NTT BITS & PIXELS

With this periodically compiled collection of short notes, the NTT Team intends to keep the community informed about changes in performance, configuration, and operation of the NTT and its subsystems.

New NTT Support Astronomer at La Silla

With the arrival of Griet van de Steene on February 1, the NTT Team received some further reinforcement. As a support astronomer at La Silla, she will help Visiting Astronomers with the usage of EMMI and SUSI and also periodically assume the function of the NTT Coordinator.

Griet is Belgian and obtained her master's degree in Gent. Thereafter she moved to Groningen where she worked on the problems of the incompleteness of catalogues of planetary nebulae and the PN distance scale and recently received her PhD from the Rijksuniversiteit there. The NTT Team cordially welcomes her to a busy but exciting job.

Rotator Stops Stopped!

During the last year, the single most important reason for losses of observing time were sudden stops of the instrument rotators, a nuisance which had been around for years. The two most severe problems could now be identified and eliminated.

On side A the problem was that the rotator would stop with accompanying error messages "Power amplifier not ready". It could be traced back to the interface between the ETEL-supplied control system for the amplifier and ESO's control system. The response time of the ETEL system was so short (msecs) that narrow but sufficiently high noise spikes were interpreted as stop commands. Filtering of the input signal has brought this behaviour to an end. Jean-Michel Moresmau's help with the analysis is much appreciated.

On side B the rotator would also stop but *without* any error message. Similarly to the problem on side A, this one was due to noise which made the VME believe that the rotator brake had been engaged manually. Consequently, the software stopped the rotator and disabled the motor driver without issuing an alarm message since the supposed manual intervention could not be assumed to be anomalous. Filtering of the input signal suppressed this problem, too.

Image Analysis and Active Optics Systems

Preparations continued for the implementation of the continuous image analysis in parallel to the scientific exposures. This had been integral part of the initial design of the NTT but was never fully implemented. The offsets between the telescope focus positions inferred from the image analysis and focus exposures taken with one of the scientific instruments have been calibrated for sides A and B. A bug in the field curvature compensating software for the trombones has been identified due to which the focus of the guide probes varies with position in the field. The minimum flux of the guide star of which 80 % are used for the image analysis has been measured. Image shifts induced by lateral displacements of M2 (to correct for decentring coma) were measured and found to be virtually negligible. Extensive tests of the continuous closed-loop operation will take place in February. Once implemented, this operation mode will keep the optical quality of the NTT permanently as close to the optimum as possible and finally make the NTT a truly active telescope.

Telescope Optomechanics

Gerardo Ihle has kindly undertaken precision measurements of the flexure of the telescope as a function of zenith distance. The most important component of the flexure is fully elastic. This is consistent with image analyses performed at different telescope elevations. It opens the possibility to establish, by analogy to pointing models, an active optics model so that the residual corrections to be measured and applied in closed loop are accordingly smaller.

Other tests indicate that M1 may be under permanent stress from its lateral supports which furthermore varies with zenith distance. The resulting deformation of the mirror may not follow one of its natural modes. But astigmatism would not be orthogonal to it, and astigmatism has, in fact, often been found to vary significantly with telescope position. This will be further investigated during tests in February as it may have a bearing on the frequently reported elongated images of point sources.

Further Field Tests of VLT-Like Control Software

In January, the first part of Work Component 4 of the NTT Upgrade Plan was successfully completed. Functionally, it concerned the control of the calibration units and on side A (IRSPEC/SUSI) the autoguider. The real objective, however, was to test the VLT Common Control Software (CCS). A few minor problems with the CCS were discovered. However, their effects could all be worked around on-site, and the conclusion is that the CCS is already in good shape. Feed-back to the VLT Software Group has been formally filed in the form of six SPR's. Test observations showed no difference in performance.

An interesting by-product of some observations has been obtained by Stefano Benetti during the first night when the new control system of the autoguider was not yet fully installed: For exposure times up to 15 minutes and not too extreme telescope positions he also found no significant difference between observations obtained with and without autoguider. Given the much improved pointing which is based on exactly the same software as the telescope tracking, this is no surprise.

New-Generation CCD Controller Tested on EMMI

Also in January, the prototype of ESO's new-generation controller, ACE (Array Control Electronics), was tested on the blue arm of EMMI. This was a test of the entire system that will be used for the FORS and UVES instruments on the VLT; the system includes ACE, the LCU (local control unit), the WS (workstation) and the new modular dewars. All individual modules performed well and the system as a whole demonstrated that the fundamental design is sound.

