Date: 10/30/2012
Location: ACRC
Aircraft: Thor, GPS FASER
Pilot: Arion Mangio
Flights: 4 Thor, 1 GPS FASER Low Speed Taxi

Weather
Clear skies, winds down the runway around 10 mph.
METAR (Anoka County)

KANE 301850Z 36010G15KT 10SM SCT200 09/M02 A3012
KANE 302055Z 36010G16KT 10SM SCT200 11/M03 A3009

Adhika, Andrei, Arion, and Brian arrived at ACRC around 2:00pm to test a quaternion navigation filter on Thor during a manual flight and to gather closed-loop pitch doublet data to characterize the closed-loop response of the aircraft in the longitudinal axis. Additionally, two waypoint tracking algorithms were tested on Thor, an expanding square and a sector search. Finally, static and low speed taxi ground test data was gathered on GPS FASER for Adhika's research and to quantify the quality of GPS reception for the three receivers in an open sky environment.

Software used for this flight was trunk/Software/FlightCode rev 929

Thor flight 77 consisted of manual flight with a quaternion navigation filter running (EKF_15state_quat.c). The quaternion navigation filter appeared to be working well; however, our baseline EKF15 was used for the remaining tests. EKF15 using quaternions will be used in the future pending data review.

Thor flight 78 consisted of a pitch doublet pattern to characterize the closed-loop longitudinal response of the aircraft (theta_pattern_cmd).

Thor flight 79 was conducted using the revised waypoint guidance algorithm (path_track_newexpanding.c). This consists of an expanding rectangular pattern for the aircraft and appeared to work as expected.

Thor flight80 was conducted using the revised waypoint guidance algorithm (path_track_newsector.c). This consists of a sector search algorithm, which should have produced a clover-leaf flight pattern; however, the algorithm did not work as expected and needs further investigation and data review.

GPS FASER ground 8 was a low speed taxi test conducted to test the quality of the GPS receiver signal strength under open-sky conditions and low rates of movement.

Other software modules used were waypoint_tracker, and EKF_15state.

FLIGHT DATA

Thor Flight 77
Rx Data: A39, L4, F000, H000

Thor Flight 78
Rx Data: A67, L53, F000, H000

Thor Flight 79
Rx Data: A25, L430, F1, H000

Thor Flight 80
Rx Data: A26, L7, F000, H000

GPS FASER Ground 08

Issues Sector search waypoint algorithm did not work as expected, further data review and investigation is needed.