1 SCOPE

This document describes the interface between PFIS the various subsystems of SALT. The subsystems are:

a) Tracker rotation stage
b) Guidance Probes
c) SALTICAM (slit image)
d) Igloos behind Primary Mirror
e) Cooler Boxes on TOP HEX
f) Cooler boxes for electronics on PFIS
g) Computer Room
h) Control Room
i) Glycol and air Supply
j) Electrical Power
2 INTERFACES

2.1 PFIS

The PFIS can be divided into the following major components that will have interfaces with the Payload Structure and or other parts of SALT:

- Cooler Boxes on PFIS, enclosing all PFIS electronics
- Structure (Which will mount onto Tracker Rotation Stage)
- Cryocooler (mounted in a cooler box behind the Primary Mirror-called the Igloo)
- PFIS computer (Located in control Room)
- PFIS Man Machine Interface (MMI) display and controls, called from any computer on the network

Note: A cryocooler will also be required for the commissioning instrument. If possible both the PFIS and Commissioning instrument can use the same one.

The following schematic diagram shows the location of the various PFIS subsystems and interfaces. Interfaces are numbered and will be discussed subsequently (i indicates internal and e external interfaces)
The subsequent sections will describe the various external interfaces of PFIS.

2.1.1 PFIS Computer <-> TCS Server (1e)

2.1.1.1 Electrical
   a) Network connection
      1) Connectors
      2) Electrical wiring details
      3) Distance
   b) Precise Time Signal(TBC)
      1) Connectors
      2) Electrical wiring details
      3) Distance

2.1.1.2 Data
   a) Health status information (TBD)
   b) Commands for slit alignment (TBD)
   c) RA and DEC (TBD)
   (DATA ICD ???)

2.1.2 PFIS <-> Electrical Power (2e)
   a) Power Supply

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UF Power (SALT)
220VAC, 20A,
single phase

UPS Power
220VAC, 15A,
single phase

Essential Power
(SALT)
220VAC, 20A,
single phase

UPS CCD
(SALT)
220VAC, 10A,
single phase

Igloo behind Primary Mirror (D)

PFIS Power
Distribution Panel

PFIS Power
Supply

PFIS Power
Switch

Cryocooler

Cooler Box at
TOP HEX

PFIS Power
Distribution Panel

PFIS Power
Supply

PFIS Power
Switch

Cooler Box on PFIS
-PXI Chassis
-PXI power supply
-Stepper power supply
-SDSU power supply
-SDSU Array Controller
-CCD Ion pump Contr
-CCD Vac Gauge Contr
-Star Tracker Base

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NOTE: SALT to Supply Power up to Isolator Switches, from there it is the responsibility of PFIS

b) Cable Routes to TOP HEX and Igloo behind Primary Mirror

c) Cable Routes from TOP HEX to PFIS

Total length is approximately 20m, the exact routing still to be finalised.
2.1.3 PFIS <-> Glycol and Air Supply (3e)

a) SALT to supply glycol to cooler boxes and Igloo.
b) Clean air supply: Outlet supplied by SALT on Payload
   1) Flow rate 3l/min
   2) Pressure 6bar (+/-1)

c) Normal air supply: Outlet supplied by SALT on Payload
   1) Flow rate 3l/min
   2) Pressure 6bar (+/-1)

d) Layout and connector drawings: TBD

e) Maximum Cooling Capacity Available to PFIS: 1.3kW

Note:
1) The system specification requires that no subsystem in the optical path should:
   • have a surface temperature of more than 8degC above ambient.
   • have forced-air cooling which is exhausted into ambient
   • dissipate more than 4Watts continuously to ambient, if so the item must be
     housed within an enclosure from which heat will be removed by the Glycol system

2) The system specification requires that no subsystem outside the optical path should:
   • have a surface temperature of more than 8degC above ambient.
   • have forced-air cooling which is exhausted into ambient
   • dissipate more than 6.5Watts continuously to ambient, if so the item must be
     housed within an enclosure from which heat will be removed by the Glycol system

2.1.4 PFIS Structure <-> Tracker Rotation Stage – 4e

2.1.4.1 Physical
a) PFIS – Tracker Rotation Stage interface drawing
b) PFIS – Orientation relative to SALTICAM
The picture below shows the telescope configuration in VI mode. The coordinate system is centred on the PFIS focal plane. Zenith is in the negative Z-direction. SALTICAM will be mounted in the YZ plane (below the star tracker head in the figure below), with the PFIS slit coincident with Y. The fixed mounting point of PFIS and the structure carrying SALTICAM will be on Y. +Y is at a nominal elevation (relative to local horizon) of 37°.

