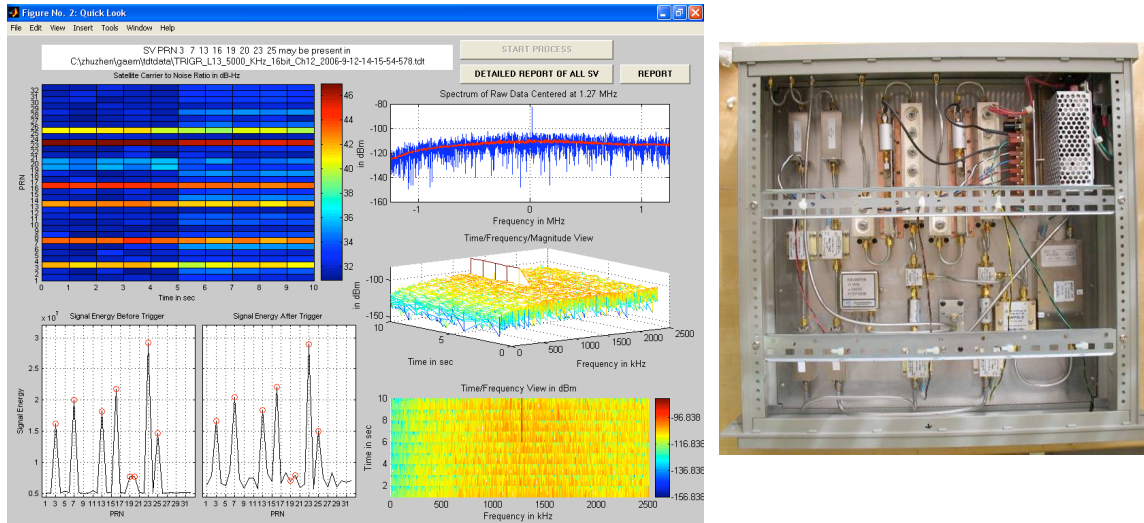


Remote-Controlled, Continuously Operating GPS Anomalous Event Monitor (GAEM)

PI: Frank van Graas, Ohio University

Sponsor: Federal Aviation Administration (FAA)



GPS Anomalous Event Monitor. Left: Processing results after injection of a tone jammer in the middle of a 10-second data set. Right: Instrumentation-Quality GPS Front End.

Continuous realtime monitoring of the Global Positioning System (GPS) to detect and flag satellite anomalous events remains a key factor in guaranteeing its integrity and availability for use in safety-of-life applications such as the Local Area Augmentation System (LAAS) for aircraft precision approach and landing. Currently available receivers focus on achieving the best measurement accuracies for a given update rate, and do not have the ability to provide details on loss-of-lock conditions.

Ohio University's Avionics Engineering Center has been conducting research and development in the area of GPS transform-domain receivers with one of the main focal points being signal quality and satellite anomalous event monitoring. To support GPS system design and analysis, remotely-controlled, continuously operating GPS Anomalous Event Monitors (GAEM) were prototyped and installed at Memphis Airport, FAA's William J. Hughes Technical Center in Atlantic City and at Ohio University. The GAEM stores radio frequency (RF), 14-bit GPS samples at a rate of 5 mega samples per second. Once an anomaly has been flagged by the GPS receivers, the GAEM creates a permanent record of the RF data starting at 25 seconds before the event and ending 5 seconds after the event. These samples are remotely accessed and post-processed using an extensive suite of GPS receiver algorithms implemented in MatlabTM, to determine the nature of the anomaly.

Further reading: S. Gunawardena, M. Uijt de Haag, F. van Graas and Z. Zhu, "Remote-Controlled, Continuously Operating GPS Anomalous Event Monitor," *Proceedings of the Institute of Navigation GNSS-06 Meeting*, Ft. Worth, TX, September 2006.