K1DM3 Technical Note

872-LTN1027

M1 Box Coolant Test

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1 Introduction

The K1DM3 electronics box which will be mounted on the tower structure behind M1 contains an chiller circuit as described and specified by the reference drawings (References 1 and 2). The circuit consists of a forced fan liquid cooled radiator, flow meter, and flow control valve. The air circulated and cooled within the box.

This document summarizes the testing performed on this system.

2 Test Set-up

A water chiller was connected to the box as shown in Figures 1 and 2. The lines just inside the box were instrumented with thermocouples to monitor supply and return line temperatures (Figure 3). Flow was adjusted to approximately 1.75 liters/minute (Figure 4). Figure 5 shows the ambient thermocouple attached to the section panel. During the test the chiller water was set at 17.8 C. This was the default temperature set on the chiller at startup. Since this was cooler than the cold room ambient temperature (~25 C) there was no reason to change the setting.

3 Results

The electronics were powered up and the box closed. Once equilibrium was reached the following paramaters were noted:

Inlet temperature – 17.8 C

Outlet temperature – 21 C

Ambient temperature – 19 C

Flow rate – 1.75 l/m

Chiller exhaust pressure – 32 psi

4 Summary

Since the ambient and exit line temperatures were below ambient the system and flow conditions were sufficient to keeping the electronics cool. Coolant flow, at 1.75 l/m, was at a very low level comparted to what can be provided at the telescope. The telescope facilities, however, operate with glycol. Glycol has a specific heat that is about 20% lower than water. Therefore, in operation at the telescope the coolant flow should be 20% higher, or 2.1 l/m

Figure 1 - Test setup in the cold room. Water chiller supplying the M1 Box.

