

IMUCalcs package

The goal of the IMUCalcs package is to expose inconsistencies between the velocity and location values that are computed by the Flight Controller. Velocity values are calculated using a different method than the FC. Comparing the IMUCalcs velocities to the original FC velocities can provide insights into the cause of erratic flight and/or a fly away.

DatCon applies IMUCalcs during the .DAT to .csv conversion. CsvView applies IMUCalcs by modifying the .csv that the PhantomHelp converter creates.

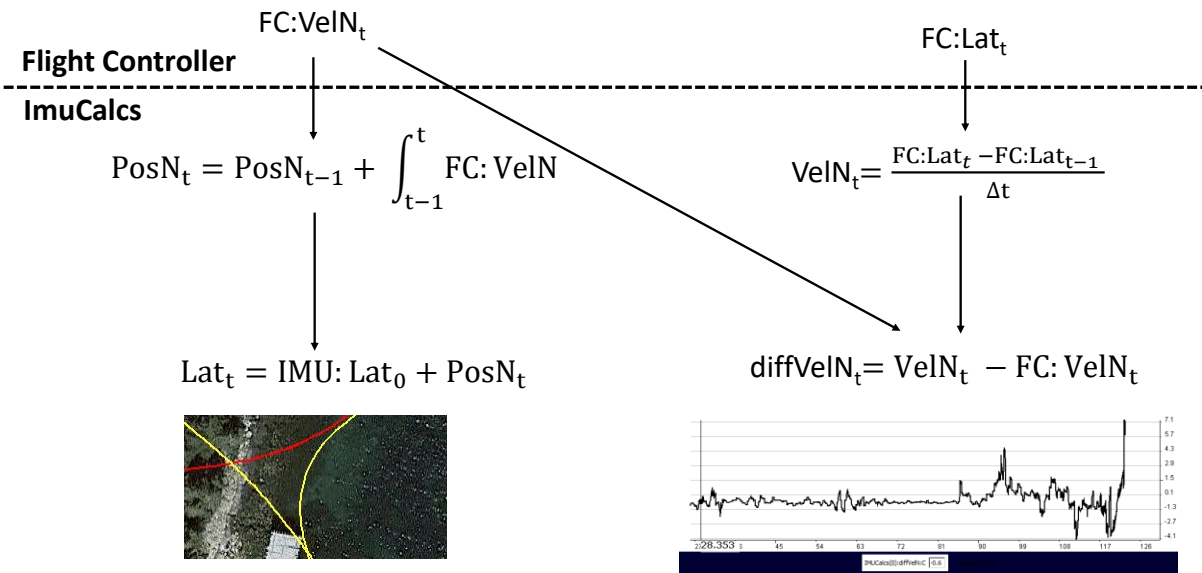
IMUCalcs uses these data

Flight Controller	.DAT	.txt
VelN	IMU_ATT1:VelN	OSD:xSpeed
VelE	IMU_ATT1:VelE	OSD:ySpeed
VelD	IMU_ATT1:VelD	OSD:zSpeed
Latitude	IMU_ATT1:Latitude	OSD:Latitude
Longitude	IMU_ATT1:Longitude	OSD:Longitude
RelativeHeight	IMU_ATT1:relHeight	OSD:height

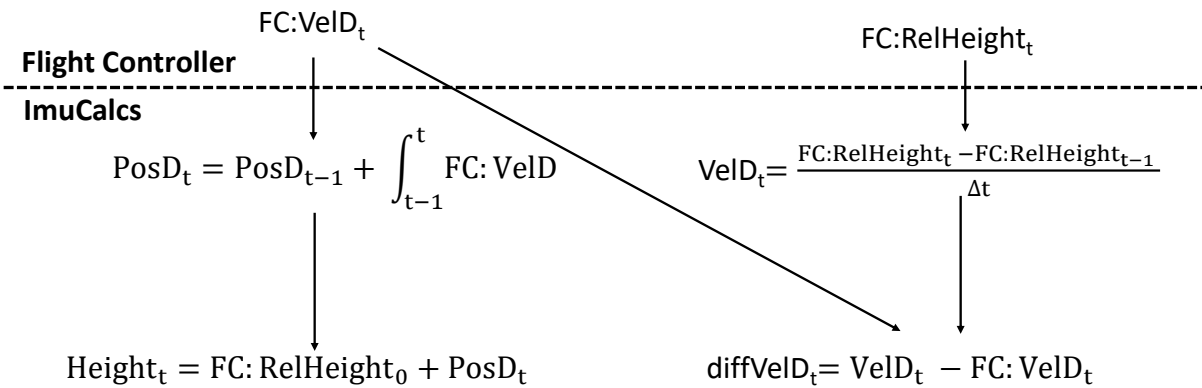
IMUCalcs creates these data

.csv created by DatCon or CsvView	
IMUCalcs:PosN	True north distance from initial position.
IMUCalcs:PosE	True east distance from initial position.
IMUCalcs:PosD	Distance below initial position
IMUCalcs:Height	-IMUCalcs:PosD
IMUCalcs:VelN	True north velocity
IMUCalcs:VelE	True east velocity
IMUCalcs:VelD	Down velocity
IMUCalcs:VelH	$\text{Sqrt}(\text{IMUCalcs:VelN}^2 + \text{IMUCalcs:VelE}^2)$
IMUCalcs:diffVelN	Difference between FC velN and velN computed by IMUCalcs
IMUCalcs:diffVelE	Difference between FC velE and velE computed by IMUCalcs
IMUCalcs:diffVelD	Difference between FC velD and velD computed by IMUCalcs
IMUCalcs:Long	Longitude
IMUCalcs:Lat	Latitude

Shown below are the latitude/VelN calculations. The longitude/VelE calculations are similar.



Here are the calculations for relHeight/VelD



Limitations

1. IMUCalcs calculates its velocity data by time differentiating the FC's location data. Better results can be obtained with an inertial solution based on accelerometer, gyro and magnetometer data. This is the method used by sar104 on the mavicpilots.com forum.
2. The IMUCalcs have limited usefulness for the MavicMini and MavicAir2 platforms. These platforms appear to apply more weight to the GPS data when calculating velocity and position. This significantly reduces the likelihood that the FC's velocity and position data will be inconsistent.