The LAMA: A Laser Drilling Machine for Multi-apertures Spectroscopy

The LAMA (LAser MAchine) is a new facility under development to allow the laser drilling of focal plane multi-aperture masks with apertures of any size and shape for use with the focal reducer and ultimately with the MOS/SIS spectrograph. The laser mask generation system is expected to be operational at the summit by September 1990, and released for general use for visiting astronomers. The laser drilling is performed by a 70 Watt Nd-YAG laser mounted on a bench allowing precise computer controlled X-Y motions and was delivered to CFHT from Micro-Control Corporation in France. Extensive testing was carried out before delivery by le laboratoire d'optique, Observatoire de Marseille. Initial tests show that high quality apertures may be cut in thin sheets of metal to a positional accuracy of a few microns coupled to a rms noise on the sides of the apertures also of a few microns. Experimentation is now underway to further define the best operational parameters of the laser drilling and to complete the computer control interface.

T. Gregory

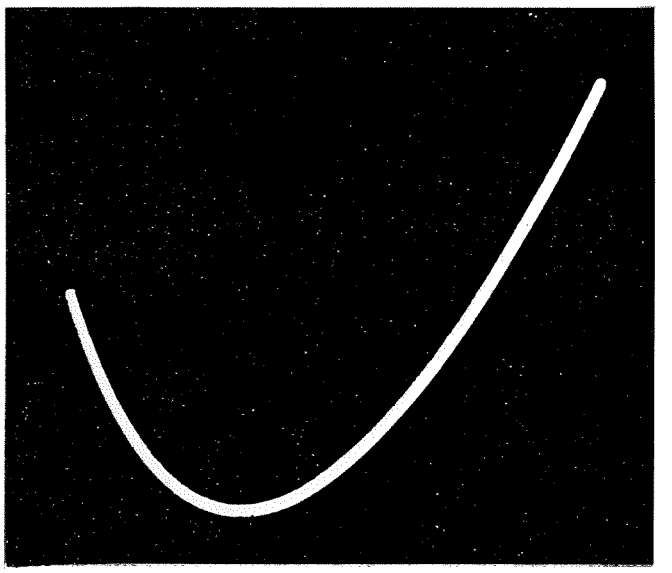

Figure 12

CCD Controller Modification and Exposure Timing

Historically the CCD controller electronics have performed quite well, with the exception of two illusive problems. The first is an intermittent lock-up problem where the controller required and electronic reset to continue. While this problem always occurred at the start of an exposure, so no data was lost, it was a nuisance and occurred ~ once a night. The second problem relates to exposure timing errors. For some CCDs (RCA2 and RCA4) timing errors in excess of 1-2% had been reported. Tests designed to track-down both of these problems proved most difficult, making progress slow.

In the case of the reset problem all of the evidence strongly suggested a communications link problem (GPIB bus lock-up). However, after an exhaustive study of the communication link between the CCD controller and the host computer, it was found that the link was sound and not the source of trouble. Simultaneously, work was done to measure the CCD exposure timing accuracy with a newly developed independent timer. At this point it was noted that the existing timing algorithm placed the CCD controller's CPU in a fragile state. In this state about 1 out of 500 exposures failed to start, resulting in a controller lock-up.

A new exposure timing algorithm was written and tested, and proved to solve both problems effectively. Not only does it improve the accuracy of CCD exposure timing, but it eliminates the reset problem. Extensive lab tests and telescope-site tests have shown these modifications work well. To date over 20,000 frames have been taken with no controller resets needed and CCD exposure accuracies are better than 0.1%.

The new independent timer will be tested during second semester 1990 and, if successful at the telescope, will be implemented to provide a second, independent check of the integration time recorded in the FITS header. Note: to correct exposures taken with the old algorithm (only RCA2 and RCA4 were affected, not PHX1 or SAIC1), multiply the recorded time by 1.016. The old exposures were fast (shortened) by 1 part in 60. Since the multiplicative factor applies to all exposures, e.g. astronomical objects, and calibration fields, photometric accuracy has always been preserved.

C. Clark and D. Josephson

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Questions and comments about the Bulletin should be sent to the attention of Dr. O. Le Fèvre at CFHT.

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