the optics and by shifting the reflection minimum of the single-layer MgF2 antireflection coating more to the UV. The polychromatic image quality is excellent everywhere in the 25 × 25 mm field; 80 per cent of the light is concentrated in a circle with a diameter of 20 μm (0.″4).

An initial set of grisms has also been completed; their properties are summarized in Table 2. Grisms with higher dispersion and probably also an echelle will be added when the final detector format is known.

In the second half of 1989, EFOSC2 will be used at the NTT for tests. Some scientific work will also be possible, although, because the instrument parameters were optimized for the 2.2-m, EFOSC2 tends to oversample stellar images. On the NTT the scale at the detector is 115 μm/arcsec which yields a field of 2.′9 × 2.′9 with the Thomson 1024 × 1024 chip. With grism # 3 the slit-limited resolution is 13 Å at 4400 Å with a 1″ slit.

After EMMI has been installed and tested on the NTT, EFOSC2 will be moved to the 2.2-m where it will become generally available in the course of 1990.

H. DEKKER, ESO

MIDAS Memo

ESO Image Processing Group

1. Application Developments

Now that system developments in the portable version of MIDAS have stabilized, activities in the area of applications have resumed.

The echelle package is being upgraded to minimize the number of parameters controlling the reduction sequence, and to correct some known deficiencies of the current version. The new package will also be optimized to process data from other instruments like EFOSC and Echelec.

A new package for the reduction of long-slit spectra is now being tested. This package will replace the IPCS context of the old MIDAS version.

In the portable version of MIDAS the implementation of the ROMAFOT crowded field photometry package has been completed for DEC/VMS systems. Currently an upgrade is in progress to port the package to UNIX systems. This upgrade mainly involves the complete implementation of the MIDAS table file system and is expected to be released with the 89 MAY release (see below).

Also in the portable version, the upgrade of the INVENTORY package was finalized. The documentation of the package has been updated accordingly.

A new file system has been implemented in the plot package. In the new release, MIDAS plot information will be contained in only one plotfile. This plotfile is created by the major PLOT commands and will have the name of the frame, table, keyword or descriptor that is plotted. The file extension is ".PLT". Subsequent OVERPLOT commands will append the plot file with the new plot instructions. The SHOW/PLOT command shows the user the name of the current plotfile. MIDAS will allow one version of a plot file: an old plot file with the same name as a newly created one will be deleted. In the SEND/PLOT command, as the second parameter, one can specify which plotfile is to be sent to the graphics device.

2. Data Analysis Workshop

The next Data Analysis Workshop will be held April 18–20, 1989, in the ESO headquarters. Its form will change significantly in the sense that the main emphasis will be placed on astronomical applications rather than on system related software. The first day and a half will be devoted to applications for a specific area, while the last day will be used for MIDAS and ST-ECF sessions.