

# COBRA/SOFIA Spectrometer Overview and Interfaces PRELIMINARY DESCRIPTION

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## **1 Overview**

This document describes the physical interfaces (timing, microwave, data link, electrical, and mechanical) interfaces for the COBRA spectrometer for SOFIA, its signal processor, and external synchronization signals. It also provides a brief overview of internal microwave and digital signal processing components.

## **2 Microwave inputs**

### *2.1 Input band*

4 to 5 GHz (TBC)

### *2.2 Input power level*

-10 dBm nominal, range -13 to -3 dBm. Band flatness degrades as input power increases. (TBC)

### *2.3 Signal dynamic range*

Signal dynamic range from nominal input power is minus 0 dBm, plus 3 dBm. Larger signal swings require compensation with input attenuation. (TBC)

### *2.4 Band flatness*

$\pm 1.5$  dB from nominal slope across 4 to 5 GHz (TBC) of:

1. Maximum rolloff with increasing frequency of 0 dB.
2. Maximum rollup (preferred) with increasing frequency of 3 dB.

### *2.5 Mechanical*

SMA female.

## **3 Data links**

### *3.1 Signal processor to host computer*

? Could be serial, parallel, Ethernet, CANbus, or SPI. Need to control attenuators, read power levels for two channels.

### *3.2 Correlator to external synchronization signals*

? Into correlator computer, or into DSP?

## **4 Electrical power**

### *4.1 Spectrometer chassis*

115 VAC, 30 A twist-lock plug on rear panel

### *4.2 Signal processing chassis*

TBD

#### 4.3 *Power dissipation*

TBD

### **5 Microwave processing modules**

#### 5.1 *Descriptive overview*

Convert input band to baseband, provide ALC for sampler and power measurement for spectral amplitude calibration. Sampler input is  $-6$  dBm. Interface is TBD.

### **6 Internal signal processing, timing and synchronization**

#### 6.1 *Internal computer*

Diskless 1.2 GHz Pentium system, 512 MB RAM, Linux OS with PXE boot from Redhat 9 system.

#### 6.2 *Peripherals*

TBD

#### 6.3 *Timing generator*

Requires CMOS signals at 6 ms, 1 s frequencies for hardware integration control and synchronization.

### **7 Mechanical**

#### 7.1 *Spectrometer chassis dimensions*

Compact PCI bus chassis for 19" relay rack mounting and 6U cards. Excluding mounting ears, the chassis body dimensions are 17" wide, 17.5" high without feet (18" high with feet), and 26.25" deep. Cables protrude from front panel.

#### 7.2 *Mass*

34.8 kg (76.6 lbf).

#### 7.3 *Cooling*

Forced air from dual fans. Air intake at bottom front and bottom front sides. Exhaust top rear.

#### 7.4 *Connectors, controls, and indicators for spectrometer chassis*

##### 7.4.1 *Front Panel*

Power indicator lamps (LED)  
AC power switch (shrouded toggle)

##### 7.4.2 *Rear Panel*

Power connector, 30 A twist-lock

7.5 *Connectors, controls, and indicators, CPU*

RJ-45 Ethernet

DB-9 female connector for RS-232 serial interface.

7.6 *Connectors, controls, and indicators, digitizer and correlator cards*

4 ea. SMA female connectors for microwave inputs

4 ea. digital signal cables

7.7 *Connectors, controls, and indicators, timing card*

2 ea. RJ-45 connectors for timing signals

**8 Environmental**

8.1 *Thermal operating limits*

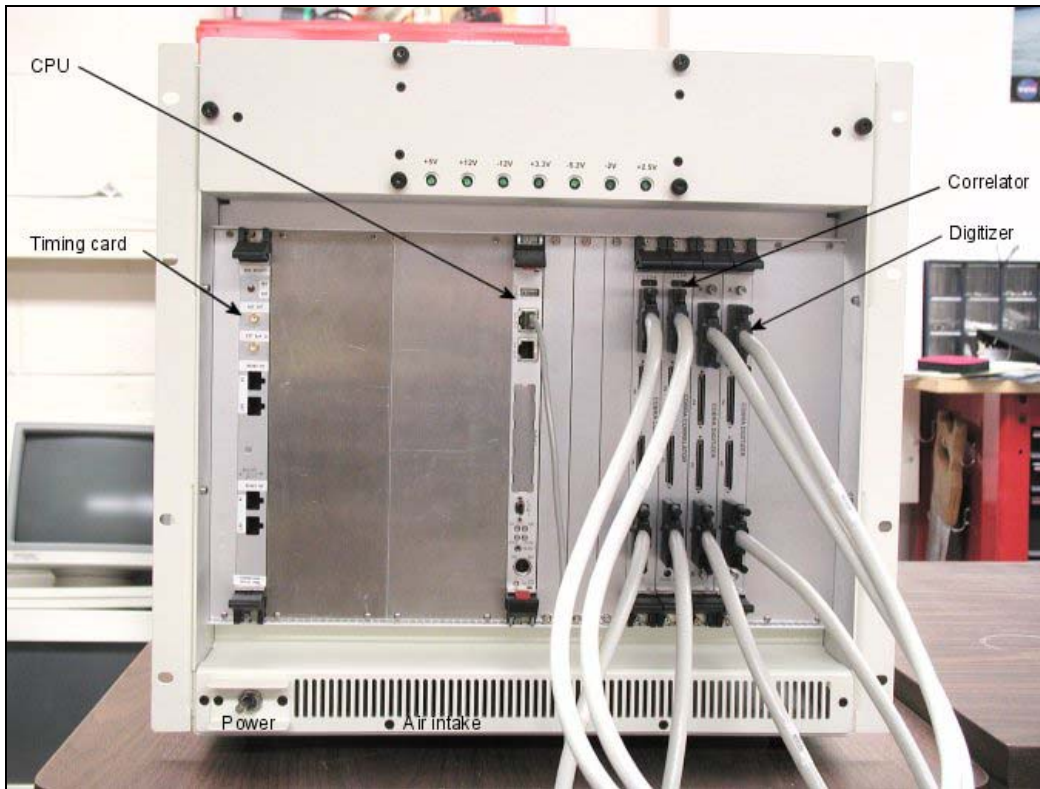
10 to 30° C.

8.2 *Temperature stability*

Astronomical data should be taken with components within  $\pm 2^\circ \text{C}$  (TBD).

**9 Photographs**

On following pages, with some description.



Front view



Left hand side view



Rear view



Right hand side view