

MONTHLY STATUS REPORT FOR SEPTEMBER 2001

Spartan IR Camera for the SOAR Telescope

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On 4 September 2001, the project team started work according to the program plan, which E. L. and Neil Gaughan created.

Table 1 Milestones completed during September 2001.

Date	Event	
6-Sep-2001	Rotation stage released for fabrication	EL
7-Sep-2001	Requisition to PAVE for vacuum connectors issued	JB
10-Sep-2001	New optical layout	EL
10-Sep-2001	Sober requirements written	MD
19-Sep-2001	RFQs for mirrors issued	EL
20-Sep-2001	Detector surface metrology done	EL&MD
25-Sep-2001	Digital circuits on camera card checked	JB
30-Sep-2001	Interface requirements written	EL
1-Oct-2001	Requisition to Compunetics for flexible circuit board issued	JB

1 Tasks

1.1 New optical layout

A new optical layout was made to accommodate the symmetric placement of the detector in the frame. We had assumed the detector was offset in the frame, since the multiplexer was. However, Rockwell modified their procedures and would not offset the detector. An offset placement allows a closer separation between detectors.

With the new layout (Figure 1), a pyramidal mirror directs the beam to four separate image planes. The spacing between detectors is now 21% of the width of a single detector, whereas it would have been 53%. The wider spacing causes two problems. The diameter of the field becomes 8.9 arcmin,

rather than 7.8 arcmin. About 15 mm more space is required between the first fold mirror and the beam heading toward the collimator, but space there is already tight.

The new layout is more compact.

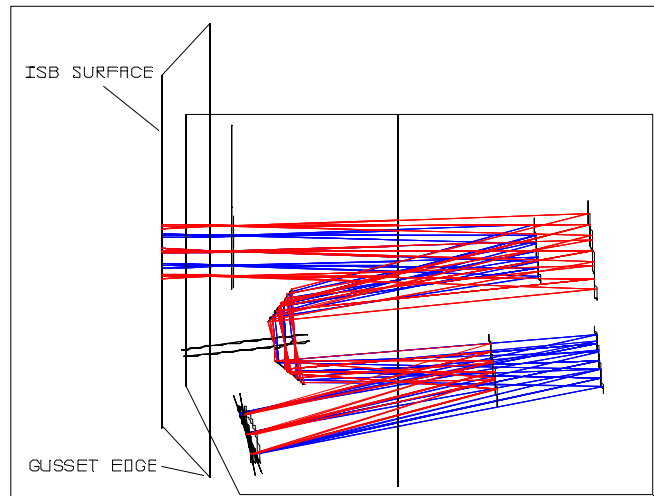


Figure 1 Optical layout. The box is the outline of the cryogenic optical box. The detector assembly is shown without the pyramidal mirror. The optical box is 940×790×400mm.

1.2 Requests for quotes for mirrors

Request for quotes for four off-axis mirrors, two flats, and aluminum cells were sent to Space Optics Research Laboratory of Waltham, MA, Hastings Controls of Pittsburgh, PA, and REOSC of France. The mirrors are to be delivered in the aluminum cells. By ordering this unit from the vendor, we avoid the problem of designing for the thermal contraction between the mirrors and our all-aluminum mounting posts.

The document will be put on the web.

1.3 Space envelope

The master 3-dimensional mechanical model of the layout defines the space envelope of every assembly. When an assembly is designed, it will be inserted into the master to check for interference. Dave Keesaer, a part-time designer who works for MC Molds of Williamston, MI, is making the layout.

The space envelope for the mirrors and cells can be met by the two mirror vendors who responded.

A mounting post attaches each optical assembly to the optical box. The mechanical engineering for the mounting posts is complete. The design for each post was scaled from Owen Loh's design for the f/11 collimator (Figure 2). The tightest requirement is the tilt of the mirror, which derives from the boresight alignment with the tip-tilt sensor. In this design, two I-beams separated by the width of the mirror resist tilt.

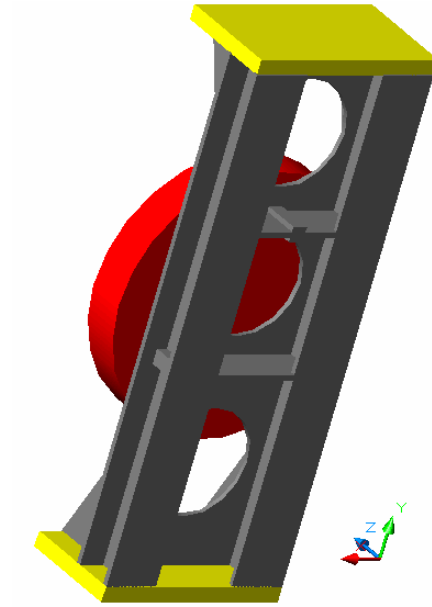


Figure 2. Mounting post for the f/11 collimator and the f/21 camera mirror.

