can be achieved with one image fibre pointing to a conveniently bright star in the field. If such a star cannot be seen on any of the image fibre bundles, one of the arms must be moved to find it.

2.4 Control of the Instrument

An Olivetti M300 PC/AT is used for the general control of the positioners and the Acquisition and Guiding module. The arms are driven by a central master card located in the PC. This card is connected through two optical fibers to slave cards located on each positioner. Both cards, master and slaves, are based on 8 bit 80451 and 80535 microprocessors, respectively.

The coordinates of the arm positions are stored in the master card. The latter questions and sends commands to all the arms; once well received and acknowledged, these commands are executed by the arms. The arms move therefore simultaneously and the maximum time to set up a field configuration from the "parking" position is less than 5 minutes with a repeatability of 10 μm (0.19 arcsec). The master microcontroller continuously scans the whole system. By questioning the master card, the user can observe in "real time" the dynamic state of the system.

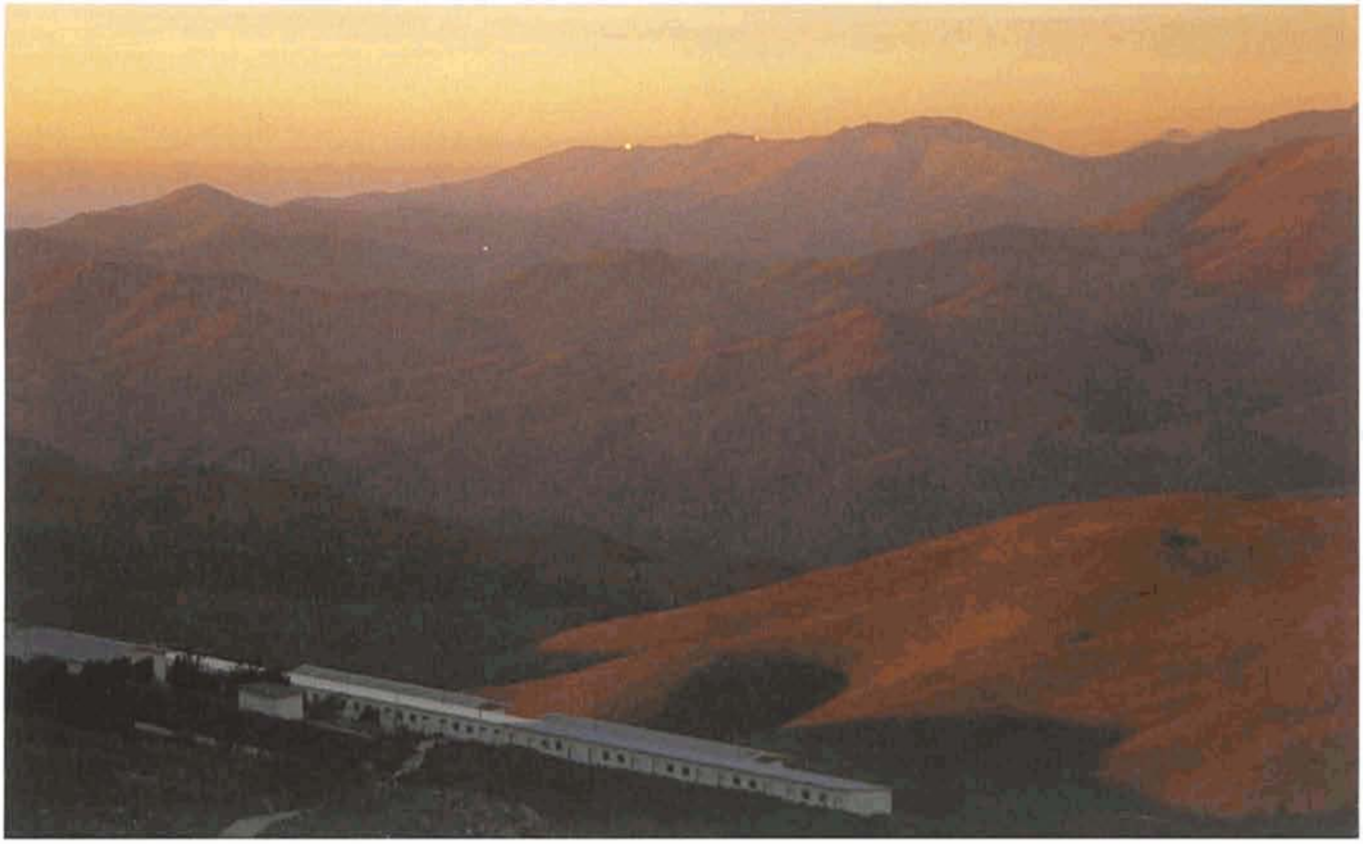
Communications between the master and the slaves are done in serial at a data rate of 375 Kbaud. The two optical fibres (transmit and receive) have a length of 75 m and are provided with an error-detection procedure.

The software that drives the whole instrument is written in C. The user provides files stored on floppy disks with the object coordinates α and δ in the fields of interest. These coordinates are converted in r, θ coordinates in the telescope focal plane. The object-to-arm assignment is made by software using the Hungarian algorithm for the best match and to avoid collisions. The coordinates stored in the master card are then distributed to the assigned arms, which first move the image fibres to the objects. The programme eventually takes care of moving the arms to set the spectroscopic fibres on the targets as explained in section 2.3.

