DataPigeon Results from Launch NS-56

The goal of DataPigeon is to log data to a separate module via a physical connection and have that module drop separately from the balloon so that data can be recovered quicker. The idea is a proof of technology concept so that programs such as NASA can use the same or a similar system as DataPigeon to drop experimental data from a research balloon without having to bring the balloon and its payload(s) back to the ground. For example, NASA has done several experiments where their balloon stayed in the atmosphere for many weeks, but cannot get the data from their payloads until they pop the balloon. With DataPigeon, NASA would be able to periodically drop data from their payload during the experiment and get data quicker.

For this launch, the goal for DataPigeon was to log data from a separate payload and in combination with a cutdown, perform a pseudo drop, pulling the physical connection out. In this launch, a Raspberry Pi 1 was used to log data and write it on an SD card. IRENE, a payload measuring radiation, was used to receive data and GANONDORF, a mechanical cutdown system, was used to release a loop of rope that dropped DataPigeon so that the data cable between IRENE and DataPigeon pulled out of the Raspberry Pi.

Several complications came up before, on the launch pad, and during the flight. Firstly, the periodic data packet from IRENE was not being properly read by the Raspberry Pi. It is believed that the problem is with the way IRENE sends its periodic data packet because the Raspberry Pi recognized that it was indeed receive packets, but was not reading them properly and that when a forced packet was sent from IRENE, the Raspberry Pi received that data perfectly fine. As a solution, the Raspberry Pi would log a timestamp when it received the "empty" packet from IRENE. Onsite, it was discovered that the Lipo board converting power from the onboard battery to the Raspberry Pi had a busted voltage regulator. Instead of outputting 5 volts, the regulator was outputting just over 1 volt. As a quick fix, power was instead sent through an Arduino and passed through the Arduino's onboard regulator and then to the Raspberry Pi. During the flight, the data log only recorded two timestamps of received data packets. The reason for this is undetermined as the Raspberry Pi successfully recorded multiple packets from IRENE in the lab and was on for several minutes with IRENE before the balloon took flight.

Despite these complications, there were some successes with the DataPigeon train. While one of the plastic sheets used to stabilize the DataPigeon train from twisting with respect to each other slipped out of its mooring on the actual DataPigeon payload, the other sheet stayed in. This sheet, while it did twist a little bit, prevented the train from spinning and causing damage to the data cable between IRENE and DataPigeon. Most importantly, during the flight, GANONDORF successfully released the extra wire, dropping DataPigeon. The data cable successfully pulled out of DataPigeon and remained on the flight. In summary, the mechanical system of DataPigeon performed better than expected.

Looking ahead to DataPigeon's next flight, the new iteration while likely use mostly the same system. A different data collection payload will be used, likely one with an Arduino on board. Additionally, it is hoped that a magnetic released usb data cable will be used to put less stress on the cable. Beyond that, the current idea is that DataPigeon will be physically attached to the data collection payload and drop completely from the string and deploy a parachute and land on the ground. Onboard would be a tracking system and the cutdown system.