0.0.0.0.1 Gyroscope

The *Gyroscope* subsystem is depicted in Figure **??**.

It reads raw data from the gyroscope driver for each of three-dimensional axes [*x, y, z*]. For each axis, sensor bias is first removed. Then, the data is reformatted into SI units representing angular velocity ω. This is performed in the *Data Conversion* subsystem, which is depicted in Figure **??**. A discrete low-pass bessel filter is used to reduce sensor noise. [*The effect of this is untested.*]

An integrator is used to also determine angular position θ.

0.0.0.0.2 Bias

The gyroscope sensor reading inherently has bias. This bias causes inaccurate angular velocity ω readings. More importantly, since angular position θ is determined via the integration of angular velocity ω, the bias causes the angular position θ calculation to incorrectly increment after each time interval. This ultimately causes the angular position θ measurement to continually diverge.

Since the controller relies on the observance of the angular position, this inaccuracy must be mitigated as much as possible.

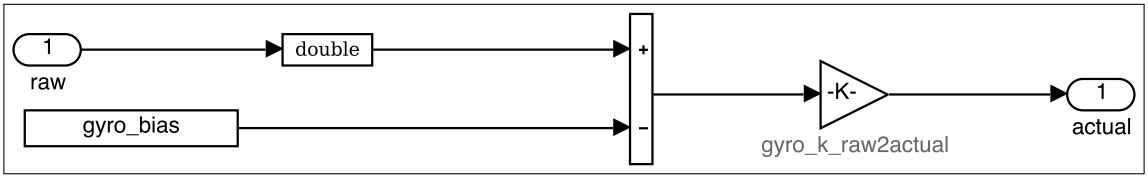

Figure 0.1: [minseg_M2V3_2017a:Plant:Hardware]: Gyroscope/Data Conversion

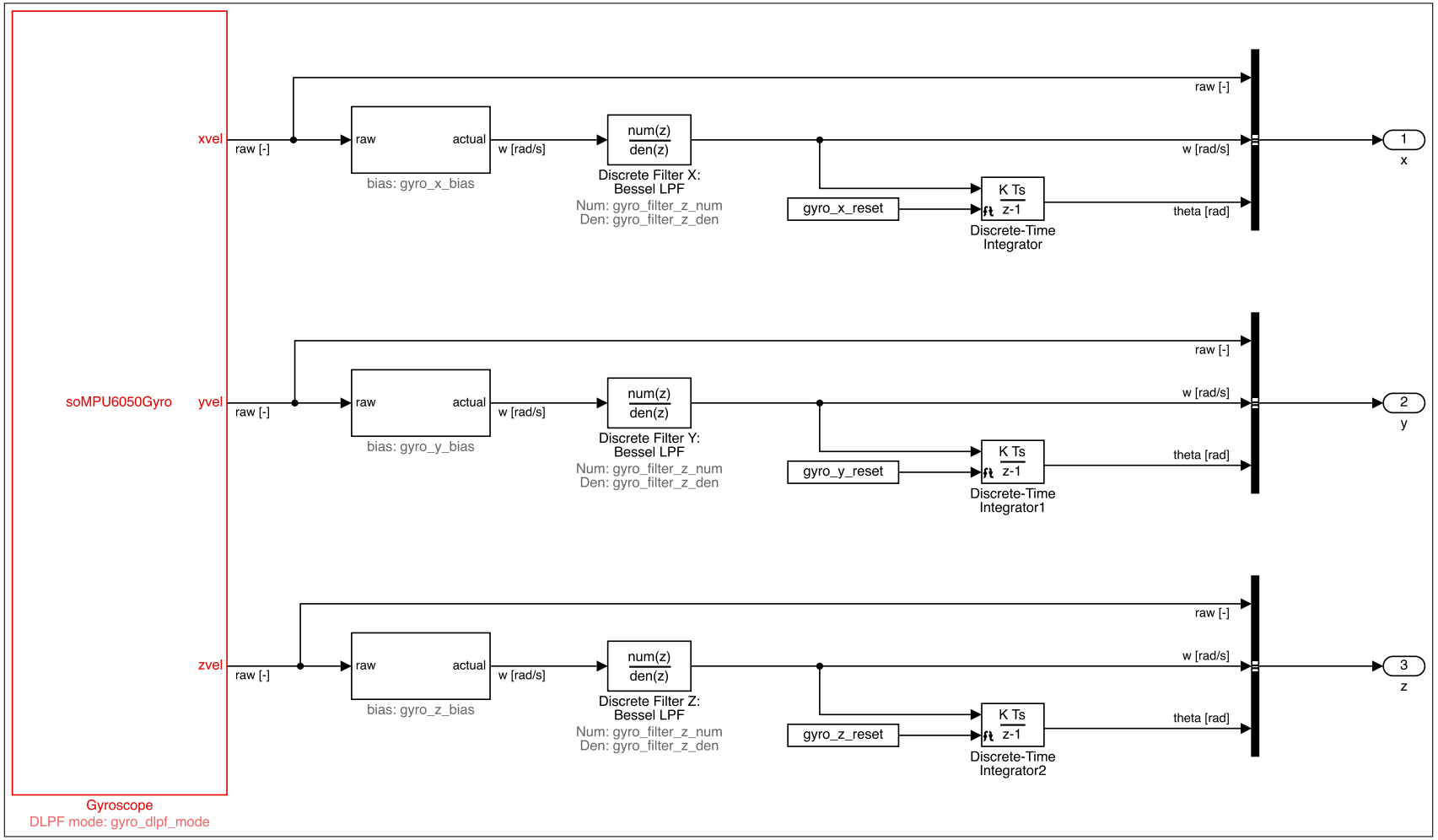

Figure 0.2: [minseg_M2V3_2017a:Plant:Hardware]: Gyroscope