Figure 2 - Chiller lines connected to M1Box

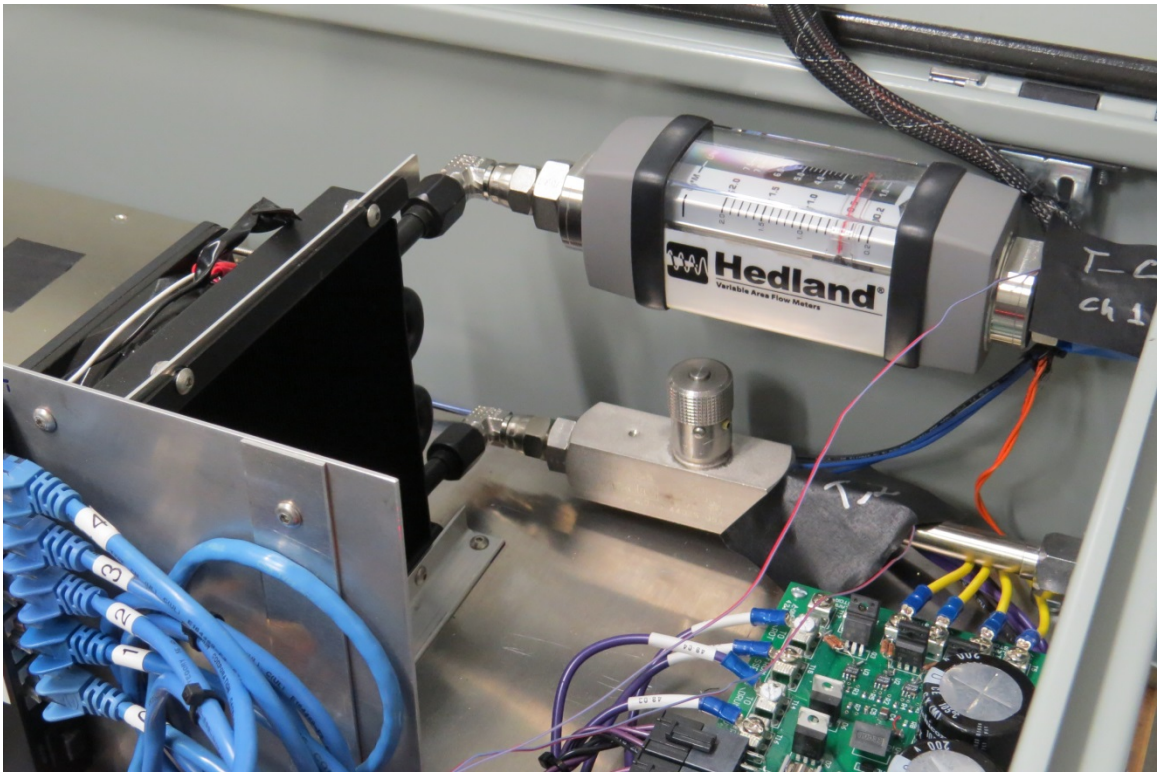

Figure 3 - Chiller system inside the electronics box. Thermocouples on inlet and exit lines.

Figure 4 - Flowmeter showing rate during test at 1.75 liters/minute.

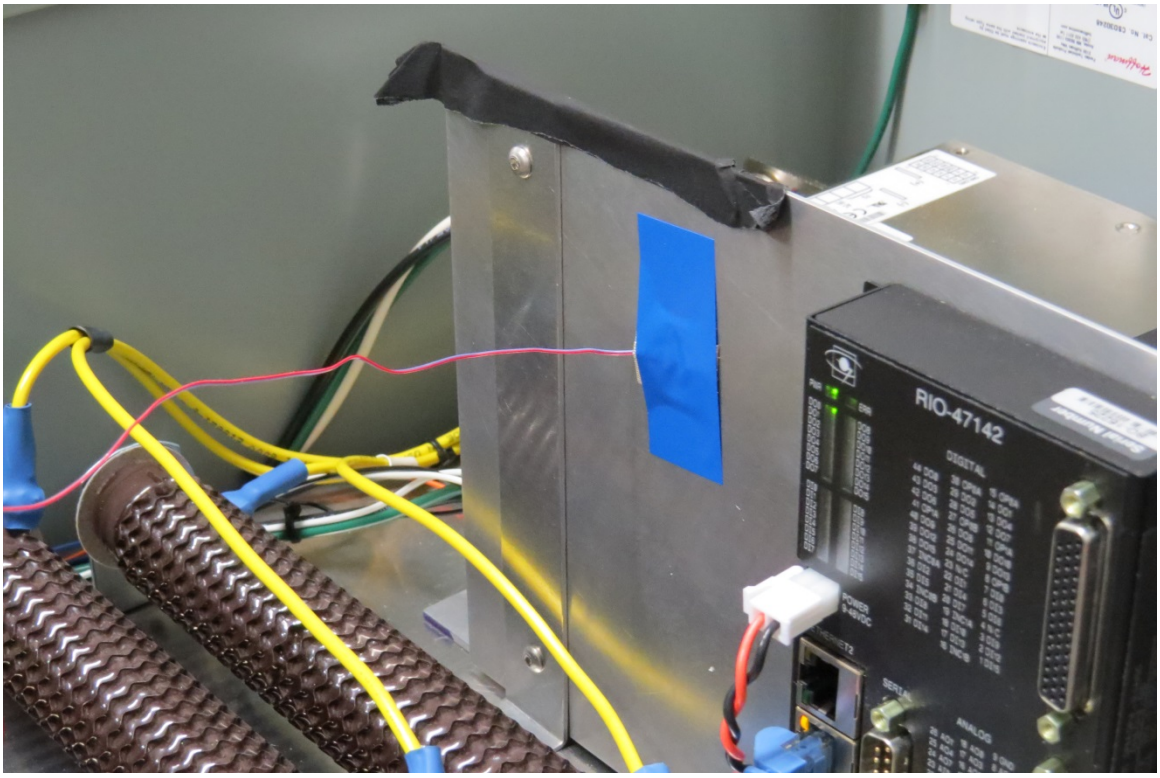

Figure 5 - Thermocouple on section panel to represent ambient air.

5 References

5.1 *Electronics Box Cooling Schematic,* UCO Drawing, 872-LM5101, Revision E, 19 October 2017

5.2 *Electronics Box Cooling Layout,* UCO Drawing, 872-LM5201, Revision C, 17 October 2017

6 Revisions

A Initial release, 24 August 2017

B Renumbered references, 30Jan19