2.1.4.2 Constraints
a) Mass of PFIS < 375kg (including Infra Red Beam)
b) Volume above prime focus:
   (i) Diameter : 3.0m
   (ii) Height : 1.5m
c) Centre of Gravity in a cubic volume of less than 10x10x10cm , centred less than 65cm above the focal plane.
d) Structural stability of mechanical mounting points (under all loading and environmental conditions):
   (i) Stability of mounting points relative to one another, in z-direction, should be less than 10 microns.
   (ii) Global tilts relative to optical axis shall be less than 100 arc seconds
   (iii) Movement in focus direction shall be less than 100 microns
e) Accessibility
   (i) Slit mask replacement once a week
   (ii) Filter wheel replacement once a month
f) Adjustability: The PFIS structure shall provide mechanisms to adjust alignment with the focal plane and optical axis. This means 5 degrees of freedom adjustability, x, y, z, tip and tilt. The ranges to provide for is as follows:
   (iii) X, Y >= 3mm
   (iv) Z >= 2mm
   (v) Tip and Tilt >= 0.3 degrees
2.1.5 PFIS Structure <-> Guidance Probe – 5e

2.1.5.1 Physical
Note: The figure below is about to be changed within the next month after completion of the proto-type. Some of the dimensions are expected to change quite a bit.

![Diagram of PFIS Structure <-> Guidance Probe – 5e]

2.1.6 TOP HEX Cooler Box <-> TOP HEX – 6e

2.1.6.1 Physical
a) Dimensions of packaging space required by PFIS: 480 x 380 x 270mm
b) Cooling Capacity required: TBD
c) Interface between Cooler Box and electronics Frame: TBD
d) The figure below depicts the layout on the top hex.
2.1.7 PFIS Cooler Boxes <-> PFIS Structure – 6e

2.1.7.1 Physical

   e) Dimensions of packaging space/s required by PFIS: TBD
   f) Cooling Capacity required for each: TBD
   g) Interface between Cooler Box and electronics Frame: TBD
2.1.8 Layout of Igloo behind Primary Mirror
## 2.1.9 Cable List

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Cable Source</th>
<th>Cable Destination</th>
<th>Required Current (A)</th>
<th>Cross section (per core) for 0.5 deg temp rise (m)</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>PFIS Computer</td>
<td>Electrical Room UPS</td>
<td>Computer Room</td>
<td>2</td>
<td>10</td>
<td>Coax</td>
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<td>PXI AC</td>
<td>Electrical Room UPS</td>
<td>PFIS</td>
<td>2</td>
<td>60</td>
<td>Fiber</td>
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<tr>
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<td>Electrical Room UPS</td>
<td>PFIS</td>
<td>2</td>
<td>60</td>
<td>Fiber</td>
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<tr>
<td>Leach Controller</td>
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<td>PFIS (Vis)</td>
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<td>60</td>
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<tr>
<td>Fiber Optic - Leach Controller</td>
<td>SAAO PC Computer Room</td>
<td>PFIS (Vis)</td>
<td>2</td>
<td>60</td>
<td>Fiber</td>
</tr>
<tr>
<td>Fiber Optic - PXI Chassis</td>
<td>PFIS PC Computer room</td>
<td>PFIS</td>
<td>1</td>
<td>60</td>
<td>Fiber</td>
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<tr>
<td>RS232 - Etalon Controller</td>
<td>PFIS PC Computer room</td>
<td>Top Hex (Vis)</td>
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<td>40</td>
<td>Fiber</td>
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<tr>
<td>Queensgate: xyz</td>
<td>Top Hex</td>
<td>PFIS (Vis)</td>
<td>3</td>
<td>20</td>
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<tr>
<td>Queensgate: HV</td>
<td>Top Hex</td>
<td>PFIS (Vis)</td>
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<td>20</td>
<td>Coax</td>
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<td>Queensgate: AC</td>
<td>Electrical Room UPS</td>
<td>Top Hex (Vis)</td>
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<td>40</td>
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<tr>
<td>Star Tracker Head</td>
<td>Payload</td>
<td>Payload</td>
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<td>5</td>
<td>Fiber</td>
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<td>Star Tracker AC</td>
<td>Electrical Room UPS</td>
<td>Payload</td>
<td>2</td>
<td>60</td>
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<td>Star Tracker Video</td>
<td>Payload</td>
<td>Computer Room</td>
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<td>60</td>
<td>Fiber</td>
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<td>Star Tracker Ethernet</td>
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<td>PFIS Contact Microphone</td>
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<td>Operator's Area</td>
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<td>PFIS (Vis)</td>
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<td>Braided steel</td>
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<td>Braided steel</td>
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<td>Compressed dry air - instr gr</td>
<td>see payload sheet</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Glycol</td>
<td>see payload sheet</td>
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</table>

**NOTE:** Main Supply power is 220V ac - general mains and UPS