During 1995, modifications will be made in the hardware and software to prepare for the FORS and UVES instruments. The question of when this system could be installed on the NTT is being

discussed with the newly-formed optical detector group.

An article is in preparation for the next issue of *The Messenger* to provide a detailed description of the controller system and the results of the January test.

New Field Lens Installed in Red Arm of EMMI

The 2k × 2k Tektronix CCD which in February 1994 was installed in the red arm of EMMI has a significant intrinsic curvature. As a result, the focus would be constant only in concentric annuli. Now, a new field lens has been installed which compensates the axisymmetric part of the non-flatness of the detector. The results are described in a separate article in this issue of *The Messenger.*

During the tests it was furthermore confirmed that a lens in the red camera probably is not properly cemented and has some play. Image shifts of the order of 1–2 pixels may occur as the rotator position angle of EMMI changes.

Straylight in EMMI's Echelle Mode Eliminated

Observer Sandro D'Odorico found that the long-known problem of straylight in the echelle mode of EMMI was actually due to external light leakages or an internal parasitic light source outside the beam. The symptoms of this problem could, therefore, be quickly cured by adding some extra light baffles. The investigation of the actual origin of the straylight continues. For observations of faint sources the achieved reduction in effective system noise can be quite significant.

Further Steps Towards Automatic On-Line Data Reduction

The capability to associate incoming calibration frames with science exposures and vice versa has been added by Michele Péron to the MIDAS Data Organizer. Default association rules have been defined for EMMI and SUSI which, however, can be fully customized. This will make the task of the observers much easier as they no longer have to do much tedious bookkeeping when reducing the data.

As a first step towards automatic exploitation of the association table provided by the Data Organizer, Rein Warmels has interfaced the MIDAS CCD package to it. In its present installation, the observer still has to trigger the reduction process in order to exclude unwanted interference with the data acquisition. However, thereafter the reduction is fully automatic and includes the averaging of multiple calibration exposures, bias subtraction, flatfielding, etc.

The next stages such as flux calibration for on-line magnitudes or the extraction of wavelength-calibrated spectra are in preparation.

More Space on Faster Disks

Two fast wide SCSI disks of 4 Gbyte each were attached on workstation insntt where observers perform the online analysis of their data. The loading of a new CCD frame now takes only 2 seconds as compared to 9 seconds before.

The installation of IRAF is now foreseen for February.

Logging of Temperatures and Windspeeds Within Enclosure

Various temperature sensors and anemometers have been installed. The measurements are merged with the telescope operations log files which are transferred daily to the ESO Archive. The Archive will also make them available to archival users of NTT data. The more immediate aim is to build up an empirical database which can be compared with model computations for the windflow within the enclosure. From this comparison and its correlation with actual seeing data, an operations model for the enclosure will be developed which should permit the dome seeing to be minimised.

Graphical User Interface to IRSPEC Package in MIDAS

Now that also IRSPEC data are routinely transferred to a workstation, a graphical user interface to the IRSPEC reduction package in MIDAS has been added. This makes the on-line quality control and reduction of IRSPEC data quite effective. Meanwhile this user interface has been made available as part of the 94NOV release of MIDAS and can, therefore, also be used for off-line work. Cristian Levín is to be thanked for the development effort.

Eightfold Throughput Improvement for Remote Observers Confirmed

The improvements which in the previous issue of *The Messenger* were announced to result from the coming into operation of the new 2 Mbit/s roof-to-roof link have meanwhile been confirmed during a number of remote observing runs performed from Garching. The system also seems to be very stable. The efforts of Joar Brynnel, Michael Fendt, Manfred Mornhinweg, Charlie Ounnas and Manfred Ziebell in making this system operational are gratefully acknowledged.

Improved Reliability?

One of the stated aims of the NTT Upgrade Project is to improve the reliability of the NTT. Only 10 months after the start of the project it is certainly too early for any conclusions. But we are delighted to report that the start into 1995 was a very encouraging one: During the month of January, only 2 times 20 minutes of observing time were reported lost by the observers (a terminal caught fire, and EMMI's slitwheel got stuck). Thirteen of these 31 nights were used for a large variety of tests (cf. above) which in the past would often have put the system under considerable stress, provoking a variety of problems. Even after subtraction of these 13 nights, the fraction of the time lost between astronomical twilights does not amount to more than 0.5 %.

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