Data Acquisition Upgrades

Continuing improvements to the data acquisition software has been our primary activity during this last semester, taking advantage of the many industry standard now available since the adoption of the new computer systems as networking, X-windows and Unix.

These improvements have been directed not only to expand the capabilities of the instruments control software but to increase the efficiency of the observation sequence.

A brief description of the new features or improvements is given below:

- Computer Aided Focussing: This tool provides a standard procedure to find the best focus. See the details in another article of this bulletin.
- Medians: The option of calculating the median of multiple exposures for bias, darks and flats has been added to the exposure control. The use of this option increases considerably the valuable disc space available, specially when large format CCD are used.
- FTS-CCD: A two dimensional image acquisition has been added to the FTS observing program. This program is still in the engineering and evaluation phase.
- TIGER Observing program: An improved state changing technology has been added to support an automated switching between the different viewing modes of the TIGER instrument, allowing also an easy implementation of user defined quick look computations and display.
- LAMA: The preliminary tests of the Laser YAG computer control software has been successfully implemented in a PC stand alone system.

  This project was developed in collaboration with the Marseille Observatory. The porting of the software package to the HP9000 Data Acquisition Computer is currently under the testing phase.
- PALILA: A user defined partial scan mode was added, to allow for customization of the Fabry-Perot scanning parameters. The specifics are covered in other article in this bulletin.
- Guide Star Catalogue: The GSC from the Space Telescope Science Institute is presently available at the Waimea computers. Soon it will be accessible from the Data Acquisition Computer at the summit. The observer will be able to ask for an automatic selection of a guide star or manually select a guide star from a graphic display that will contain the guiding zone from the Prime Focus or Cassegrain Bonnettes.
- General: The porting of the present User Interface to X11-Window system is progressing steadily. The completion of this project is expected by the end of August of this year.

B. Grundseth

Session de tests sur le FTS

Aprés deux séries de tests éffectués sur le FTS en Avril et Mai, nous avons pu enregistrer des améliorations dans plusieurs domaines.

Une source de bruit à 2400 Hz dans la boucle d'asservissement a été éliminée par remplacement de l'alimentation 5V du tiroir d'électronique "error signal". Il a été noté que cette nouvelle alimentation LAMBDA génère un peu plus de chaleur que l'ancienne, ce qui nécessite l'utilisation d'un ventilateur pour améliorer la circulation d'air. Quoi qu'il en soit, toute réduction de bruit dans la boucle d'asservissement ne peut qu'être bénéfique à la stabilité du système.

Mais le progrès le plus important a été apporté par la mise au point d'un dispositif de test et de simulation, facilitant l'étude et l'investigation des anomalies. On utilise comme source de lumière un laser infrarouge à 1,5 µm, entrant dans la cuve du FTS à travers l'ouverture de l'oculaire et par l'intermédiaire d'une fibre optique. En faisant fonctionner le FTS avec une source monochromatique, il est plus facile de corréler les erreurs d'acquisition avec les informations obtenues. Un ensemble d'outils informatiques contrôle l'instrument, affiche à l'écran les différents interférogrammes et prévient l'opérateur en cas d'erreur. Au cours d'une séance typique de tests, la cuve du FTS est placée prés du pilier sud du télescope, avec la source monochromatique et les cryostats installés. Elle est ensuite cablée à l'électronique de contrôle (située dans la salle d'observation du fond) à l'aide des panneaux d'instrumentation. Par ailleurs, on dispose d'un analyseur logique à grande capacité pour surveiller les cartes électroniques et obtenir des diagrammes temporels. Enfin, il est possible d'explorer la réponse en fréquence du servo à l'aide d'un analyseur de spectre.

Cette technique a permis de mettre en évidence plusieurs phénomènes et d'identifier leurs causes. Un type particulier d'erreur d'acquisition a été localisé dans une carte logique gérant les signaux de contrôle. Du bruit présent sur la masse de la carte générait de fausses demandes de transfert. Ceci avait pour effet de charger le même échantillon deux fois de suite dans le registre FIFO du CAMAC. Comme le programme compte simplement le nombre d'échantillons présent dans le registre, il terminait le balayage de l'interférogramme trop tôt. Les modifications apportées à la carte ont permis de réduire considérablement le taux d'erreur appelée: "échantillons doubles". Il est envisagé de remplaçé la carte afin de se débarasser complètement des couplages parasites encore restants. D'autres problèmes ont été identifiés, et des plans ont été édifié pour les résoudre. En particulier, il y a beaucoup de bruit 60Hz présent dans la boucle d'asservissement. Ceci pourrait être dû à du couplage avec des câbles de puissance situés trop près des câbles d'instrumentation, ou encore à des boucles de masse. Par ailleurs, d'occasionnelles surtensions sur l'alimentation 110 Volts sont probablement à l'origine des déverrouillages intempestifs du servo. En conséquence, des dispositifs de protection seront installés trés prochainement sur les prises d'alimentation. Une autre source possible de stress sur la boucle d'asservissement provient de sous-harmoniques de la porteuse à 100 KHz qui s'insèrent dans le signal d'erreur. Des composantes à 2480 et 4960 Hz ont été identifiées. Un moyen de les supprimer serait d'installer un filtre passe-haut coupant à 25 KHz.

