

Purpose of GPS “Re-radiation” Experiment for University of Wyoming Atmospheric Science Department Research Aircraft: Beech King Air N2UW

Atmospheric research data acquired by N2UW’s onboard data acquisition system relies on Global Positioning System (GPS) referenced time and position to “tag” scientific data so that it can be precisely referenced in time and space. This allows the archived data to be compared with data acquired on other research platforms, such as ground stations or satellites, or data acquired in the same geographical location but at different times.

N2UW is kept in a University of Wyoming owned hangar when it is not flying research missions. This provides a sheltered location for aircraft and systems maintenance and protects the aircraft and the associated scientific equipment. However, the all metal construction of the hangar precludes the reception of GPS signals by the aircraft instrumentation. Hence a method is needed that will allow the aircraft science equipment to acquire the GPS signal while indoors.

Due to the sensitive nature of the scientific equipment operated, especially air chemistry or mass-spectrometer equipment, it is often necessary to run these instruments for an extended period of time in order to record time-tagged baselines and calibrations prior to a research mission. Running these instruments with the aircraft pulled out (GPS in view) is not always possible due to local weather, airport traffic or the complexity of the ancillary calibration equipment required. Re-radiation of GPS signals inside the hangar will allow the equipment to acquire GPS signals and time-tag baseline/calibration data inside the hangar. Additionally, some instruments require time-tagged post-flight calibrations for data continuity and quality control. General system maintenance that requires valid GPS referenced time or position will also be possible with re-radiation.

Additionally, the formation of ice on control surfaces is hazardous to aircraft operation. Local weather conditions are often encountered that would cause ice formation on the aircraft if it is moved from a heated hangar to sit outside for an extended period of time for scientific equipment warm-up and pre-flight. GPS “re-radiating” will allow acquisition of time and position inside the hangar so that the doors can be opened, bringing the aircraft to ambient outside temperature and allowing a quick departure to the research location, while providing time-continuous data acquisition.

The proposed GPS re-radiating kit, HNRRKIT-N/5/110, from GPS Networking, Inc. will allow for the accomplishment of the above objectives by allowing the acquisition of GPS signals inside the hangar to improve the quality of atmospheric data acquired by the research aircraft. GPS re-radiation will also contribute to the development of new scientific equipment to measure a variety of atmospheric phenomena.