2.5 Spectrograph

The Boller & Chivens spectrograph has been adapted to the use with MEFOS. The standard F/8 parabolic mirror used as collimator and the Schmidt camera have been replaced by two fully dioptric elements, an F/3 collimator and an F/2 camera, respectively. With this new configuration the fibre-spectrograph matching is optimal. As was mentioned above, the light losses at the central obscuration of the camera are avoided and the focal ratio degradation at F/3 is minimal. During the first test observation in January 1991, the spectrograph detector was a Tektronix CCD with 512×512 pixels of 27 μm. The fibre output ends project a diameter of 86 μm or about 3 pixels on the detector. The usual complement of gratings and corresponding dispersions of the B & C spectrograph in the OPTOPUS configuration is available to the observers.

A Distant View of . . . Las Campanas



With reference to the article by W.C. Keel in an earlier issue of the *Messenger* (**55**, p. 29) in which a distant view of La Silla was reproduced, I should like to inform the readers that spectacular views of an observatory are also available to visiting astronomers at La Silla itself.

This photo was taken during my last visit to La Silla on May 2, 1991, around 18.00 from the 1-m telescope. From my experience as a long-time La Silla resident astronomer, the most favourable epochs of the year are are around one and a half months before and after the June solstice.

TH. LE BERTRE (DEMIRM, Observatoire de Paris, France)

3. First Technical Run at the 3.6-m Telescope

The first test run of MEFOS at La Silla took place from January 30 to February 7, 1991. The final instrument structure was used but with nine positioning arms only. The goal of the observing run was to check the telescope interfaces and to practise all instrument mounting and adjustment procedures. The fibre output slit could be mounted either at the spectrograph collimator or at a photomultiplier to verify the accuracy of the fibre centring. The whole system (including the read-out of the photomultiplier) was controlled by the instrument PC in the Control Room.

The spectral calibrations and flat-fields were performed using the Optopus flange mounted, as usual, on the Cassegrain adapter. The lamps sent the beams directly to the prime focus through the central hole of the main mirror. They were controlled together with the spectrograph CCD by the OPTOPUS software package running on the HP 1000 telescope computer.

Apart from minor difficulties in the mechanical installation and in the control software, the main problems were encountered in the object acquisition: at the beginning the arms were not able to reach the correct positions. This was traced down to a slightly erroneous value of the scale we were using. After this correction, the final position of the arms was still not fully satisfactory because the programme did not yet include the field distortion. Nevertheless, once the objects were brought inside the image fibres and analysed with the acquisition programme, the arms could send the spectral fibres to the objects with relatively good accuracy: better than 0.4 arcsec. Two factors contributed to this uncertainty: the spherical aberration produced by the non-perfect alignment of the triplet corrector, and small drifts in the tracking of the telescope during the acquisition exposure time. In the laboratory the procedure of target acquisition and displacement of the arms to put the spectral fibre in front of the object yields an accuracy of better than 10 μm or 0.17".

In the last three nights of the run, a number of scientific exposures were obtained. The most important exposure was on a field of galaxies with magnitudes between 17.5 and 18.6. This field had been observed before with OPTOPUS by C. Balkowsky and R. Kraan-Korteweg. The field acquisition exposure time of 5 min and the spectral exposure time of 1 hour proved to be sufficient for the purpose. The spectrum displayed in Figure 5 is from a galaxy of $m_B = 18.6$, $z = 0.06$ and reaches a signal-to-noise ratio of 50. An actual measurement of the relative efficiency of MEFOS and OPTOPUS is almost impossible because of the strong dependence on seeing. A computation which takes into account telescope, fibre and spectrograph effects indicates that MEFOS should be approximately 25% more efficient than OPTOPUS.

Acknowledgements

The design and construction of this instrument was done under the responsibility of André Collin and the mechanical workshop of the CNRS at Bellevue. We are grateful to Daniel Hofstadt for his continuous support of the project, to all colleagues who helped us during the test in Chile – in particular A. Gilliotte, M. Maugis and O. Lavin – and to P. Focardi for her help in the data reduction.

News on ESO Instrumentation

S. D'ODORICO, ESO

1. EMMI

EMMI, the ESO Multi-Mode Instrument, is in regular operation at the Nasmyth B focus of the NTT since November 1990 (see *The Messenger* **61**, p. 51). In March and April of 1991 part of the EMMI team (H. Dekker as project coordinator and optical engineer, J.L. Lizon for opto-mechanical integration and testing, A. Longinotti and G. Raffi for the control software, R. Reiss for the CCD and the author for the astronomical tests) was again on the mountain for a number of upgrades on the instrument. These are shortly summarized below.

1.1 Multi-Object Spectroscopy

The operation and the first results of the MOS mode of EMMI have been described in the *Messenger* No. **63**. Further work was needed to refine the object selection software, for slight modifications of the hardware and to prepare a user interface. The work is now completed and the mode is in operation. Figure 1 shows one MOS observing sequence. Table 1 lists the main parameters and compares them with the equivalent facility in EFOSC1 at the 3.6-m.

1.2 Medium-Dispersion Spectroscopy with the Dichroic

The DIMD mode is now also in operation. In this configuration the slit is fed by a wide-band mirror instead of the blue- or red-optimized mirrors and the blue and red beamsplitter prism below the slit is replaced by a dichroic prism. All types of coatings represent state-of-the-art coating technology. The absolute efficiencies as measured in the ESO optical laboratory are shown in Figure 2. The EMMI control software fully supports the DIMD mode and allows parallel exposures (but sequential read-out) of the two CCDs.

TABLE 1: *MOS in EMMI and (for comparison) EFOSC1*

	EMMI	EFOSC1
Wavelength range (A)	4200–10000	3600–10000
Field (arcmin)	10×10	3.6×5.8
Punch field (arcmin)	5×8	3.6×~4
Aperture shape	slit	circ. hole
Hole size (arcsec)	1.3×8.6 1.9×8.6*	2.1 3.6
No. objects per field (typical)	10–30	5–15
Punching machine	on line (on EMMI)	off line (control room)

* Available October 1991.