HASP 2014

UND-UNF Payload

Monthly Status Report for August 2014

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UND-UNF team did the following work during August 2014:

Kenneth Emanuel, Brittany Nassau and Dr. Nirmal Patel (Faculty) from UNF were participated the HASP integration workshop at the NASA-CSBF, Palestine, TX during July 28-Augst 1, 2014. UND-UNF payload successfully integrated the payload. The payload was tested in the BEMCO chamber, which is shown in Fig. 1(a) and (b) for high temperature (+40^{o}C), low temperature (-40 ^{o}C), high pressure (1.5

atm), and low pressure (3 mbar). The measured current draw at 30 VDC is about 150 mA nominal, 425 mA maximum and 40 mA minimum. During the test, sensors data, communication link and uplink commands were tested and verified. The payload was certified for the balloon flight.

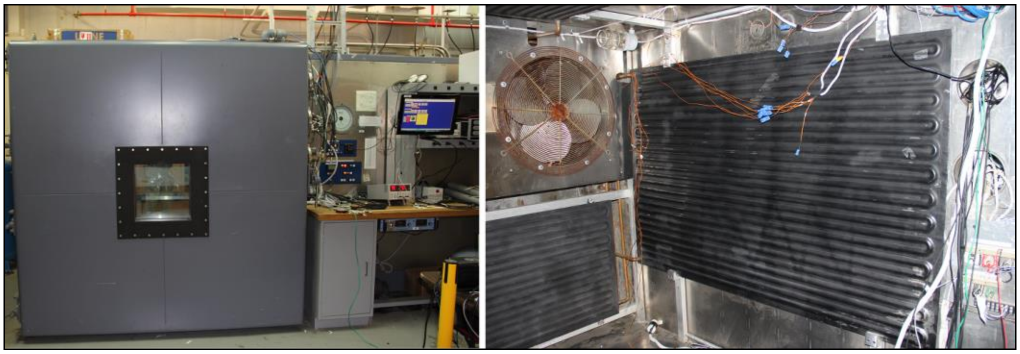

Fig.1 (a) BEMCO Thermal vacuum test chamber (b) inner view of the chamber

Fig.2 shows the variation of voltage with time during thermal vacuum test. The voltage level was nearly same during test time period. It was found that the average voltage level was 3320 mV with standard deviation of 22 mV.

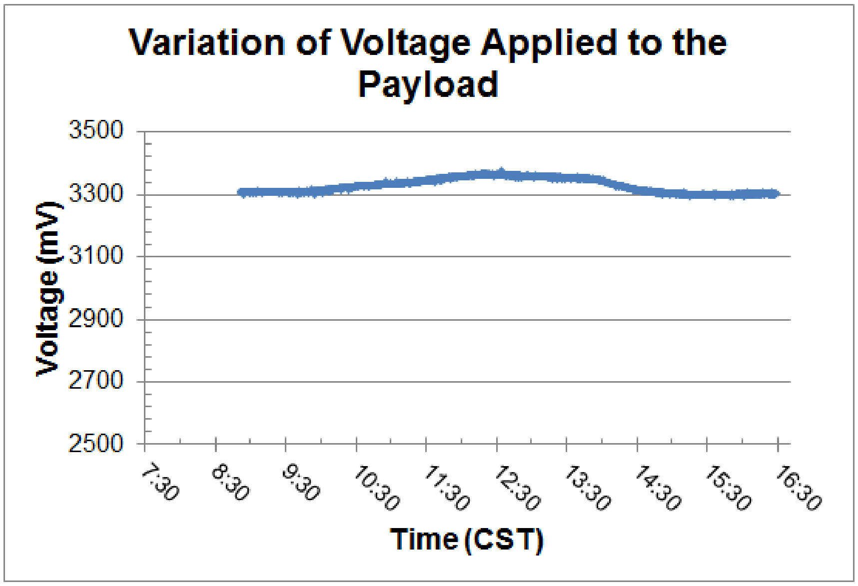

Fig.2 Variation of voltage applied to the payload with time

The current drawn by the payload during the thermal vacuum test is shown in fig. 3. Payload draw (i) 30 to 40 mA when all three heaters were off, (ii) about 150 mA when heater #1 was on, (ii) about 260 mA when heaters # 1 and 2 were on, and (iv) about 410 mA when all the three heaters #1, 2, and 3were on.