The envelope for the filter wheels and masks are defined. The filter wheel can accommodate a 10-mm thick grism. Such a grism allows a spectral resolution of 1000 for which the image quality is marginal.

The mechanisms use PRS-100 rotational stages from Phytron Inc. of Waltham, MA.

1.4 Requirements for the telescope simulator (SOBER)

Mike Davis finished writing the requirements for the telescope simulator. Even though this task is scheduled for August 2002, Mike finished it since he had been working on it during the summer.

The document will be put on the web.

1.5 Detector metrology

The detector mount holds the detector frame; we measured the surface of the detector with respect to the surface of the frame. (We used a “coordinate measuring machine” made by View Engineering, which measures position optically to a precision of 3 μ .) We drew these conclusions in the document “Detector Metrology,” Davis & Loh, 20 September 2001:

1. “The frame is not flat. With a plane defined by three corners, the fourth corner is 29 μ (63 μ) above for detector #24 (#14). [The science-grade detector is serial #24; the engineering-grade, #14.] The mount must be at three points in order not to stress the detector.
2. The detector is not parallel to the frame. With respect to the center, the heights of the four corners are (-6, 39, 6, -39) μ for detector #24 and (31, 59, -31, -59) μ for #14. This is out of tolerance (30 μ). Each detector must have its specific tilt, which is of the order $\pm 100\mu$ at the corners of the frame.
3. The detector surface is concave with a radius of curvature of 11m. This causes a difference in height of 15 μ from center to edge. This can be ignored since it is within tolerance.”

The document will be put on the web.

1.6 Detector cable

The cable between the detector and controller has three parts. (1) The detector mounts on a rigid board. (2) A flexible board connects that board and the detector controller, which is outside of the vacuum enclosure. (3) The flex board is potted in a vacuum bulkhead.

Jason Biel has sent out the requisition for the vacuum bulkhead to Pave Technology. The requisitions for the rigid board and flex board will be sent out this week.

1.7 Detector controller

We are debugging the detector controller. The detector controller works when the field programmable gate array (FPGA) is made to emulate an existing CCD controller. This proves the digital part of the design. We are working on the analog part of the circuit.

2 Brazilian collaboration

Rene's visa awaits paperwork from Brazil. His move will be postponed for at least one month.

3 Schedule

The master mechanical layout was left off of the program plan. The original model (Figure 3) no longer applies, because the optical layout was changed. This delays the start of mechanical design by 2 weeks.

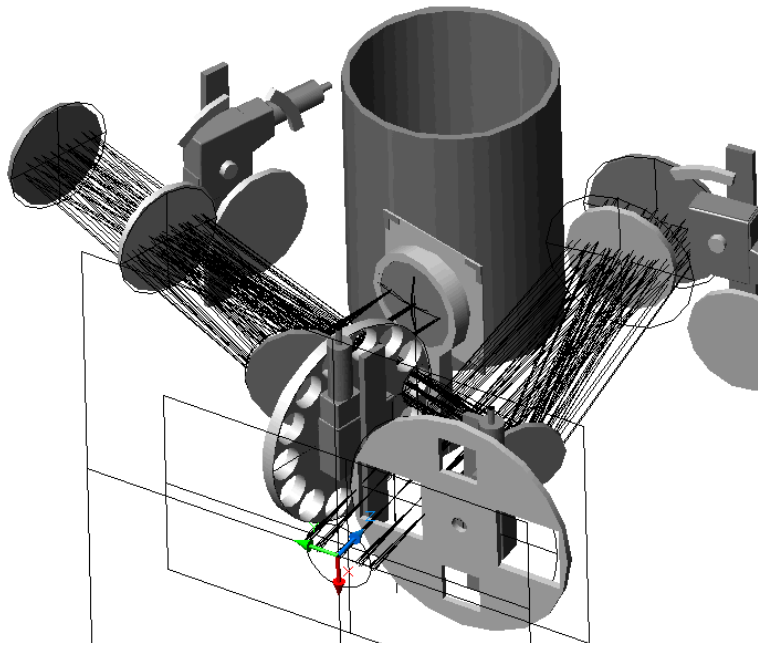


Figure 3 Master model of a previous layout used to proof space envelopes of each assembly.

4 Budget

The budget has not been completed.

There is no substantial change from the estimate of \$1.137k. The quotes for the mirrors, the largest single item besides the detectors, have not been received. The requisitions to Compunetics for the cable to the detector and to Pave for the vacuum bulkhead are higher than the preliminary quotes. However, the purchased electronics parts are still \$12k or 50% under budget.

5 Problems

The part-time designer has not been able to work a enough to meet schedule. If this persists, we will seek a different designer.