



Southern Africa Large Telescope  
Prime Focus Imaging Spectrograph  
SAAO Detector Subsystem

SALT-3190BP0001: SAAO Statement of Work

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Issue History

Number And File Name	Person	Issue	Date	Change History
<a href="#">saa0.icd.doc</a>	DOD	1.2	22 Aug 2001	PFIS PDR issue
SALT-3190BP0001 SAAO SOW Issue 1.3.doc		1.3	29 Oct 2002	First pre-PFIS CDR update
SALT-3190BP0001 SAAO SOW Issue 1.4.doc		1.4	6 Nov 2002	Major pre-PFIS CDR update
<a href="#">SALT-3190BP0001 SAAO SOW Issue 1.5.doc</a>		1.5	10 Jan 2003	Final PFIS CDR version

Table of Contents

1 Scope..... 4

2 Schedule..... 4

3 Budget..... 4

4 Work ..... 4

    4.1 Detector Subsystem ..... 4

    4.2 Integration, Test, & Operations ..... 4

    4.3 Other ..... 5

5 Documentation..... 5

    5.1 Functional Performance and Requirements Document (FPRD)..... 6

    5.2 Operational Concept Definition Document (OCDD)..... 6

    5.3 Acceptance Test Plan..... 6

    5.4 Commissioning Test Plan ..... 6

    5.5 Optical Specifications and Drawings..... 6

    5.6 Mechanical Specifications and Drawings..... 7

    5.7 Electrical Specifications and Drawings ..... 7

    5.8 Parts Lists..... 7

    5.9 Wiring Lists ..... 7

    5.10 Software Modules and Listings ..... 7

    5.11 Vendor Data Sheets..... 7



5.12	Assembly, Shipping & Installation.....	7
5.13	User's Manual and Calibration Manual .....	8
5.14	Maintenance Manual.....	8
6	Deliverables For PFIS CDR.....	9
6.1	Schedule.....	9
6.2	Budget.....	9
6.3	Design Work Towards The CDR.....	9



## **1 Scope**

This document is the Statement of Work between the University of Wisconsin-Madison and the South African Astronomical Observatory (SAAO). It specifies the work to be done by SAAO in connection to the UW's Prime Focus Imaging Spectrograph (PFIS).

## **2 Schedule**

The Detector subsystem PI shall provide a schedule, compatible with Microsoft Project 2000, to the PFIS project manager. The initial delivery shall occur 1 month before PDR, and shall be updated each quarter.

## **3 Budget**

The Detector subsystem PI shall provide a budget to the PFIS project manager. The initial delivery shall occur 1 month before PDR, and shall be updated each quarter.

The budget shall show costs of materials, labor, capital equipment, and overhead, broken down by quarter.

## **4 Work**

The Detector subsystem PI agrees to perform the following work.

### **4.1 Detector Subsystem**

1. Design and build a cryogenically-cooled detector housing
2. Integrate the PFIS CCD detectors into the detector housing
3. Integrate the detector housing with an SDSU II Array Controller and Power Supply
4. Characterize detector subsystem performance
5. Provide a LabView virtual instrument control software for the subsystem

### **4.2 Integration, Test, & Operations**

1. Support integration of the Detector subsystem into PFIS
2. Support laboratory testing of the Detector subsystem in PFIS
3. Support commissioning of the Detector subsystem of PFIS at SALT
4. Write observing software for the Detector subsystem



5. Write data reduction software for Detector subsystem observations up to the point where detector-specific calibrations (dark frames if relevant, bias frames and flat fielding) are employed. Further reductions, such as wavelength calibrations, or standard star observations are outside the scope of the work.

### 4.3 Other

1. Participate in PDR and CDR
2. Consult on commissioning science observation program for PFIS
3. Prepare a scientific paper describing the Detector subsystem if deemed sufficiently meritorious, or co-author a paper on the instrument as a whole and contribute the section describing the Detector subsystem.

## 5 Documentation

This section specifies the documentation to be supplied to UW-Madison with the Detector subsystem. Text documentation shall be provided in MS Word or PDF format. Mechanical drawings shall be provided in an electronic format compatible with Autocad release 14.

Table 1 shows the delivery dates for certain documents. Documentation described below but not included in Table 1 due with the delivery of the Detector Subsystem to UW-Madison.

**Table 1: Document Delivery Schedule**

<b>Document</b>	<b>Version</b>	<b>Delivery Date</b>
Statement of Work	Draft	PDR – 4 weeks
UW/SAAO ICD	Draft	PDR – 4 weeks
FPRD	Draft	PDR – 4 weeks
OCDD	Draft	PDR – 4 weeks
PDR Documents	Draft	PDR – 3 weeks
UW/SAAO ICD	Final	PDR + 8 weeks
FPRD	Final	PDR + 8 weeks
PDR Documents	Final	PDR + 8 weeks
OCDD	Final	CDR – 6 weeks
Acceptance Test Plan	Final	CDR – 6 weeks
Commissioning Test Plan	Final	CDR – 6 weeks



CDR Documents	Draft	CDR – 3 weeks
CDR Documents	Final	CDR + 8 weeks

### **5.1 Functional Performance and Requirements Document (FPRD)**

The Detector subsystem PI shall provide a Functional Performance and Requirements Document (FPRD) that states the end-item performance specifications, and a verification matrix showing the method of verification of each performance specification.