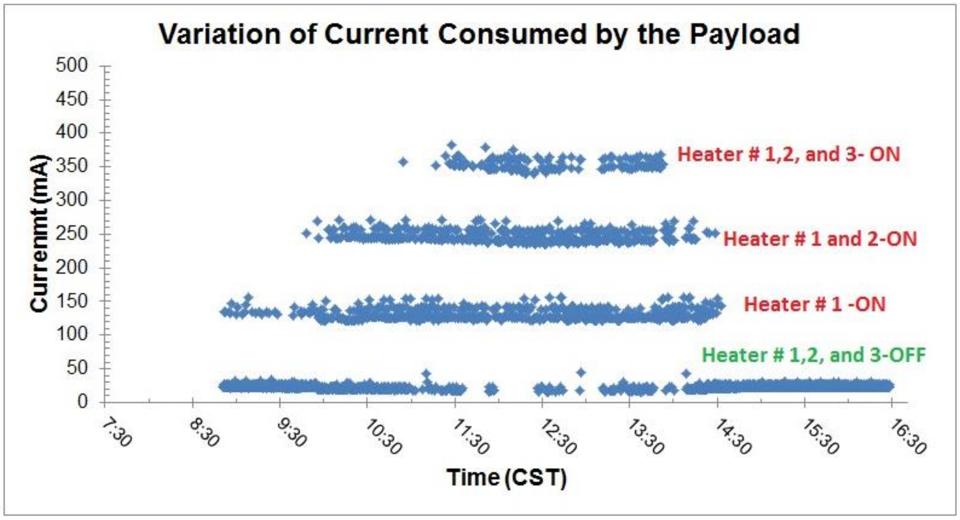

Fig.3 Variation of current consumed by the payload with time.

The variation of pressure measured by the payload during the thermal vacuum test is shown in the fig. 4(a). Our pressure transducer did not measure the pressure below 100 mbar due to the technical limitation and hence saturated. The measured pressure data were nearly same as the data measured by the HASP, which is shown in the fig. 4(b).

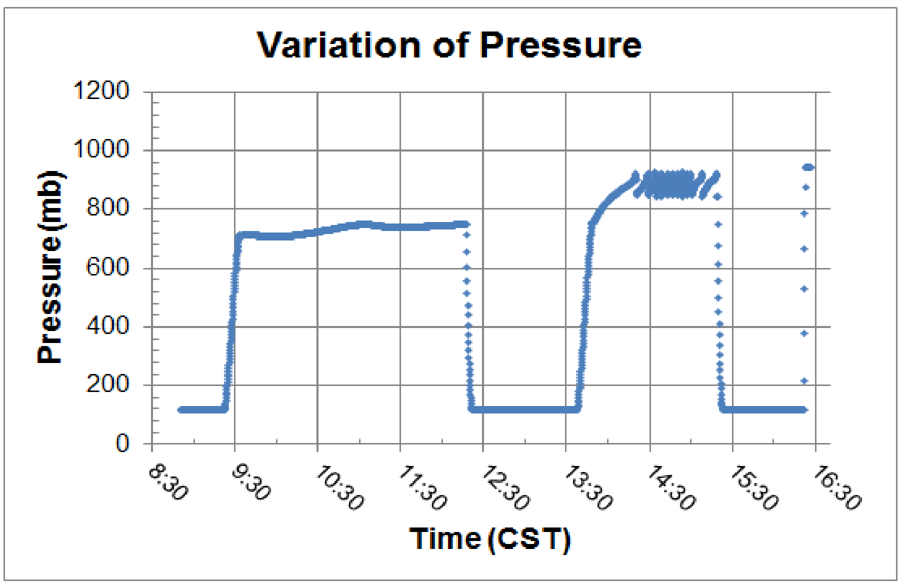

Fig.4 (a) Variation of pressure in the thermal vacuum chamber with time measured by the payload

