

Table 1: Optical Characteristics of the New f/35 IR Secondary Mirror

final output f/ratio	34.8
back focus (from the primary mirror vertex)	1991 mm
beam diameter on primary	3450 mm
material	Zerodur standard
clear diameter	400.4 mm
magnification	8.882
vertex radius	3535.8 mm
figure	hyperboloid
conic constant ($K = -e^2$)	-1.5709
back finish	acid etched
vertex thickness	38.9 mm \pm 2. mm

minimize chopping power requirements. In the old mirror this was accomplished by building the blank from top and bottom halves into which cavities were ground. The halves were then cemented together with the weight reduction cavities sandwiched inside the resulting structure. Unfortunately, these cavities printed through to the optical surface. The new mirror has 18, 38 mm diameter circular cores bored out of the back side of the otherwise solid, monolithic mirror to within 6 mm of the front surface. This approach we were assured by Contraves would not produce measurable print-through to the optical surface - a fact which was confirmed during acceptance testing in Pittsburgh.

The outer wall of the new secondary mirror is bevelled at 6 degrees so that the vertical edge is not exposed to the line of sight while chopping - the older mirror had simple vertical edges. In an additional effort to help minimize telescope emissivity, the edge of the optical surface has no bevel whatsoever and comes to a knife-sharp edge where it meets the outer mirror wall. The manufacturer was able to keep the corner sharp and at the same time maintain the high optical quality right to the edge.

CFHT took delivery of the finished and coated secondary mirror in mid-September this year, just over a year and a half after the initial

agreement with Contraves. It was already evident from earlier acceptance tests in Pittsburgh that Contraves had delivered a first-class optic. In-shop interferometric tests showed a slope-based encircled energy distribution of 82.9% within a circle of 0.2 arcseconds diameter, 94.9% within 0.3 arcseconds, and 99.9% within a 0.5 arcseconds diameter. Still the optical performance needed to be established on the sky in concert with the primary mirror. These tests have just been completed, and although the analytic results are not yet available, we can say that sub 0.5 arcsecond CCD images were obtained immediately. A lateral shearing interferogram indicative of the mirror quality is shown in Figure 6.

John Horne, Ed Stokes, Stéphane Béland, and the daycrew came together, took the glass as delivered and made it into an operating telescope system in one short month.

S. Béland and D. Salmon

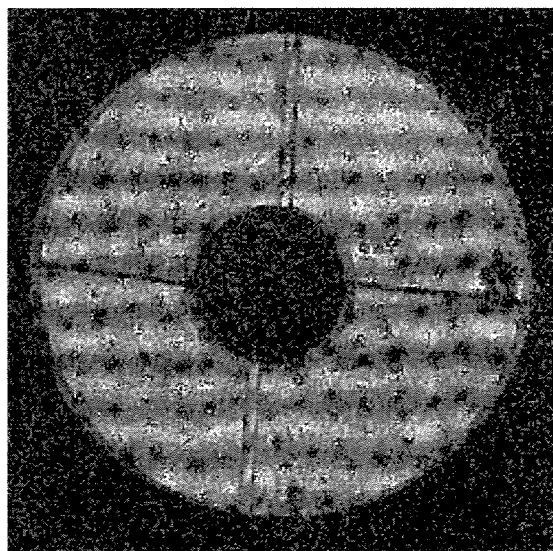


Figure 6

Detector News

During the spring and summer of this year the detector group has been working in several different areas; supporting our existing CCDs, developing the new CCD controller, acquiring new detectors, and making plans to operate the NICMOS3 IR arrays with the new controller.

New Controller

Development of the new controller has, as of this summer, moved into the operational and testing phases. We have successfully operated 2 different CCDs in the lab, and have completed a successful engineering run at the telescope using the engineering version of the JPL1 1024x1024 CCD. We are currently finalizing controller packaging designs and construction, and plan to move the Lick1 2048x2048 CCD on to the new controller in October. Our long term plan is to complete the first phase of the controller and release it for general use in the beginning of 1992.

New Chips

JPL1E, the engineering version of the 1024x1024 12 μ m JPL1 chip, is in operation and under test in the CCD lab with the new controller. Numbers regarding the performance and characteristics of the science-grade device, JPL1, will be released as

soon as possible. Another 1024x1024 18 μ m pixel device, SAIC3, has been acquired from SAI Corporation. This device has not yet been operated at CFHT, however, factory data shows it to be cosmetically superior to the SAIC1 device now used on many focal reducer and HRCam runs. We are investigating the possibilities of having a blue-enhancing coating put on it before it replaces SAIC1 and goes into service early next year. Discussion are underway with SAI Corporation to explore the options for acquisition of a thinned, coated 1024x1024 18 μ m device. The specifications for such a device call for a physically flat ($< 25 \mu$ m bow or ripples), high QE ($< 40\%$ @ 3000Å) imager that offers noise performance equal to or better than the thick SAIC1 device. We are hopeful that a device will become available to us in the next 3-4 months.

NICMOS3 Detector

A preliminary design has been completed for operation of the NICMOS3 multiplexer array (first test phase) using the new controller. This design will allow all four quadrants to be controlled independently to allow for the highest readout rates possible with this array. We anticipate being able to reach readout rates of less than 0.3 seconds per frame in the initial development phases.

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