The PI shall provide the FPRD as indicated in Table 1.

### **5.2 Operational Concept Definition Document (OCDD)**

The Detector subsystem PI shall provide a Operational Concept Definition Document (OCDD) describes the operational scenarios relevant to using the Detector subsystem.

The PI shall provide the OCDD as indicated in Table 1.

### **5.3 Acceptance Test Plan**

The Detector subsystem PI shall provide an acceptance test plan suitable for demonstrating correct operation of the Detector subsystem. The acceptance test will be run at SAAO before shipping to UW, at UW after shipping from SAAO and during integration, before shipping to South Africa, and again after arriving in South Africa.

The plan shall be suitable for verification of correct operation as well as diagnosis of problems, in so far as they can be carried out in each location.

The Detector subsystem PI shall provide an Acceptance Test Plan as indicated in Table 1.

### **5.4 Commissioning Test Plan**

The Detector subsystem PI shall provide a commissioning test plan suitable for demonstrating compliance with the FPRD and SOW.

The Detector subsystem PI shall provide Commissioning Test Plan as indicated in Table 1.

### **5.5 Optical Specifications and Drawings**

The Detector subsystem documentation shall include specifications for all optical components. (Jeff, this can only include the cryostat window so I would suggest putting this in your next section).



## **5.6 Mechanical Specifications and Drawings**

The Detector subsystem documentation shall include the definition of all mechanical components and subsystems. COTS entities will be defined by supplier details and proprietary parts numbers. Custom components and assemblies will be defined by ACAD14 compatible drawings. Assembly drawings will be of sufficient detail to enable a competent technician to interpret them.

## **5.7 Electrical Specifications and Drawings**

The Detector subsystem will include both COTS and custom electronics. The custom electrical specifications shall include voltage, current, peak and average power.

## **5.8 Parts Lists**

The Detector subsystem documentation shall include a complete description of materials, parts and components.

## **5.9 Wiring Lists**

The Detector subsystem documentation shall include a complete description of all internal wiring, all wiring diagrams, and wire lists describing every cable and connector.

## **5.10 Software Modules and Listings**

The Detector subsystem documentation shall include all software listings in electronic format.

The documentation shall include a software block diagram showing the relationship of software modules, and describe all inputs and outputs for each module.

Also included are all test procedures for component and subsystem-level testing and verification.

## **5.11 Vendor Data Sheets**

The Detector subsystem documentation shall include vendor data sheets and specifications for all commercially supplied components.

## **5.12 Assembly, Shipping & Installation**

The Detector subsystem documentation shall include manuals that describe the assembly (and disassembly) of the Detector subsystem, how to pack and ship it, and how to install it into the PFIS.



### **5.13 User's Manual and Calibration Manual**

The Detector subsystem documentation shall include a user's manual describing all operational aspects of the Detector subsystem and its calibration.

### **5.14 Maintenance Manual**

The Detector subsystem documentation shall include a maintenance manual. The manual shall contain procedures for periodic maintenance and troubleshooting.





## **6 Deliverables For PFIS CDR**

The Detector subsystem PI agrees to perform the following work for the CDR of PFIS, scheduled for March 2003.

### **6.1 Schedule**

The Detector subsystem PI shall update the PDR schedule and send it to the PFIS project manager. The initial delivery shall occur by Jan 2003, and shall be updated each following quarter.

### **6.2 Budget**

The Detector subsystem PI shall provide an updated budget to the PFIS project manager. The initial delivery shall occur by end Oct 2002 and shall be updated each following quarter.

The budget shall show costs of materials, labor, capital equipment, and overhead, broken down by quarter.

### **6.3 Design Work Towards The CDR**

The Detector subsystem PI shall provide the following design documents/reports to the PFIS project manager:

#### **6.3.1 ICD**

This document will be an update of the earlier versions.

#### **6.3.2 Testing Document**

This document will describe the Acceptance Testing (by UW of the detector package from SAAO). This document will be complete in that it will mention every aspect of the detector package that needs to be tested. However, details of the tests may be supplied only during manufacture.

#### **6.3.3 Safety Document**

This document will confine itself to the safety of the detector package alone. It will be modeled on the SALTICAM equivalent.



#### **6.3.4 Detector Document**

This document will describe the CCD detector and controller performance, similar to the design study document provided for PDR but more specific and with as much concrete information in as possible, using the SALTICAM experience.

All control issues (e.g. the shutter) will be included in this document as well.

Mosaicing of the PFIS CCDs will also be addressed in this document.

#### **6.3.5 CCD Handling Procedures**

A document describing the procedures for safe handling of the CCDs.

#### **6.3.6 Cryostat Document**

Document describing the cryostat design from a mechanical and thermal point of view.

#### **6.3.7 Software Documents**

A suitable document describing the software.

#### **6.3.8 Drawings**

A suitable set of drawings (TBD).