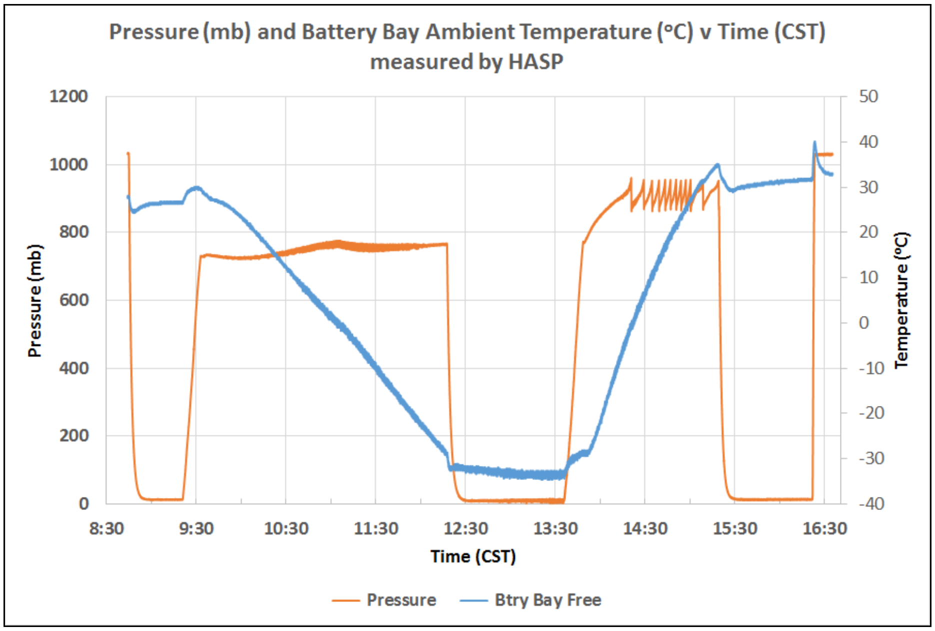

Fig.4 (b) Variation of pressure and ambient temperature in the thermal vacuum chamber with time measured by the HASP. Data courtesy: Mr. Doug Granger, HASP, LSU.

The resistance of 8 sensors in box #1, 2 and 3 was measured during the thermal vacuum test and are shown in the fig.5 (a), (b) and (c), respectively. It was observed that the resistance of all sensors was nearly constant during the test. It was also found that the resistance was slowly decreasing with time after 14:30 (CST). The ambient temperate in the chamber was increased at14:30 for about 2 hours. Due to the semiconducting properties of the sensors, it was expected that its resistance should decreased with increasing of temperature. However, that variation was reasonably small.

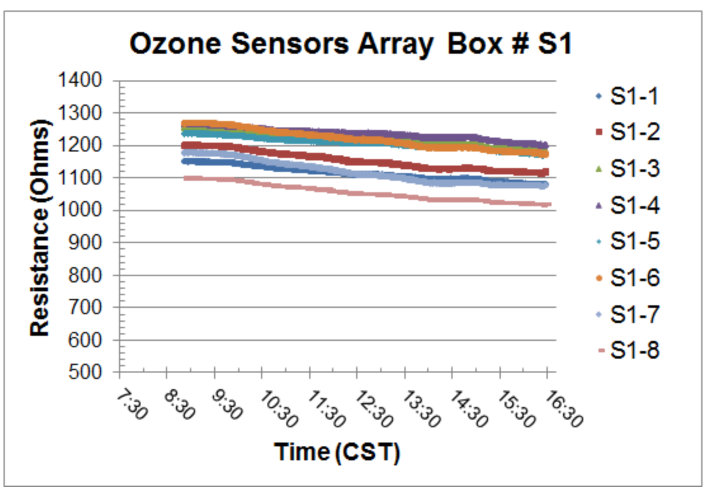

Fig.5 (a) Variation of resistance of gas sensors of sensors box #S1 with time during the thermal vacuum test

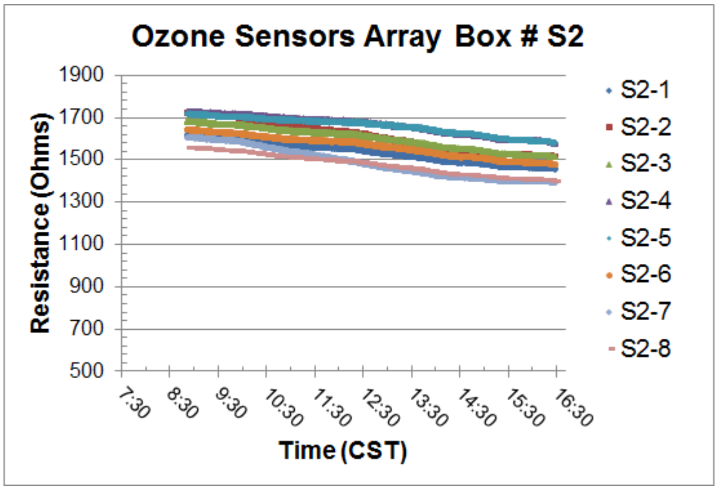

Fig.5 (b) Variation of resistance of gas sensors of sensors box #S2 with time during the thermal vacuum test

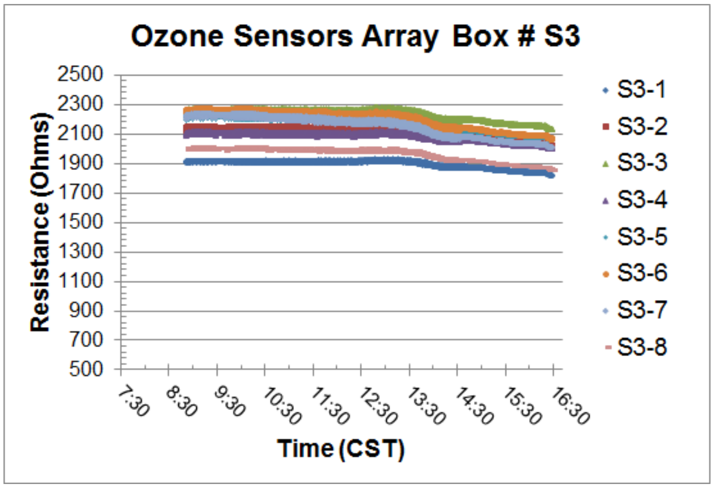

Fig.5 (c) Variation of resistance of gas sensors of sensors box #S3 with time during the thermal vacuum test