Le travail d'élimination des anomalies de balayage continue. Des tests ont montré qu'en plus des doubles échantillons, le chariot pourrait changer de direction au milieu d'un balayage. Enfin, le phénomène de "saut de franges" semble apparaître en conjonction avec le chargement d'une mauvaise valeur du paramètre P. Heureusement, ces problèmes sont statistiquement peu fréquents, ce qui explique le temps nécessaire pour trouver leur causes. Cependant, la récente coordination de puissants outils de diagnostic, tant hardware que software, a permis de beaucoup avancer dans la connaissance du comportement du FTS.

Deux nouvelles séries de tests sont prévues aprés la séance d'observation de Juillet prochain. Elles devraient apporter encore plus d'informations, et certainement d'autres modifications visant à améliorer la fiabilité du FTS.

J. Horne et P. Papasian

New Instrumentation Cables in Control Room

After remodelling last year, we immediately moved all CCD observing to the new, combined control room. However, some of our facility equipment makes use of the instrumentation cabling system, and still had to be used in the old observing room. To accommodate these instruments, we have installed several instrumentation cable extensions between the observing room and the main control room. Now that the system is complete, we want to make it available for selected visitor instrument use.

Basically, we have one extension for each type of the larger cables. The extensions are connected to the observing room panels, and thus to any instrumentation location. In the main control room, the extension panel is at the rear of the console on the observer's side of the room. The available twisted pair cables are:

20	overall shielded pairs	extends J2, J3, or J6
9	overall shielded pairs	extends J4, J5, or J7
7	individually shielded pairs	extends J8, or J9
3	individually shielded pairs	extends J10, or J11

These extensions have the same type of connectors as the original instrumentation cables they extend. As there is only one of each type of cable, instruments using multiple cables are still restricted to the back room. The available coaxial cables are:

4 – 50 Ω cables   3 – 75 Ω cables

While we now have the electrical capability to operate more instruments in the main control room, there are still physical restrictions. These are:

- equipment must be small in size, and fit entirely on or under the desk surface.
- visitor equipment must not displace permanent equipment.
- no additional tables may be placed in the control room.
- no equipment cases or electronic racks may be placed on the control room floor.

This restricts visitor instrument use of the control room to those with small control consoles or terminals which can use the cable extensions and fit on the existing table. Equipment needing rack mounting *may* be placed in the control console, but space is limited. Any cable construction will be the responsibility of the observing team. At this point, visitors with instruments needing to be used from the control room must request this use on their visitor instrument questionnaire. The request should list all equipment and cables to be used in the control room. Each request will be evaluated by CFHT, and the observer notified of the feasibility.

W. Cruise and R. Song

New F/8 Mirror Cell

A new mirror cell has been fabricated by L&F Machinery in Los Angles for our F/8 cassegrain mirror. L&F fabricated the original cell under a contract from Perkin and Elmer. The new cell is very similar to the previous one, except the method of sealing the mirror into the cell has been changed. The mirror is held into the cell, face down, with slight vacuum pressure. Although only a small vacuum pressure is used, this pressure must be precisely regulated as the telescope moves to various locations in the sky. Any small leaks in the vacuum seal causes disturbances in the pressure regulation, allowing the mirror to move off its axial defining pads or be pressed against them to hard. This would, of course, affect the image quality.

The sealing method used in the design of the original cell did not work, and that cell was modified to incorporate a revised system that could be made to work. Unfortunately this revised sealing system involved numerous threaded and clearance holes into the vacuum cavity of the cell. All these holes required sealing. Although an adequate seal could be achieved, in practice it was very difficult and frustrating to find and plug all the leaks. The F8 mirror needs to be removed from its cell and realuminized approximately every 18 months. The reinstallation process tended to be long and tedious. Because work needed to be done very close to the newly aluminized surface, it had to be sprayed with a plastic coating that was later removed.

The new cell has a sealing system that does not involve any threaded holes into the vacuum cavity and a minimum of clearance holes. All the clearance holes will be sealed with 0 rings. The new sealing method worked well when it was tested at L&F Machinery using the new cell with the steel dummy mirror. A mirror cover has been designed and fabricated which will allow work to occur on the new cell near the optical surface with out danger to the aluminized coating.

Currently both cells are in the Waimea Machine Shop where parts are being transferred to the new cell Initial tests of the cell will be done in Waimea and then it cell will be shipped to the summit for additional testing. The new mirror cell is scheduled to be in service on August 28, 1990. The cell is planned to be installed on the telescope for the first time on July 11, 1990 during the engineering shutdown.

D. Cowley