It was found that the sensors resistance was quite stable during the low temperature test cycle at time 11:00 to 14:30. The heater mounted on the back side of the sensors array was controlled by the on-off controller and maintained the temperature of sensors array constant during the low temperature test cycle. Fig.6 shows the variation of temperature of all three sensors arrays with time. It shows all three arrays remain at the constant temperature during the test. A small spike was observed around 15:00 to 15:15 due the sudden introduction of air in the chamber to increase the pressure in the chamber. The conduction of heat was not stabilized and disturbed with time due to turbulence of air molecules in the chamber.

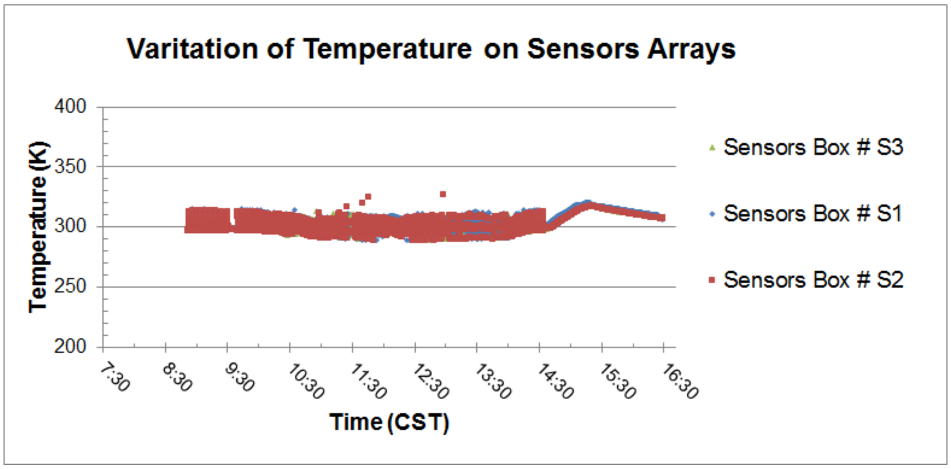

Fig.6 Variation of temperature of gas sensors of sensors box #S1, S2 and S3 with time during the thermal vacuum test

Fig. 7 shows the response of photo diode sensors mounted on sensors boxes with time. It was observed that all three photodiode sensors were in working condition. The variation of phot voltage with time was due to turning on and off the light generated by the incandescent bulbs as well as radiation heaters in the test chamber (Fig. 1(b)).

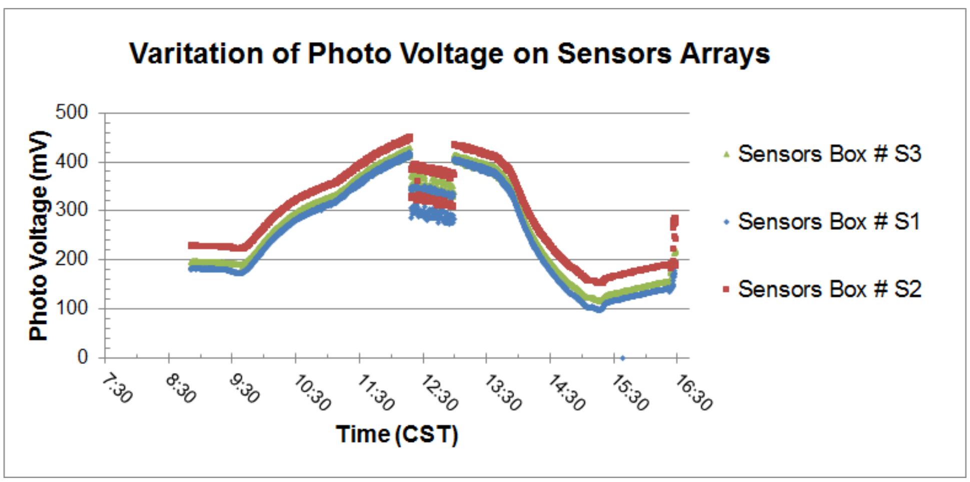

Fig.7 Response of photo sensors mounted on Sensors box #S1, S2 and S3 with time during the thermal vacuum test

The paload was sucessfully launched on Saturday, August 9, 2014 from the NASA-CSBF, Fort Summner, NM. All sensors worked well during the flight and measured the data. Data anlysis work is going on. We will report the results of the balloon flight in the next month report.